Indian and Northern Affairs Canada

Submission on the Technical Adequacy of the
Draft Environmental Impact Statement

Prepared for the
Nunavut Impact Review Board

DORIS NORTH GOLD PROJECT

Canada

August 15, 2005

EXECUTIVE SUMMARY

Miramar-Hope Bay Ltd. (MHBL), the Proponent, has proposed to build, operate, and reclaim a 30-month gold mine called Doris North at a site near Umingmaktok. The Nunavut Impact Review Board (NIRB) is leading the environmental assessment (EA) for this proposal, and has asked interveners to review the adequacy of MHBL's draft environmental impact statement (EIS). A component of the EIS is considered adequate if it contains enough detail and information to perform a full technical evaluation. The next phase, the technical review, evaluates the conclusions that are made by the Proponent, based on the data and assessment methods that are presented.

Indian and Northern Affairs Canada (INAC) is the lead federal authority for the EA of this project. INAC works with its partners in the Government of Canada to ensure that the best federally-coordinated advice is provided to NIRB. INAC's trigger for this EA is the landlease that MHBL will need for the proposed jetty. INAC also has regulatory jurisdiction in the areas of water management, and a mandate to help improve the lives of Nunavummiut through economic and social development.

INAC has completed its adequacy review and has found areas that are deficient. Our results have been categorized by the five primary areas of concern that NIRB originally identified after the Final Hearings for the first, unsuccessful, Doris EA, which ended in late 2004. At a glance:

- The Design of the Jetty: **Adequate**
- Impacts to Wildlife, Including Cumulative Effects Assessment: **Uncertain**
- The Alternatives Assessment for use of Tail Lake for Tailings Disposal: **Uncertain**
- Tail Lake Water Quality and Water Management Strategy: **Deficient**
- Socio-Economic Impact Assessment (SEIA): **Deficient**

In preparing for this adequacy review, an internal review of the Department's key concerns in the last EA (presented in a June 25, 2004 submission to NIRB) was conducted.

Adequacy has been achieved for the jetty in areas related to our jurisdiction. Due to a number of points of clarification, which were discussed in information requests submitted to NIRB on August 9, 2005, we are currently unable to determine whether the cumulative effects assessment as presented is adequate. Additionally, there is a level of detail lacking in the alternatives assessment, because it is possible that not all reasonable alternatives for tailings disposal have been considered.

Significant deficiency has been identified in regards to tailings impoundment and the socio-economic impact assessment (SEIA). Regarding the former, the

strategy for tailings impoundment proposed by MHBL is likely to work, but there is a good chance some components of it may not. Therefore, an integrated adaptive management plan is needed, so that the interveners can know how the Proponent will respond if one or more components of the tailings management strategy fail. The most probable areas of failure in the tailings impoundment strategy include uncertainties in the water balance, distribution and movement of underwater tailings, predictions on the level of dissolved materials, and the potential and impacts of shoreline erosion.

Regarding the SEIA, the Department has found that data from the past experience of each of the key communities with mining projects is needed in order to anticipate the effects that another mining project would have on these same communities and same households. As such, the SEIA does not have the necessary detail to allow for an independent assessment of determine if the diversity of values and knowledge held by residents of the affected area have been reflected in the draft EIS. Without a traceable and reproducible analysis of how valued socio-economic components (VSECs) were chosen to appropriately reflect the communities' input, as well as an analysis of the impacts prior to mitigation, it is not possible to evaluate MHBL's conclusions, including their proposed mitigation and monitoring strategies. It must be noted that the effects evaluation, mitigation measures, and monitoring needs of VSECs required in NIRB's guidelines have *not* been included in the two VSECs evaluated by MHBL.

INAC wishes to thank NIRB, the Proponent, and the other interveners for what has so far generally been a functional, efficient, and highly communicative EA. The quality of information provided is markedly improved over the previous EA.

TUKIMUAKTITIYIN NAITUMIK UNIPKAGIN

Miramar-Hope Bay Ltd-kun uyarakhiuqtin havaaqarumayun, napaqtiriyumakmata, aulapkaklugulu, utiqtivaaqlugulu ilitquhiraluaganun 30-ni tatqiqhiutini kulmik uyarakhiuqvik taiyauyok Doris North-mik nunami haniani Umingmaktum. Nunavumi Avatiliqiyin Katimayin hivuliqhuqtun avatauyumik ilituqhaqnigagun havaariyauyumayukun, apiqhuikmatalu ilauyumayun ihivriuquvlugu namakmagaa Miramar-kun titiraqaaqhimayaan avatiliqinikun aktuqniganik uqautauyunik. Ilauyuq avatiliqinikun aktuqniganik uqautauyuni namagiyauyuq piqaqan naunaipkutautiaqtunik hivuniqhiyutikhaniklu naunavyaktunik ilituqhariagani. Tukliq havaakhaq, naunavyaktunik ilituqhaknigagun, naunaiyaiyutaukman qauyimaliqtainik Havaaqarumayun, atuklugin naunaipkutin ilituqhaqnikulu havaamikun ukautigiyatik.

Inuliqiyin Kavamatuqani hivuliqhuiyun ihumaqhuqluaqtun Avatiliqinikun Ilituqhaknigagun uma havaariyauyumayukun. Inulikiyin Kavamatuqani havaqatigiyain ikayuqtigiyatik Kavamani Kanatami nakuniqhaq kavamatuqanin ihumaliurutikhak tuniyauyaagani Nunavumi Avatilikiyinun. Inuliqiyin Kavamatuqani havaagiyaagani una avatiliqinikun ilituqhaknigagun nunanik aturiaqaqmata Miramar-kun uyarakhiuqtin higinuamik aturumakmata. Inuliqiyin Kavamatuqani maligatigulu ihumaqhutikakmikmata imauyun atuqnigagun, havaaqaqhutiklu inuhiqatiaqpaliriagani Nunavumiun maniliurutikhatigun inuhiqnulu pivaalirutikhatigun.

Inuliqiyin Kavamatuqani iniqhihimalikmata naamatiaqmagaa ilituqhaknigagun qauyimaliqhutiklu ilaginik ihiutunik. Iniqtavun talimanun atautimiiliqtitavun ihumalutigiyauluaqtun Nunavumi Avatiliqiyin uqaqaaqhimayainik Kiguliqmi Naalaktititilugin hivuliqmi, iniqhimagitumi, Doris-kun Avatiliqinikun Ilituqhaknigagun, ihulihimayumik 2004 nuguliqtilugu. Takugiaqlugin:

- Qanurituunikhaa Higiuyum: **Namaktuq**
- Aktuqniginik Umayunik, Ukualu Amigaiqpaliayun Aktuqniginik Ilituqhaknigagun: **Naunaqman**
- Ahiagun Atuqnigagun Ilituqhakniga Tahiq Attaguuqvikhaq Uyaqiqivikmin: **Naunaqman**
- Attaguqvikhaq Uyaqiqivikmin Imariyaa Qanurituniga Imauyuniklu Munariyaagani Atulirumayainik: **Naamaginman**
- Inuhiqnik Maniliurutikhaniklu Aktuqnigagun Ilituqhakniga: **Naamaginman**

Ihuaqhaitilugin umiga Naamakmagaa ilituqhakniganik, talvani timiuyumi ilituqhakniganik Piliqiyin ihumaluutigiluaqtainik kiguliqmi Avatiliqinikun Ilituqhaknigagun (uqautauyuq June 25-mi 2004-mi tuniyauhimayumi Nunavumi Avatilikiyinun) havaariyauhimayuq.

Naamainaqtuq higinuaq atuqnigagun ihumaqhutigiyaptigun. Ilagin huli naunairiakakmata, uqautauhimayun hivuniqhiyutikhanik piyumayainik Nunavumi

Avatiliqiyin August 9-mi 2005-mi, taya naunaqman amigaiqpaliayun aktuqniginik ilituqhaknigagun tuniyauhimaliqtuq, naamakmagaa. Ilaalu, piqaginman naunaiyautinik ahiagun atuqnigagun ilituqhaknigani, tamaita ahiagugutaulaqtun atuqnigagun attaguuqvium uyaqiqivikmin ihumagiyauhimaginmata.

Naamatiaginigin uqautauhimaliqmata attaguukvium uyaqiqivikmin qanurinigagun inuhiqniklu maniliurutikhaniklu aktuqnigagun ilituqhaqnigagun. Hivulikun, atulirumayain attaguukvikhamik uyaqiqivikmin Miramar-kun ihuarunaqhiyuq, kihiani ilagin taimainiaginmata. Taimaitilugu, ilaqaqtuq atuulaaqtuqlu munariyutinun paqnaiyautinik piyariaqaqtun, ukua ilauyun qauyimayaagani qanuq Uyarakhiuqtin upiyutiqaqniaqmagaa atauhik amigaituluuniin havaariyauyumayun attaguuqvikun uyaqiqivikmin atulirumayainik ihuilitpata. Ihuiliyutaulaqtun attaguuqvium uyaqiqivikmin atulirumayainik imauyum qanurilivalianigagun, hiamayaktiknigagulu, aulanigagulu imaqmiuyun attaguuqtan, nalautaqtailu nugutpalianikhagun hunavaluin imaqmi, hinaalu nugutpalianiaqan tatim qanurilivalianiaqmagaa.

Uvuuna inuhiqnik maniliurutikhaniklu aktuqnigagun ilituqhaqnigagun, Piliqiyin qauyimaliqmata ukua naunaipkutin atuqhimaliqtain atuni nunaliin uyarakhiuqtukaqniaqtilugu piyariaqaqmata qanuq aktuqniqaqniaqmagaa ukua nunaliin atautin iglumiyulu ahiinik uyarakhiuqtuqaliqan. Taimaitulugu, inuhiqnik maniliurutikhaniklu aktuqnigagun ilituqhaqnigagun naunaitiarutauginman ilikun ilituqhariagani naunaiqlunilu ukua aalatkiin inuyutauluaqtunik qauyimayainiklu nunaliin piqagitpan titiraqaqhimayumi Avatiliqinikun Aktuqniganik Uqautauyumi. Naunaiyatialimagitpan qanuq inuyutauluaqtunik maniliurutauyuniklu piqaqnigin tikuaqtauhimakmagaa ihuaqtukun nunaliin uqauhiin takukhauyaagani, unalu ilituqhaqnigagun aktuqniginik ihuaqhaqtaugiaqtinagu, ayuqnaqman naunaiyatiariagani Miramar-kun ihumagiyain, ukualu ihuaqhautikhanun amiriyutikhanulu atulirumayainik. Qauyimayauyariaqaqtuq qanuq aktuqniganik naunaiyautin, ihuaqhautilu, amiriyutikhalu piyariaqaqtun inuyutauluaqtunik maniliurutauyuniklu piqaqnigin aturiaqaqtun Nunavumi Avatiliqiyin maliruagakhaini ilauhimaginmata malrukni inuyutauluaqtunik maniliurutauyuniklu piqaqnigini Miramar-kun ilituqhaqhimyaini.

Inuliqiyin Kavamatuqani quyagiyumayain Nunavumi Avatiliqiyin, Uyaraqhiuqtilu, ahiilu ilauyun aulatiaqman, ihuaqhunilu, uqautautiaqhunilu avatauyumik ilituqhaqniga. Qanurinigin hivuniqhiyutikhan ihuaqhivaaliqtun kiguliqmin avatauyumik ilituqhaqniganin.

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1 Overview

Background

Indian and Northern Affairs Canada (INAC) received the Draft Environmental Impact Statement (Draft EIS) for the Doris North Gold Project, Nunavut Canada on June 13th, 2005. Upon request of the Nunavut Impact Review Board (NIRB), INAC prepared and submitted its review to NIRB on the project's Draft EIS ability to conform to the *original* Environmental Assessment Guidelines of October 15, 2002. Based on this conformity exercise, on July 21, 2005 Miramar Hope Bay Ltd. (the Proponent) submitted Supplemental Information to address the identified deficiencies. Following NIRB's review of the supplemental information, the Board was satisfied that the conformity deficiencies had been satisfactorily addressed to proceed to an adequacy review of the information and technical sessions to facilitate the understanding between the Proponent, the Board, and the Parties involved.

This adequacy (technical adequacy/ deficiency) review submission compares the Draft EIS, and related Supplemental Conformity submission by Miramar Hope Bay Ltd. (MHBL) with the Guidelines from the Doris Hinge Project. The adequacy review is intended to comment on the Draft EIS' ability to meet, as well as "observe the intent" of the guidelines. To determine this, the department involved a number of reviewers, including staff and outside technical support, and provided comments and recommendations in areas related to socio-economics, engineering, and physical sciences. The reviewers were asked not to draw conclusions on the validity of the proponent's conclusions regarding impacts or their significance; rather, determine what information is still required in order to further and complete a technical review of the project once the Final Environmental Impact Statement (Final EIS) is submitted.

Where the original project proposal was recommended not to proceed following environmental review, NIRB has required the Proponent to address five areas of previous significant deficiency within this review. The five explicit categories, as well as how the whole Draft EIS document has addressed the guidelines, is described from INAC's perspective in this submission.

The Nunavut Impact Review Board (NIRB) sent a letter dated July 13th, 2005 proposing technical meetings, scheduled for August 23-25th 2005 in Yellowknife NWT, to discuss all technical issues that Parties have discerned through their technical review of the Draft EIS. The technical meetings will result in a list, to be determined by NIRB, of requirements for the compilation and filing of a Final EIS. At the end of the technical meetings, the Board has asked that the NIRB staff discuss various Final Hearing procedural-related matters with the interveners, such as: timing of the Final EIS filing, Final Hearing venues, Final Hearing format, and the timing of the Final Hearing. This proposed procedural focussed meeting on August 25th will replace the pre-hearing conference meetings that typically occur in the affected communities.

As instructed in NIRB's letter of August 5th, 2005, the Board has introduced a step in the environmental adequacy review stage, prior to the technical meetings taking place, whereby all parties may ask the Proponent (via NIRB) specific questions for clarification purposes; information that will enable the parties to continue with their review of the Draft EIS. The series of information requests submitted to NIRB by INAC on August 9th, 2005 is appended to this submission as an Appendix. All requests for further information made by INAC, whether they are contained in this adequacy review submission or in the information requests submission, are grouped by relevant topic area, and include contextual information to help clarify the request, and recommendations on how best to address the uncertainty.

Mandate

The Doris North project falls on Inuit Owned Lands (IOL) administered by the Kitikmeot Inuit Association. Subsurface mineral rights are owned by Nunavut Tunngavik Incorporated. The only part of the project which falls on lands administered by INAC is the 90 meter jetty dock proposed to be built into Roberts Bay. INAC will issue a water lot lease for the bed of Roberts Bay occupied by the jetty under the *Territorial Lands Act*, should the project be deemed to proceed.

The remainder of the department's responsibilities for the project are related to the use of water and deposit of waste outlined in the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act.* The Minister will review the water licence issued by the Nunavut Water Board and INAC will enforce the terms of the licence.

Although INAC has no direct responsibility for the majority of surface and sub-surface rights in the project area, surficial and bedrock geology are relevant to discussions regarding Acid Rock Drainage, geotechnical aspects of tailings disposal, and hydrogeology issues. Consequently, these areas have been reviewed by department officials. As well, the department will examine project economics in order to quantify the risk of the project adding to Canada's mine-related liabilities for water, as per the Nunavut Mine Reclamation policy.

INAC also has a role to support Inuit in developing healthy, sustainable communities and achieving economic aspirations. This role predicates a key objective of Gathering Strength to support strong communities, people and economies. Additionally, the department has responsibilities laid out in its Sustainable Development Strategy that require, among other things, consideration of economic viability and social implication in decision-making.

In terms of the environmental impact statement assessment and regulatory processes the project is undergoing, the Minister has additional responsibilities laid out primarily in Articles 12 and 13 of the Nunavut Land Claim Agreement. The comments that follow are based on these departmental responsibilities.

It must be noted that Miramar Hope Bay Limited has significantly improved its collection and compilation of information for environmental assessment purposes. INAC has worked closely with the Proponent as they have worked diligently to enter the review process again. The department strives to work closely with NIRB, the Proponent, and all parties to provide the best advice for the responsible development of this project.

2 Lowering Tail Lake Before Deposition

2.1 Related NIRB Guideline

Guideline 4.11

2.1.1 Associated Draft EIS Section Numbers

SD A3

2.1.2 Rationale

The discussion of alternative approaches to tailings management in SD A3 describes subaqueous tailings disposal in Tail Lake that includes the potential for raising the lake level by an anticipated 1.4 m and a maximum 5.2 m behind two frozen core dams before returning the lake to its original elevation for closure. The information provided for this alternative states that, with the lake restored it its natural elevation, there will be a minimum 4 m of water cover over all of the tailings (assuming relatively flat tailings deposition). This is twice the minimum design water cover of 2 m.

Given that the natural lake level provides 4 m of water over the ultimate tailings elevation and that the anticipated range in water level for mine operations is only 1.4 m, it appears reasonable to contemplate an operating plan that might provide for subaqueous disposal without need for increasing the lake level with dams. Under such a scenario, the lake level would be lowered slightly to provide for some operating freeboard and tailings would continue to be deposited under water. Such an approach might provide the benefits of subaqueous disposal without the risks and costs associated with the construction, operation and closure of frozen core dams.

For example, raising the lake water level behind the two frozen core dams represents a risk that one or both of the dams might fail and release non-compliant water into the environment. This risk to the environment would be eliminated if the lake level were not raised above its' natural elevation. A possible large-scale mitigation measure that is common to both approaches to subaqueous disposal is the future construction of a dam (or of a larger dam) if it were necessary to provide substantially increased storage capacity for non-compliant water.

Because of the potential reduction in environmental risks, we feel that this "variant" of subaqueous tailings disposal should be considered by the proponent as an alternative approach to tailings management.

2.1.3 Recommendation

(1) That the proponent provide a conceptual review of the variant of subaqueous tailings disposal described above (i.e., without a planned

raising of the lake level) that is similar in scope to the two alternatives presented in SD A3.

3 Adequacy Issues Relating to the Proposed Tail Lake Water Management Strategy

3.1 Freshwater Outflow Conditions

3.1.1 Related NIRB Guideline:

- 4.10.1.5, Water Balance and water management plan
- 4.19, Data Analysis and Reporting
- 4.21.1.2, Impact Assessment – Tailings Pond
- 4.21.2.3, Impact Assessment – Water Quality
- 4.24.1, Environmental Management and Mitigation, Tailings Disposal

3.1.2 Associated Draft EIS Section Numbers

EIS 5.3.2, Technical Chapter 10, SD A2, Conformity supplement line 540, Tailings Water Management Strategy

3.1.3 Rationale and reasons of importance

The plan to mitigate water quality issues related to release of decant water from Tail Lake by mixing with Doris Creek flow requires a method of accurately estimating Doris Creek flow. This creek may freeze to its bed at the outlet of Doris Lake and, regardless, likely contains ice blockage that extends into the spring runoff period. As this brief period experiences the greatest flow during the year, and therefore the best opportunity of releasing Tail Lake water, several weeks of lost opportunity would result if accurate estimates of Doris Creek flows are not possible because of a partially ice-filled channel.

MHBL recognize this and suggest that "…flows in Doris Creek will commence as soon as practical…", and further suggest that "Real-time monitoring may comprise a pressure transducer … discharging through a calibrated v-notch weir." The approach therefore, is to wait until open water conditions prevail and to make no attempt to take advantage of high flows during ice conditions in the channel.

MHBL have not made adequate effort to develop an understanding of Doris Lake outflow during the brief, spring high-flow period when the outlet channel is ice-filled, or partially ice-filled. This is considered to be an important information gap that relates to assessing the effectiveness of a proposed mitigation measure.

Further, in order to adequately assess the impacts of the Tail Lake discharge on the downstream receiving environment, total loadings along with concentrations are required. This is particularly important when looking at the overall

environmental assessment of ongoing discharge on the ultimate receiving environment such as Roberts Bay.

3.1.4 Recommendations

(1) Characterize ice conditions along Doris Creek at, and immediately downstream of Doris Lake outlet.

(2) Characterize ice conditions at the downstream waterfall. Perhaps the flow control offered by this feature would provide an opportunity to estimate flows at an earlier stage than at some upstream point.

(3) Characterize flow conditions within the ice cover during the breakup period.

(4) Have as an overall objective, the development of a reasonably accurate method of estimating Doris Lake outflows during spring when the channel is ice-filled, so that discharge from Tail Lake can commence as early as possible.

(5) Provide as part of their Water Quality Model total loadings of all the modeled parameters for each of the scenarios investigated.

3.2 Insufficient Data Set Utilized for Baseline Water Quality Data

3.2.1 NIRB Guidelines

- 4.10.1.5, Water Supply and Management
- 4.12, Description of Physical Environment
- 4.19, Impact Assessment Methodology
- 4.21.1.2, Processed Ore Containment and Tailings Ponds
- 4.21.2.3, Water Quality and Quantity

3.2.2 Associated Draft EIS Section(s)

EIS 4.2, EIS 5.3.2, Technical Chapter 10, SD A2, C1-C4

3.2.3 Rationale

Water quality baseline data was collected at the site from 1995 to 2000 and 2003 from a variety water bodies at different sampling frequencies and seasons. In Supplemental Document A2, it is stated that “a review of those results indicated that supplemental monitoring would be required to assess seasonal changes in water quality and to remove any ambiguity in the results associated with limitations in detection limits and quality assurance and quality control.” A more intensive program was carried out in 2004. All of this data has been provided as part of the Draft EIS submission in the attached support documents.

However, only the 2004 data has been used to represent the background water quality in the water quality model. This prevents any assessment of inter-annual variations in the water quality at the site. Although all of the previous data is provided as part of the EIS there is no discussion on annual variation provided. It is important to the review of the DEIS that to understand whether the 2004 data is representative of general conditions at the site.

3.2.4 Recommendations

(1) MHBL should use all of the available water quality data to provide an assessment of the inter-annual variations and trends in the site water quality.

(2) MHBL should provide a discussion on how well the 2004 data represents the baseline conditions at the site (i.e. similar or different to previous years for key water parameters and adequacy of using it to define baseline conditions).

3.3 Settling Behaviour of Fines in Tail Lake

3.3.1 Related NIRB Guideline

Guideline 4.21.1.5, Natural Drainage Diversion; and, 4.24.1, Environmental Management and Mitigation Draft EIS.

3.3.2 Associated Draft EIS Section Numbers

Draft EIS. Conformity discussion lines 405 and 540

3.3.3 Rationale and reasons of importance

Tailings physical characteristics have been documented, but there does not appear to be any detailed analysis that addresses the deposition potential of the fine-grained portion of the tailings material in Tail Lake.

Quantitative methods are available and MHBL should use these to predict deposition of fine-grained sediments based on expected retention times and impact of wave action on keeping these sediments suspended. This is an important aspect of assessing the likely effectiveness of the proposed mitigation strategy.

3.3.4 Recommendation

1) Please demonstrate, quantitatively, predictions of sediment deposition rates, retention rates, and granular movement from wave action.

3.4 Risk of Long Term Movement of Tailings Particles

3.4.1 Related NIRB Guideline:

Guideline 4.24.1, Environmental Management and Mitigation, Tailings Disposal

3.4.2 Associated Draft EIS Section Numbers

Draft EIS. Conformity supplement line 540, Tailings Water Management Strategy

3.4.3 Rationale and reasons of import

Tail Lake morphology (contours) shows that much of the lake is presently shallow "…with a maximum depth of 6 m in the widest section … between 1 and 3 m deep (southern area of lake)…". Total slurry solids deposited in the lake over a two year operating period will total about 640,000 m^3, which will displace water and increase lake levels in the order of 0.9 m. Slurry will be deposited in the deeper lake areas, with deposit depths limited to where water depth is at least two metres. Normal lake level rise is about one metre during the summer. Whether it takes 9 years or 25 years before the north dam is breached, the ultimate goal will be to return Tail Lake to its original outlet condition. Of concern is the potential for deposited material to be re-suspended in response to wave action, with the possibility that this material is transported into Tail Creek.

The most likely scenario for re-suspension of tailings material would be during a drought period when several consecutive years of below average runoff would see a corresponding lowering of lake levels. It is recommended that the following tasks be undertaken to determine the risk of wave action eroding deposited tailings material in the post-closure period.

3.4.4 Recommendations

(1) Develop a realistic estimate of Tail Lake bed contours after two years of tailings deposition.

(2) Assuming the current lake outlet condition after breaching of the North dam, conduct water balance modelling that includes up to five consecutive years of below average runoff (drought) to determine potential extreme low lake levels.

(3) Generate potential maximum wave heights and assess the risk of deposited tailings material being eroded.

(4) Also include the possible scenario of lake ice, which could be two metres thick, freezing to the tailings material during a drought - affected lake level, and ultimately seeing this material lifted and deposited in another area of the lake by wind-shifted ice floes.

3.5 Storage Optimization in Tail Lake

3.5.1 Related NIRB Guideline

n/a

3.5.2 Associated Draft EIS Section

SD A.3, Section 2.2.1, SD A.2, Section 2.5

3.5.3 Rationale

The discussion of subaqueous tailings disposal in SD A.3, Section 2.2.1 states that “The primary hydraulic design criteria for the containment dams have been based on a rigorous water balance for the facility” and “based on this information the full supply level (FSL) of the dams was set at an elevation of 33.5 m”.

The discussion of the referenced water balance in SD A.2, Section 2.5 confirms that “the primary purpose of the water balance was to determine an appropriate height for the containment dams”. Section 2.5 then states that “through an iterative procedure, and in consultation with MHBL, it was determined that an optimal design FSL in Tail lake would be 33.5 m”. Section 2.5 then presents the implications of this selected FSL in terms of the length of time for filling of the reservoir to the FSL under various climate and discharge scenarios.

The selection of the design FSL is a key design factor that controls many issues that are important to the assessment of environmental effects and mitigation measures such as the available storage for non-compliant mine water. For example, since the shoreline of Tail Lake is sensitive to permafrost thaw induced erosion, it is critical that the operating levels of the pond be kept as close to the existing lake levels as possible (28.3) to minimize potential erosion. It is, therefore, important to the review of the EIS to have a solid understanding of the optimization process that was undertaken by the proponent for determining the design FSL.

The quotes provided above are the only rationale that was located in the DEIS for how the design FSL was selected. This information is not adequate to provide a solid understanding of the process that was undertaken to arrive at a FSL of 33.5 m.

3.5.4 Recommendation

It is requested that MHBL provide a clear description of the process that was followed for optimization of the design FSL for Tail Lake, including all of the criteria that were considered.

3.6 Tail Lake Water Levels

3.6.1 Related NIRB Guideline

- 4.10.1.3 Processed Ore Containment
- 4.11 Alternatives (Including "No Go")
- 4.21.1.15 Impact Assessment, Temporary Closure, Final Closure and Reclamation Programs
- 4.28 Closure and Reclamation

3.6.2 Associated Draft EIS Section Numbers

- DEIS sections 2, 3.1, 3.2.1, 9
- Technical Report Chapters 3, 4, 5, 6
- Supporting Documents (SD) A1, A2, A3, B2, G1.
- Non-conformity supplemental data Appendix F and H

3.6.3 Rationale and Reasons of Importance

Frozen core dams constructed of crushed rock obtained from a nearby quarry is proposed, by MHBL, as the preferred means of providing long term storage for mine tailings. SD A1 provides the conceptual design of the proposed frozen core dams. There are several technical issues that need to be addressed with respect to the dam design, which have been put in the form of Information Requests that have been previously submitted to NIRB.

There are also several adequacy deficiencies as follows:

There is inadequate discussion provided in SD A1 on justification for how much water cover is required over the tailings. The criteria used mentions that 0.3 m is sufficient to prevent oxidation of tailings and that 1m is the minimum required to prevent tailings re-suspension by wave action on the basis of "rules of thumb". More technical backup is required to justify the minimum water depth, since the present analysis would indicate that no additional water cover is required. This has implications on the overall height of the dam required and the extent of the flooded area affecting shoreline stability.

If water levels in Tail Lake do reach the proposed FSL of 33.5, there is only 1.0 m of freeboard to the top of the GCL liner, which is also the top of the frozen core. Therefore, the predicted wind induced waves would have a run-up which would exceed the top of the frozen core and potentially cause thermal damage inside the crest section of the dam depending on the duration of the event. The freeboard stated in SD A1 included the portion of the dam above the GCL which is not frozen and is needed for thermal protection of the frozen core. The GCL protects the frozen core along the upstream face of the dam, whereas the downstream side is unprotected and may be affected by wind driven water seeping through the crest under extreme conditions. For embankment dams (which includes frozen core dams), Canadian Dam Association (CDA) guidelines

require that the extreme steady state level is normally at or below the top of the impervious core and that if greater overtopping is permitted, the volume of overtopping flow and its potential effects should not endanger the dam. This has not been adequately addressed in the DEIS.

Closure of the tailings containment area is covered in SD G1. There is inadequate detail provided with respect to mitigating the shoreline erosion around Tail Lake and dealing with potential suspended solids in the water. In Section 1.2, the report mentions that over time the tailings will eventually become covered with sediment. There is no discussion on the potential depth of sediment related to the erosion assessment done in SD A3. Presumably all of the eroded shoreline material will be transported into the bottom of Tail Lake, thereby reducing the depth of water over the lake bottom, implying a potential for re-suspension if water depths become too shallow. SD G1 states that 25% of the shoreline was assumed to require some type of erosion protection and that an allowance for this has been included in the closure cost estimate. The information provided is inadequate to judge if the amount of reclamation cost estimated is reasonable for mitigating the potential shoreline instability and erosion.

3.6.4 Recommendations

To address the adequacy issues related to the Alternatives and Closure of the Tail Lake Tailings Containment Facility, MHBL should:

(1) Provide a clear, technical basis for the amount of water cover required over the tailings.
(2) Provide a clear, technical demonstration that, at closure, the water cover will be sufficient to prevent re-suspension of the tailings as well as any lakebed sediment that covers the tailings.
(3) Review the dam crest elevation and top of GCL/frozen core elevations with respect to freeboard requirements to ensure that the frozen core of the dam is protected under extreme water levels and wind conditions per CDA guidelines.
(4) Provide details in terms of conceptual plans and sections showing the mitigation measures proposed for stabilizing the shoreline of Tail Lake at closure. There was nothing in Section 6.1.6 or 7.5 in SD G1 regarding slope stabilization or erosion control.
(5) In SD G1, Table 1.1, add stable slopes around Tail Lake as a criterion for physical stability.

3.7 Potential for Shoreline Erosion around Tail Lake

3.7.1 Related NIRB Guidelines

4.10.1.3 Processed Ore Containment
4.10.1.5 Water Balance and Water Management

4.12 Description of Physical Environment
4.19 Impact Assessment Methodology
4.21.1.2 Impact Assessment- Processed Ore Containment and Tailings Ponds
4.21.2.1 Impact Assessment- Landscape and Terrain
4.21.2.3 Physical and Biological Environmental- Water Quality and Quantity
4.24.1 Environmental Management and Overview

3.7.2 Associated Draft EIS Section

- Draft EIS Sections 2.0, 4.1, 5.2, 5.3.2, 6.1. Also the impact of each project component is discussed in each VEC.
- Technical Report Sections 1, 2, 3, 5, 6, 8, 9-25.
- Supporting Documents A1, A2, A3, C1, C2, C3, C4, D1, F1, & G1.
- Non-conformity supplemental information Appendix F and H.

3.7.3 Rationale and Reasons of Importance

Flooding of frozen marine clays will occur as a result of operation of the tailings facility. It is expected that this material will thaw. MHBL has acknowledged this issue and reports that 5 case studies have been identified which pertain to the problem. These have not been included in the Supporting Documents. SRK/MHBL reason that there are no known scientific methods to assess the potential extent of shoreline erosion, nevertheless they come to the conclusion that the risk of excessive sedimentation associated with shoreline erosion is very low. As a result, an ”adaptive management approach” is proposed that will be carried out in Years 1-9 under the tailings water management strategy, after which it is predicted that water quality in Tail Lake will meet CCME guidelines. Potential impacts after closure could include chronic sediment release from the thawed and eroding lake shore.

MHBL has suggested that sediment concentration in Tail Lake may reach a maximum of 10.3 mg/L over the life of the project, including closure, due to shoreline erosion, which is less than the MMER limit of 15 mg/L. This is based on an unproven hypothesis for predicting shoreline erosion and is somewhat contradictory to MHBL’s earlier conclusion that the extent of shoreline erosion cannot be predicted. It is our view that there is a high risk of greater than predicted sediment concentrations in Tail Lake in both the short term and the long term. The water quality model does not include total suspended solids related to shoreline erosion as a modelled parameter.

There is no description of any monitoring program relating to shoreline erosion, either during operation or after the breach of the tailings dam. It is possible that the most severe erosion of the shoreline will occur after lowering of the water level. There is no description of a contingency plan to address sediment release into Tailings Lake. It is implied in the reclamation costing that there is an allowance for this work, however no scope of work is described.

At this stage there is inadequate information presented to estimate the scope of any contingency measures and the criteria under which they would be implemented.

With respect to water quality, inadequate information is provided on the suspended solids (TSS) predictions for the Tail Lake water during operations and closure. Specifically, additional information is needed in the following areas:

- The measured TSS in Tail Lake ranged from <1 mg/L to 4 mg/L under ice cover and from <1 mg/L to 17 mg/L during the summer (SD G1). There was no information provided that indicated what the TSS material in the water samples consisted of.
- In SD A3, the analysis of soil samples reported that the smectite portion of the soil samples would result in a TSS of only 0.34 mg/L but doe not relate this to the suspended solids material contained in the background water samples collected from Tail Lake.
- There is no laboratory testing data showing the actual settling times of particles in a water column using the marine clay/silt from Tail Lake shoreline.
- There is no information provided as to how the TSS concentrations in Tail Lake water predicted for each annual time step were derived.
- There is no discussion on what the actual sediment loading into Tail Lake may be as a result of shoreline erosion. This has important consequences on the depth of water cover over the lake bed and the possible re-suspension of material, particularly along the shallow foreshore areas, subject to wave action and long-shore currents.
- There is inadequate discussion on the proposed details for remediating the shoreline erosion and instability once it occurs and regarding the triggers which would initiate action to remediate the problem. The only contingency would be to hold water in the pond, but this may lead to a “Catch-22” situation where increased storage leads to further degradation, leading to the need for further lake raising to provide even longer retention time, etc.
- The effects of fluctuating water levels on rates of erosion were not considered. Operational water quality values for suspended sediment (which are modeled at near to background levels Table 4.1 of SD A2) may be optimistic. After closure, the erosion may continue for an extended time period until stable conditions are established.

If used as a basis for decision-making, the literature review of shoreline erosion should be exhaustive and include other known case studies, such as:

- The Big Spruce Lake reservoir, which undergoes relatively large annual water level fluctuations and where there may be some issues with shoreline instability. The overburden soils in the area consist of glacial deposits of till and glaciolacustrine silts and clays, possibly similar to those at the Discovery Mine that may be permafrost affected locally; and

- The Aishihik Hydro plant in Yukon, operated by Yukon Electric. This reservoir was raised and resulted in extensive areas of shoreline erosion, possibly with permafrost affected soils locally.

3.7.4 Recommendations

To address the adequacy issues, MHBL should:

(1) Determine the constituents making up the suspended solids in the background water quality samples at Tail Lake.
(2) Conduct shake flask settling tests using samples of the marine silt/clay soils from the Tail Lake shoreline to measure actual settling rates and the mineralogy of the suspended sediments at various times and use those results to assess sedimentation.
(3) Incorporate TSS loadings from shoreline erosion in the Water Quality Model for Tail Lake and Doris Creek and provide a sensitivity analysis. Provide details on how the TSS values were determined for each time step in the water quality model.
(4) Estimate actual sediment loading and sediment thickness in Tail Lake, assuming no mitigation is carried out, to assess the potential effects on water cover required to ensure a stable lakebed at closure.
(5) Provide copies of the relevant literature references cited and investigate additional case studies of lakeshore erosion.
(6) Provide details showing the proposed mitigative and preventative measures that may be required to stabilize the shoreline and prevent erosion and under what circumstances (trigger events) they would be constructed.
(7) Relate the potential water level fluctuations in Tail Lake to those experienced in other reservoirs to assess potential impacts on shoreline erosion.
(8) Include a terrain map showing the distribution of marine clay around the Tailings Lake.

3.8 Adaptive Management Plan for Shoreline Erosion

3.8.1 Related NIRB Guideline

n/a

3.8.2 Associated Draft EIS Section

SD A.3, Section 2.2.4, Section 4

3.8.3 Rationale

It is likely that there would be erosion of the fine-grained soils around the perimeter of Tail Lake as a result of increasing and subsequently varying the lake water level. The proponent acknowledges this and further states that there are no

scientific methods available at this time for predicting the extents or effects of this nature of erosion. This is an important issue for the review of the EIS because experience at other locations suggests that shoreline erosion can result in substantial environmental effects in some circumstances.

The proponent provides a review of relevant case studies, including a detailed assessment of the effects and mechanisms of similar erosional events at several local sites such as the nearby abandoned Roberts Lake Mine. From this review and investigation, the proponent develops a new hypothesis for predicting "a probable reasonable upper bound for the rate of shoreline erosion and associated increase in suspended sediment concentration" (i.e., in Tail Lake). The proponent suggests that the concentration of total suspended sediment in Tail Lake will not exceed 10.3 mg/L through the life of the project. The proponent's calculations using this new hypothesis are then used as the basis for developing a proposed Adaptive Management Plan for shoreline erosion.

In our view, the research and investigation reported by the proponent may lead to the development of valuable information for the monitoring and management of potential shoreline erosion at this and, possibly, other projects in the future. However, we believe that the suggested hypothesis for predicting upper bounds of shoreline erosion is a preliminary scientific work that should not be adopted as a predictive tool for this project at this time.

The mitigation measures that are proposed as possible responses to observed erosion are limited to those that would respond to the scale of event predicted under he proponent's new hypothesis. We feel that the scale of the proposed mitigation measures is, therefore, too limited and does not provide adequate recognition of the possibility of larger scale events and impacts. For example, the proposed adaptive management responses assume that mitigation measures, if required, can be successfully implemented before the water reaches full supply level. Some consideration should be given to mitigation of possible larger sale events that might result, possibly, from a greater than anticipated fraction of sediment that remains in suspension indefinitely under natural conditions.

Further, the proposed adaptive management approach suggest that the trigger for initiating mitigation measures would be the concentration of total suspended solids exceeding 15 mg/L in Tail Lake. This approach to establishing a threshold/trigger is "reactive". The threshold/trigger for the adaptive management response should be proactive and anticipatory of an environmental effect such that mitigation measures can be implemented in time to prevent that effect.

3.8.4 Recommendation(s)

(1) Provide a revised conceptual adaptive management plan for shoreline erosion that includes, among other items that may be relevant:

a. Consideration of a range of possible events from small scale to large scale;

b. Anticipatory thresholds/triggers that would initiate an adaptive management response;

c. A range of possible mitigation measures that would be considered for implementation depending in the nature and scale of the event and a description of a decision-making framework for selecting appropriate mitigation measures;

d. A commitment to re-evaluate and update the adaptive management plan on a regular basis; and

e. A commitment from MHBL to develop a final adaptive management plan as part of the regulatory process and to implement that plan prior to increasing the water level in Tail Lake.

3.9 Variations in Contaminant Loadings to Tail Lake

3.9.1 NIRB Guidelines

- 4.10.1.5, Water Balance and water management plan
- 4.19, Data Analysis and Reporting
- 4.21.1.2, Impact Assessment – Tailings Pond
- 4.21.2.3, Impact Assessment – Water Quality

3.9.2 Associated Draft EIS Section

EIS 5.3.2, Technical Chapter 3 and 10, SD A2

3.9.3 Rationale

MHBL has provided a sensitivity analysis as part of Updated Water Quality Model for low flow conditions, increases in background copper concentrations in Doris Creek, oxygen demand and sediment loadings. A key contribution to the contaminant loading in Tail Lake is the contribution from the blended mill effluent. Variations in the predicted quality of this effluent have not been assessed as part of the model sensitivity analysis. This information is needed to adequately assess the various discharge scenarios and the suitability of the discharge water management plan.

3.9.4 Recommendation

MHBL should provide a sensitivity analysis, with adequate documentation of methodology and approach, for variations in blended effluent. The analysis should include a description of the effects on MHBL's ability to release and retain water that would result from small variations in the effluent quality and

quantities entering the lake, water quality and quantities released from the lake, water quality and quantities flowing from Doris Lake and other relevant parameters.

3.10 Ability of Achieving CCME Detection Limits On-Site.

3.10.1 NIRB Guidelines

- 4.10.1.5, Water Balance and water management plan
- 4.19, Data Analysis and Reporting
- 4.21.1.2, Impact Assessment – Tailings Pond
- 4.21.2.3, Impact Assessment – Water Quality

3.10.2 Associated Draft EIS Section

Technical Chapter 3 and 10, SD A2

3.10.3 Rationale

An essential element of the proposed water management strategy for Tail Lake discharge is the ability to monitor water quality in Tail Lake and Doris Creek weekly in advance of commencing discharge. The Allowable Discharge Volume Ratio (ADVR) will be calculated based on copper concentrations in Tail Lake and Doris Creek. It will also be verified for other parameters to ensure that CCME guidelines are met in Doris Creek. Then a Target Discharge Volume Ratio (TDVR) will be set at 80% of the ADVR. MHBL states that they will have the necessary analytical equipment on site to monitor copper concentrations at CCME levels of detection. The ability to achieve, accurately, the low detection limits that will be required to successfully implement the effluent discharge strategy is technically challenging. MHBL has not adequately demonstrated that the proposed mitigation strategy can be successfully implemented through an on-site laboratory that is capable of accurately analysing water samples to the required detection limits.

3.10.4 Recommendation

Provide a description of the type of analytical equipment and the nature of training/experience of analytical personnel to be used along with a description of the laboratory set up to ensure that the necessary levels of detection can be accurately achieved on site.

3.11 Influence of Iron Carbonates on Buffering Capacity

3.11.1 Related NIRB Guideline

4.21.1.3, Waste Rock, Ore & Overburden Storage

3.11.2 Associated Draft EIS Section

Technical Report Section 3.8.5; Supporting Document B2

3.11.3 Rationale

Discussion on the tailings characteristics, provided in SD-B2, does not consider the influence of iron carbonates on the effective neutralization potential and lag to acid generation potential of the tailings streams. Iron carbonate is ineffective at buffering (NP) value. The report provides kinetic test data for the first 8 week of testing and additional data is referred to in the Technical Report, but is not provided or discussed in detail.

3.11.4 Recommendation

Provide the additional tailings kinetic test data, and discuss results provided in B2 in conjunction with those results, and the potential influence of iron carbonates on the effective buffering capacity of the various tailings streams.

3.12 Site Specific Water Quality Guideline for Copper

3.12.1 NIRB Guidelines

- 4.10.1.5, Water Balance and water management plan
- 4.19, Data Analysis and Reporting
- 4.21.1.2, Impact Assessment – Tailings Pond
- 4.21.2.3, Impact Assessment – Water Quality

3.12.2 Associated Draft EIS Section

EIS Chapter 5, Technical Chapter 10, SD F7

3.12.3 Rationale

As stated in the EIS and supporting technical documents, MHBL is committed to meeting the CCME water quality guidelines for the protection of aquatic life below the water fall on Doris Outflow. Furthermore, MHBL (Technical Chapter 10.2.5) states that naturally elevated concentrations of copper in surface waters in the project area may increase the possibility of discharge water exceeding the CCME guidelines for short periods of time (i.e., between effluent sampling events).

Additionally, MHBL proposes a site-specific water quality guideline for copper (0.0041 mg/L) that was derived using a biotic ligand model (SD F.7). MHBL proposes that this value would be used as a check to “provide an additional level of assurance that the discharge water from Tail Lake containing copper concentrations that are marginally above the CCME water quality guideline are not likely to result in effects on aquatic biota”.

In effect, the inference from the information in the DEIS is that the CCME guideline value of 0.002 mg/L copper is the commitment for Doris Outflow; however copper concentrations up to 0.0041 mg/L would not be considered harmful to the aquatic environment over brief periods of time, presumably in the order of one week. The derivation of 0.0041 mg/L is based, in part, on the beneficial aspects (as regards the toxicity of copper) of other constituents in the

water and appears to assume that those other constituents increase in proportion to an increase in copper.

No further discussion was located in the DEIS regarding how the proposed site specific guideline for copper will be applied in the Tail Lake discharge management plan. The site specific guideline has not been incorporated into any of the modeling scenarios.

It is important to the review of the DEIS to understand the proponent's intent for applying the proposed site specific guideline because of the (assumed) suggestion that the site specific guideline is protective of the aquatic environment over brief periods of time.

3.12.4 Recommendation

Clearly describe how the proposed site specific water quality guideline for copper will be applied at the site. This should include an assessment of the anticipated concentrations of other constituents in the effluent that may increase in proportion to copper.

4 Adequacy Issues Relating to the Proposed Jetty

Indian and Northern Affairs Canada (INAC) has not identified any adequacy issues regarding the jetty. A number of information requests have been communicated separately (August 9, 2005).

5 Adequacy Issues Related to Wildlife and Cumulative Effects

Indian and Northern Affairs Canada (INAC) is not able, at the present time, to determine adequacy for the cumulative effects assessment (CEA) presented in the draft EIS. A number of information requests (IRs), which requested the information needed to make this determination, was submitted on August 9, 2005 to NIRB.

6 Socio-Economic-Related Adequacy Issues

6.1 Identification of Valued Socio-Economic Components

6.1.1 NIRB Guidelines

- 4.5 Public Consultation

6.1.2 Associated Draft EIS Section

EIS Chapter 1; Technical Chapters 7, 8, 24, 25; SD E1; Supplemental Appendix

6.1.3 Rationale

1) Methodology for Selection of VSECs

Identifying appropriate Valued Socio-Economic Components (VSECs) sets the stage for data gathering, project design, mitigation measures, monitoring, and negotiation. Inadequate VSEC identification may mean that adverse effects are not as successfully avoided as they might be and that beneficial effects are not maximized.

It is unclear how the two socio-economic VSECs were chosen and what level of community validation of these two VSECs has been carried out. Suggestions that input into the selection of these VSECs that was provided through IQ Workshop, consultations, literature review and other processes are not presented in any of the Supporting Documents. No clear methodology leading to VSEC identification is provided in any of the supporting documents.

In the report from the IQ Workshop (SD E1), Section 6.7 is entitled "Valued Socio-economic Components." However, this section simply states that "while VSECs were discussed in both the interviews and the workshop, results relevant to VSECs are discussed in Robert Hornal & Associates (2003 b)." The presentation of VSECs in that document is inadequate to provide reasonable confidence that the VSECs identified—and which are substantively different than the two presented in the current Draft EIS—represent the full range of valued socio-economic components that may be affected by the project. This inadequacy could result in important valued socio-economic components being excluded from the socio-economic impact assessment process, with no steps taken to avoid, mitigate, or monitor adverse effects.

2) Ability of the two VSECs to support analysis

The ability of the two identified VSECs to support a complete analysis of these potential effects seems to be highly inadequate. Are these potential behaviours of concern simply because they may lead to increased demand on community service agencies? Or is there some other valued social component—family integrity or community stability or child welfare…—that identifies these behaviours as being of concern?

3) Effects Pathways

On the biophysical side of the Draft EIS, MHBL has included components of the environment—water quality and atmospheric environment—"where there may not be any intrinsic value to the component, but changes in such components are critical to understand as the changes potentially cause adverse effects on other VECs" (TR p 7-8). No similar treatment has been given to pathways of effects on the socio-economic side of the Draft EIS.

6.1.4 Recommendations

The VSECs that are presented are clear. However, discussion of other aspects of socio-economic value seems to suggest that there may be other VSECs that have to be included in the VSECs analysis. This is particularly the case in Supplemental Appendix J. It is recommended that MHBL demonstrate their methodology leading to VSEC identification, interactions, and validation regarding the appropriateness of VSECs selected, via consultation work already completed.

It is also recommended that MHBL consider adding one or more additional VSECs to address any gaps in their coverage of valued social components of the targeted communities.

6.2 Data Gathering, Presentation, and Analysis Methodology

6.2.1 NIRB Guidelines

- 4.3 Baseline Data
- 4.5 Public Consultation
- 4.14 Description of the socio-economic environment
- 4.17 Data acquisition
- 4.18 Data analysis and reporting

6.2.2 Associated Draft EIS Section

EIS Chapters 1, 4, 5 Technical Chapters 2, 3, 6, 24, 25, SD E2; EIS Supplement #46

6.2.3 Rationale

1) Lack of a Model to Guide Data Collection and Analysis

Data presentation and analysis seems to suffer from the absence of a clearly articulated model for assessing socio-economic effects. Such a socio-economic impact model might clarify what data is needed, the relationship between effects and mitigation, and the indicators that need to be monitored. In the absence of such a model, data seems to be scattered across the various documents with little rationale provided for their inclusion or exclusion.

2) Community Research Data

Apart from SD 1, which provides a report on discussions arising from the IQ Workshop, little data is provided on any issues, concerns, values, or experiences that may have been expressed during public consultation meetings and research.

The level of detail provided in the issues scoping chapter (TR 6) is not adequate to support an independent assessment of the quality of MHBL's data analysis and application approach.

3) Baseline Data related to VSECs identified by MHBL

i) While data related to the two specific VSECs is presented by MHBL, this data is not always sufficient to support a technical review of MHBL's conclusions related to the anticipated effects arising from Project – VSEC interactions. This concern applies to both VSECs identified: Community, Services, and Infrastructure and Employment and Economy. For example, of relevance to understanding effects on the Employment and Economy VSEC, no indication is provided as to baseline 'turnover' rates amongst community services workers or residents of the West Kitikmeot, nor to baseline 'wage scale' data. Some understanding of 'turnover' is needed in order to anticipate how many individuals might need to be hired to supply the Project's workforce. Wage scale data will be relevant to understanding the potential for the Project to draw workers from existing employers in the target communities.

ii) Some insight into the importance of the "mixed economy" model to households, likely to become involved with the Project, is needed in order to understand project effects on economy at the household and community level.

iii) There is no clear picture provided of the eligible labour pool from which MHBL intends to hire Inuit employees. This is significant since there is a reasonable prospect that the range of socio-economic effects associated with hiring workers with previous rotational work experience may be different than with hiring workers with no previous experience in this sort of work. No indication of how many people fit these criteria has been provided.

A broad statement is made that, "Kugluktuk is a community that has had more residents with work experience in mining in the past and as a result will have more residents with experience for this Project" (TR 24-5). Yet MHBL does not supply data to indicate how many individuals have been employed in previous or current mines, what income distribution patterns have been generated by these employment experiences, nor any data that might serve as indicators or either beneficial or adverse social effects at the individual, household or community level. There is also no indication provided that the experience of the Lupin mine closure has informed this Draft EIS. Data to support MHBL's conclusions are not adequate—how big is the 'pool' of experienced mine workers in Kugluktuk and the other community? How many of these people are currently employed in community service jobs or other sectors? How many of these people would consider working again in the mining sector? How many will take jobs at the Tahera mine?

iv) The selection of baseline indicators is not adequately described to indicate the rationale or relation between the data presented and the potential impacts the

project may have on the socio-economic environment. Why, for example, has MHBL not discussed data related to community-level business capacity or presented indicators that could be relevant to community stability and to family integrity? What indicators might be useful in assessing the state of the traditional economy? Concern is reported that the Project might impact on community service providers' ability to recruit and retain workers, yet no data related to employee recruitment and retention is presented.

4) Data Analysis and Application

The confidence expressed by MHBL that socio-economic baseline conditions are adequate to support assessment of potential adverse effects and that uncertainty levels are low is not supported by the data provided, nor by the explanation of how socio-economic data has been analysed. The absence of data indicating the level of past experience in each of the key communities with similar projects and the sorts of beneficial and adverse effects that these past projects have had on the socio-economic environment suggests that uncertainty level are high, in contrast to MHBL's conclusions. As a result, it is not possible to assess whether MHBL's impact statement and, in particular, its analysis and conclusions, adequately reflect all the significant data arising from the community research findings.

6.2.4 Recommendations

Please provide the information obtained and used from the community consultation meetings and any sources that were used to determine the socio-economic effects to be included in the review of the Doris North project. This data will allow a transparent review of why certain effects were included and why others were not. This foundational data will then enable the Review to see the relationship between the effects identified and the appropriate mitigation measures targeted to address these effects. From the effects analysis, indicators described during consultation sessions can then be followed up for monitoring of their effectiveness.

Data from the past experience of each of the key communities with mining projects is needed in order to anticipate the effects that another mining project would be expected to have on these same communities and same households. Unfortunately there is little detail provided related to past employment, past benefits, or past adverse effects related to the involvement of individuals from the target communities in the mining sector. If a model has *not* been used to understand which data may still be required for an assessment of all project and socio-economic impact interactions, detailed data derived from community consultations and other research will need to be provided to help understand impacts that have not been addressed in the two VSECs identified by the Proponent.

6.3 *Project Component- VSEC Effects Assessment*

6.3.1 NIRB Guidelines

- 4.19 Impact Assessment Methodology
- 4.20 Indicators and Criteria
- 4.21 Impact Assessment
- 4.21.4 Social, Economic, and Cultural Components
- 4.22 Cumulative Effects
- 4.23 Summary of Effects

6.3.2 Associated Draft EIS Section

EIS Chapter 5; Technical Chapters 2, 8, 24, 25; EIS Supplement Appendices J & K

6.3.3 Rationale

Pre-mitigation Project component – VSEC effects assessment

MHBL does not provide an assessment of the anticipated effects of the Project *prior* to mitigation activities. The only systematic assessment of project effects is provided as an assessment of residual effects following mitigation measures. All of these are determined to be 'not-significant'. This approach is problematic as it does not provide any solid indication of how critical the various effects management and mitigation measures are, nor where monitoring efforts should be focussed. A more useful approach to effects assessment — and the approach called for by NIRB (Guidelines 4.21.4 and 4.24.1) — must be to identify effects prior to mitigation activities and then to assess the anticipated effectiveness of these mitigation measures by presenting anticipated residual effects.

In focussing the assessment of Project effects on two specific VSECs, several areas of relevance to NIRB Guideline 4.21.4 do not appear to have been adequately addressed. These include:

- well-being of residents — partially addressed in CSI VSEC and Appendix J but inadequate presentation of distribution of effects across social groups;

- traditional way of life — the only effects pathway addressed relates to contamination effects, other potential interaction pathways are not adequately discussed;

- cultural well-being — apart from discussion of heritage resources, other potential effects pathways are not adequately provided and appropriate indicators are not adequately identified;

- family and community stability — partially addressed in CSI VSEC but appropriate indicators and supporting data is not adequately presented;

- employment and labour market — partially addressed in EE and CSI VSECs, but inadequate data on typical 'turnover' rates experienced in the region to understand the number of people likely to be directly involved with the Project. Inadequate data on typical wages and wage differentials between mine sector, public sector and other private sector employment to support understanding on the likely impact on the local labour market on a community-basis.

6.3.4 Recommendation

The absence of an assessment of Project effects on socio-economic components (identified in NIRB 24.1.4, such as 'traditional way of life', 'cultural well-being', family and community stability') is a serious adequacy concern as it reduces understanding of the importance of the proposed mitigation measures. Please provide the information to the significance of effects *prior* to mitigation and how those effects have been incorporated into the two VSECs identified. With this information, the systematic methodology of how mitigation measures will effectively work to manage the effects identified will certainly be more relevant and focused.

6.4 Mitigation Measures and Assessment of Residuals

6.4.1 NIRB Guidelines

- 4.24 Environmental Management and Mitigation Plans
- 4.24.3 Management of Impacts on Socio-Economic Environment
- 4.24.3.1 Human Resources
- 4.24.3.2 Occupational Health and Safety
- 4.24.3.3 Nunavummiut Involvement
- 4.24.3.4 Public Involvement
- 4.24.3.5 Impact and Benefits Agreement
- 4.25 Residual Impacts

6.4.2 Associated Draft EIS Section

EIS Chapter 5; Technical Chapters 1, 5, 24, 25; EIS Supplement Item 75 & Appendix J

6.4.3 Rationale

The absence of any VSEC that may be directly affected by adverse effects at the individual or family level raises a serious concern that inadequate attention has been paid to management or mitigation of these potential effects. Any valued socio-economic components of the target communities—or of social groups within these communities—that are not integrated into the two selected VSECs are simply not addressed.

Reference is made to a range of measures designed to avoid or mitigate adverse effects. Some of these mitigation measures are too vaguely described to support an assessment of their probable efficacy. For example: "Work with the four

hamlets to develop a strategy to help them retain sufficient skilled individuals (Technical Report 25-15)."

As noted elsewhere, the lack of systematic presentation of pre-mitigation effects means that the importance of effective mitigation is not known. Nor is it clear how critical these mitigation measures are in achieving MHBL's assessment conclusions that the Project will have no significant adverse socio-economic effects.

6.4.4 Recommendations

In the absence of the pre-mitigation assessment of Project effects, the relative importance of the various proposed mitigation measures can not really be assessed. This information is highly recommended to allow for further *necessary* review in the areas within the VSECs assessed and other potential adverse effects at the individual, family, and community levels.

One area of concern related to adequacy of mitigation, identified by MHBL within the VSECs chosen, lies in relation to the introduction of mine employment opportunities to communities where previous experience has been limited. The value of offering a pre-employment orientation program for <u>any interested members</u> of target communities, where previous experience may be limited, should be considered. This program should focus on 'soft' skills related to the transition into an industrial workplace.

Please provide any previous experience, from MHBL or other mining companies operating with employment from Northern Communities, that can provide any insight into 'early warning' indicators that might trigger some of these mitigation measures.

6.5 Monitoring and Follow-Up

6.5.1 NIRB Guidelines

- 4.26 Monitoring and Follow-Up
- 4.26.1 Present a Monitoring and Follow-Up Plan
- 4.26.2 Community Liaison Committees

6.5.2 Associated Draft EIS Section

EIS Chapter 7; Technical Chapters 1,5, 24, 25; EIS Supplement Items 65, 74, 75, 76, 79, 84 & Appendix J, L

6.5.3 Rationale

1) <u>Monitoring Program Detail to be Developed</u>

Adequate detail related to monitoring and follow-up of socio-economic effects needs to be provided in order to ensure that the things that need to be monitored are detected and followed up on. As there are no regulatory compliance stages

related to socio-economic effects, the monitoring and follow-up plans for this area need to be adequate at the EIA stage.

Apart from the IIBA and the NIRB EIA, it is not at all clear what processes might be expected to trigger further elaboration of these measures and, specifically, the socio-economic monitoring program. Presumably MHBL anticipates the development of an acceptable program to be a term of the NIRB Project Certificate. However, it is not clear what process might be carried out to ensure that such a program was successfully negotiated with all relevant stakeholders.

MHBL's monitoring plan is not sufficiently detailed to provide an understanding of the indicators that need to be monitored; who will do the monitoring; whether monitoring efforts need to be focused more at certain phases or components of the project or at certain social groupings or communities; or, the indicator levels that would trigger management action. Nor is there adequate detail provided to set out how the effectiveness of mitigation measures is to be assessed, what indicator levels would trigger concern and action, or what would be done if planned mitigation is found to be ineffective. For example, what does MHBL intend to do if its Inuit hiring assumptions are not met, either due to low recruitment or to high turnover—will new incentives be provided? Will more workers be recruited from other regions? What impact might this have on the community services VSEC?

Similar with the design of mitigation measures, the monitoring needs of valued socio-economic components of the environment not integrated into the two identified VSECs are not addressed in MHBL's Draft EIS.

2) Community Relations

Within the Community Relations Plan, MHBL addresses emergency response as a means to identify issues that may cause 'community outrage' considering "issues that are a direct or indirect consequence of the mine, the cumulative effects of multiple mining projects in the area and outside issues that may adversely impact the project (i.e. political)." The plan calls for the preparation of a risk management plan to monitor and control these issues and include contingency measures (Supplement Appendix L 4.6 p 7). MHBL should address the potential that legitimate, but 'minority' concerns may arise—would minority issues (that might be of 'major' importance to the minority group) that don't get on the regional political radar be detected and addressed?

6.5.4 Recommendations

It is recommended that MHBL's monitoring plan be further developed to identify specific indicators that need to be monitored; who will do the monitoring; whether monitoring efforts need to be focused more at certain phases or components of the project or at certain social groupings or communities. Also, please provide adequate detail to set out how the efficacy of mitigation measures is to be

assessed, what indicator levels would trigger concern and management action, or what would be done if planned mitigation is found to be ineffective.

MHBL does provide a clear commitment to monitor those things that the company has direct control over— mine expenditures, worker health and recruitment data. Recruitment and contract expenditure data should be provided on a community-by-community basis with an indication of the distribution of annual earnings by community grouping (aggregated so as to protect worker confidentiality, but adequately disaggregated so as to support understanding of socio-economic interactions). Worker health data should include the number and sorts of services provided by the Employee Assistance Program, by community, again aggregated so as to protect worker confidentiality, but adequately disaggregated so as to support understanding of socio-economic interactions.

7 Other Adequacy Issues

7.1 Management of Mine Waste Rock

7.1.1 Related NIRB Guideline

4.21.1.3, Waste Rock, Ore & Overburden Storage

7.1.2 Associated Draft EIS Section

Technical Report Section 3.8.4; Supporting Document B2, B4

7.1.3 Rationale

Although the acid-base accounting (ABA) data appears adequate, other aspects of the geochemical baseline information are extremely limited (mineralogy), and discussion on how the results are representative and/or linked to the volumes and types of rock that will be produced form the mine are lacking. Thus it is unclear how the baseline data is applicable to the mine components (ramp development rock potentially 'quarried' for construction; waste rock potentially stored on surface during the mine life; waste rock excavated but retained underground; wall rock), what types and volumes of rock will be excavated and wastes, and what their characteristics are, with respect to acid generation and metal leaching potential. There is no schedule showing the potential quantity of this rock. It will not be suitable for use in surface infrastructure projects. In the early stage of the mine life (conceivably the first year) there may not be any underground disposal space as ongoing development may fill all voids in the cut and fill stopes. More PAG rock is expected from development in the halo zone around the ore. There is no estimate of the quantity of this material. It is suggested that visual segregation using 0.3% visible sulphides will be used as a segregation criteria: the reference for this cannot be found. This is not an accurate method, particularly for vein type rocks.

The Updated Surface infrastructure Preliminary Design report (SD A7) notes that any excess waste rock (that not used in construction, but stored temporarily on

surface) will be "stored directly onto the tundra immediately downslope of the ore stockpile." (pg 34) The ore stockpile may store up to 10,000 tonnes (15 days mill feed) (page 31). The water quality model (SDA2) suggests that up to 115,000 tonnes of 'excess' ore may need to be stored on surface (page 22). This appears to be a discrepancy. In either case, drawings in SD A7 (infrastructure report) do not show a specific area for the storage of 'excess' waste rock.

At this stage there is inadequate information presented to show that the material can be properly segregated and how much may remain on surface at the time of closure.

There is not enough discussion of geochemical data to develop a clear picture of the waste materials and their potential for metal leaching or acid generating potential.

7.1.4 Recommendations

(1) Discussions on rock types provided in SD B4 should be expanded to consider:

- The suitability of 0.3% sulphur as an adequate definition of suitable construction rock, in terms of metal leaching and acid generation potential;
- Specific proposed use of ramp development rock as construction material, versus quarried rock (note that much of infrastructure specifies source as quarries 1,2 and 3, and does not proposed use of ‘quarried’ ramp development rock, and that Supporting Document B2 contains a single extraction test result for the mine portal area, with no apparent ABA analyses on the tested sample); and
- It is recommended that MHBL provide a schedule showing the expected use of waste rock in cut and fill stopes. A schedule of waste rock production from the halo around the ore zone should be prepared. Review of these schedules would facilitate assessment of the quantity of PAG rock which may be stockpiled on surface.

8 Glossary of Acronyms

ARD	Acid Rock Drainage
BIPAR	Bathurst Inlet Port and Road
CAM-	A prefix identifier used for the name of some contaminated sites
CCG	Canadian Coast Guard
CCME	Canadian Council of the Ministers of the Environment
CE	Cumulative Effects
CEA	Cumulative Effects Assessment
CEAA	Canadian Environmental Assessment Act
CEAA	Canadian Environmental Assessment Agency
CEAM	Cumulative Effects Assessment Management
CEAMF	Cumulative Effects Assessment Management Framework
CMR	Canada Mining Regulations
CWS	Canadian Wildlife Service
DEIS	Draft Environmental Impact Statement
DEW	Distant Early Warning
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
EA	Environmental Assessment
EIS	Environmental Impact Statement
EISG	Environmental Impact Statement Guidelines
EC	Environment Canada
FCSAAP	Federal Contaminated Sites Accelerated Action Plan
FEIS	Final Environmental Impact Statement
GN	Government of Nunavut
GNDOE	Nunavut Department of Environment
IIBA	Inuit Impact Benefit Agreement
IMO	International Maritime Organisation
INAC	Indian and Northern Affairs Canada
IOL	Inuit Owned Lands
IPG	Institute of Public Governance (NIRB, NPC, NWB, and NWMB)
IQ	Inuit Qaujimajatuqangit
KIA or KivIA	Kivalliq Inuit Association
KIA	Kitikmeot Inuit Association
KLUP	Keewatin Land Use Plan
LUP	Land Use Plan
ML	Metal Leaching
MMER	Metal Mining Effluent Regulations
NGMP	Nunavut General Monitoring Plan
NIRB	Nunavut Impact Review Board
NLCA	Nunavut Land Claims Agreement
NPC	Nunavut Planning Commission
NRI	Nunavut Research Institute
NT	Northwest Territories
NU	Nunavut
NW	Northwest
NWB	Nunavut Water Board
NWMB	Nunavut Wildlife Management Board
NWS	North Warning Sites
NWT	Northwest Territories
PAG	Potentially Acid Generating
PAME	Protection of Arctic Marine Environment
PC	Parks Canada
PIN-	A prefix identifier used for the name of some contaminated sites
PLANNER	Public Land Use Application, Network Notification and Environmental Reporter
PPD	Petroleum Products Division (GN)
RPA	Regional Plan of Action
TK	Traditional Knowledge
VC	Valued Component
VEC	Valued Ecosystem Component

VSEC	Valued Socio-Economic Component
WKLUP	West Kitikmeot Land Use Plan

9 Appendix: Inuktitut Executive Summary

10 Information Request, previously submitted to NIRB