July 30, 2007

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
Gjoa Haven, NU X0B 1J0

Re: 2AM-DOH / Miramar Hope Bay Ltd. / Doris North Project / Type A Licence Application / Indian and Northern Affairs Canada Intervention to August 13-15, 2007 Final Hearing

Indian and Northern Affairs Canada thanks the Nunavut Water Board for the opportunity to review the Miramar Hope Bay Ltd.'s (MHBL) Doris North Project Type A water licence application. Attached to this letter is the department's written intervention for the public hearings scheduled for Cambridge Bay, Nunavut from August 13 to 15, 2007.

Indian and Northern Affairs Canada's role in the review of the MHBL Doris North Project Type A water licence application is to offer advice and insight relating to our department's responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

Overall, the department has few concerns with the MHBL application. However, there are some outstanding items that require resolution. Specifically, we are providing for the Board's consideration recommendations relating to surface and permafrost disturbance, water quality and quantity assessment, waste management, and abandonment and reclamation. Each is discussed in more detail in our written intervention. Common among these considerations are concerns regarding monitoring, management, and reclamation activities for a project with a two-year operational life. This short project lifespan offers limited time to establish and verify trends in critical parameters. Should problems arise, they may appear with little warning and there could be inadequate data on hand to determine the best strategy for resolution or insufficient opportunity to revise security provisions.

Please note that Indian and Northern Affairs Canada reserves the right to offer further recommendations regarding any material omitted in the license application or which may have been overlooked during our review. We recognize that these issues may arise at the final hearing and the department's insight may be of value. Our written intervention is based on information provided by the Water Board up to July 19, 2007. Information provided after this date will be addressed at the Final Hearing if it affects areas of concern for the Department.

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The department would like to recognize the efforts made by MHBL's environmental management to share information and discuss technical issues at the water license technical meetings held in Cambridge Bay on June 11 and 12, 2007. Their commitment to transparency and openness has made the work of reviewing the MHBL application much easier.

Indian and Northern Affairs Canada supports MHBL's Doris North Project Type A licence application and looks forward to a continued mutually productive working relationship with MHBL, the Nunavut Water Board, and other relevant stakeholders.

Sincerely,

Original signed by Michael Nadler

Michael Nadler
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C.C.:

Larry Connell – Miramar Mining Corporation, General Manager of Environment

Amy Liu – Fisheries and Oceans Canada, Fish Habitat Biologist

Savanna Levenson – Environment Canada, Project Coordinator

Mike Atkinson – Government of Nunavut, Department of Environment, Manager of Land-use Planning and Environmental Assessment

Geoffrey Clark – Kitikmeot Inuit Association; Director of Lands, Environment, and Resources

Indian and Northern Affairs Canada Intervention

Doris North Gold Mine

Miramar Hope Bay Ltd.
Type A Water Licence Application

July 30, 2007

Table of Contents

Executive Summary

Indian and Northern Affairs Canada's (INAC) review of Miramar Hope Bay Ltd.'s (MHBL) Type A licence application for the Doris North Project is focussed on those issues within its mandate, namely surface and permafrost disturbance, water quality and quantity assessment, waste management, and abandonment and reclamation cost estimates.

Many of the concerns identified by INAC throughout the technical review of MHBL's licence application have been addressed through information provided in MHBL's June 2007 Water Licence Pre-hearing Technical Meeting Information Support Document and subsequent information submissions. This intervention will discuss those issues that remain a concern for INAC and provides recommendations for the NWB's consideration when writing licence terms and conditions. Please be advised that the complete intervention will expand upon the summary provided below and discuss other issues of concern.

Indian and Northern Affairs Canada Recommendations

Indian and Northern Affairs recommends that the NWB water licence require MHBL to provide clarification on certain matters related to management of its proposed Doris North Project. The primary issues of concern are: (a) monitoring the geotechnical / permafrost stability of project structures, (b) monitoring the water balance and water quality model, (c) geochemical monitoring, (d) waste rock management, and (f) closure and reclamation conditions. Further discussion on these issues is provided below:

(a) Monitoring the Geotechnical / Permafrost Stability of Project Structures

The provision of monitoring and final design data for project structures is critical to understanding their geotechnical / permafrost stability and assessing their performance with respect to design predictions. Indian and Northern Affairs Canada recommends that additional geotechnical investigations and laboratory testing of foundations soils be undertaken, a comprehensive thermal analysis program be followed, a monitoring and follow-up program regarding thermal, deformation and seepage data be developed, and that the results of regular site inspection program be provided to the NWB for review on a regular basis.

(b) Monitoring of the Water Balance / Water Quality Model

Miramar Hope Bay Ltd. has developed a water balance / water quality model to manage the discharge of water within the tailings containment area, (i.e., Tail Lake). This model is designed to ensure that the quality of discharged water will not exceed Metal Mining Effluent Regulations criteria and that the Canadian Council of Ministers of the Environment water quality guidelines for the protection of freshwater aquatic life are met

downstream of the Doris Creek waterfall. Indian and Northern Affairs Canada understands that MHBL will collect climate and hydrological data as part of its ongoing monitoring program. It is recommended that MHBL notify the NWB of its intentions to incorporate collected data into the water balance / water quality model. Within the June 2007 information supplement, MHBL further clarified that "model recalibration would only be required if the model significantly underestimates solute concentrations in Tail Lake and it is shown to potentially have a significant impact on the water management strategy."

Presently, MHBL proposes that the model be rerun when there is a more than 20 percent deviation above the predicted concentrations for any of the critical or significant parameters. Indian and Northern Affairs Canada recommends that MHBL be required to submit a water balance and water quality modelling report every three (3) months for the two (2) years of mine operation. The model would be re-calibrated as necessary at the end of each three (3) month period. This will allow for confidence in the water quality modelling results and the eventual release of water. Following the two (2) years of mine operations, water balance and quality monitoring can become an annual occurrence.

(c) Geochemical Monitoring

Indian and Northern Affairs Canada recommends that a Geochemical Monitoring and Waste Rock Storage Report be provided to the NWB on an annual basis. This Report would present and interpret data associated with tailings solids, tailings supernatant, cyanide leach residue, bleed from the cyanide destruction process, and waste rock. This Report is needed to assess the quality and quantity of leachate produced within the project area and to determine its effects on the receiving environment.

(d) Waste Rock Management

As proposed, MHBL does not plan to use underground waste rock for the construction of project infrastructure (e.g., roads, building pads, laydown areas, and dams) to ensure that only non-acid generating rock is used. All waste rock will be brought to surface, delivered to a bermed Temporary Waste Rock Pile Pad, and returned underground as space becomes available.

Indian and Northern Affairs Canada recommends that MHBL identify all waste rock by general lithology and underground location relative to its placement in the Temporary Waste Rock Pile Pad. The location of waste rock should then be tracked as it is placed back underground. This will allow for MHBL and the NWB to understand the type of backfilled waste rock and provide a basis for investigating the cause of underground acid rock drainage should this occur. Furthermore, all waste rock should be placed underground and not be used for construction or left on surface either subaerially or subaqueously at closure. Waste rock remaining on surface after two (2) years of

operations should be characterized for acid rock drainage and metal leaching to assess outstanding risks.

(E) Closure and Reclamation Conditions

Given the short life of the Doris North Project, it is recommended that MHBL submit an Interim Mine Closure and Reclamation Plan not later than 6 months after the start of mining (once all constructed facilities are in place) and a Final Mine Closure and Reclamation Plan no later than 18 months after the start of mining (6 months before the expected end of mining) to the NWB for review and approval. Both the Interim and Final Plans are to incorporate revisions that reflect the current status of mine development.

Conclusion

Indian and Northern Affairs Canada appreciates the cooperation that MHBL has provided throughout the environmental assessment and regulatory review of the Doris North Project. The Department is confident that the concerns brought forward by all interveners will be fully addressed by the Nunavut Water Board at the upcoming Final Hearing from August 13 to15, 2007 in Cambridge Bay, Nunavut. Indian and Northern Affairs Canada looks forward to participating in these hearings.

Naitumik Ukautait

Kanatami Inuligiyiit (INAC) ihivgiukhimayait Miramar Hope Bay Ltd (MHBL) Atuktait "A" laisinsiit uktugutikhait Doris North Hanayakhami kungiakhugit tahapkoa ihumagiyauyut iluani maligutikhainik, ilaa kaagani ovalo hikut ataani ihuinaalaagutait, imat naamagutikhait ovalo nakuutjutikhainik ihivgiugutikhainik, igitukhat munagitjutikhainik ovalo kimagutikhainik ovalo utiktitjutikhait akiit naunaiyautainik.

Amigaitut ihumaalugiyauyut naunaiyakhimayait INACkut hamani ihivgiugutainik MHBLkut laisinsiit uktugutikhait ukakhimayaagani tamaat tuhagutikhainik tunihimayait MHBLkut Junemi 2007 Imat Laisinsiit Naalagutikhaini Katimatinagit Tuhaktitjutikhait Makpigaat ovalo tuhagutikhait tunihimayukhat. Hamna naalagutikhait ukaniaktut tahapkoa ihumagiyauyut ihumaalugiyait INACkut ovalo tunihimayut pitkutiyakhainik NWBkut ihumagiyakhainik titigaligumik laisinsiit maliktakhait ovalo maligutikhait. Nalungilutit inihimayut naalagutikhait angililaaktut ukautainik hamani ovalo ukakhimayut ihumagiyainik ihumaalugiyait.

Kanatami Inuligiyit Pitkuhimayait

Kanatami Inuligiyit pitkuhimayut NWBkut imat laisinsiit piyumayait MHBLkut tunilutik ukautautikhainik ilangit himagiyait mikhaanut munagitjutikhait uktugumayainik Doris North Hanayakhami. Ihuviliit ihumaalugiyait hapkoa: a) kungiagutikhait ataani hikuit nunaligiyiit naamagutikhait hanayakhat havakvikhainik, b) kungiagutikhait imat naamagutikhainik ovalo nakuutjutikhainik atugutikhainik, c) nunani atugutikhait kungigutikhait, d) igitukhat uyakat munagitjutikhait, ovalo f) umiktigutikhait ovalo utiktitjutikhait maligutikhainik. Ovalo ukafaakhimayut hamani hapkoa ihumagiyait:

(a) Kungiagutikhait ataani hikuit ovalo nunaligiyiit naamagutikhait hanayakat havagutikhainik

Ilangit kungiagutikhait ovalo inikhimayut katitigutait hanayakhat havakvikhait ikpinaktut nalungiyaagani nunani atugutikhait/ataani hikuit naamagutikhait ovalo ihivgiugutikhait havagutainik mikhaanut hanauyakhaimayait nalungitakhainik. Kanatami Inuligiyit pitkuhimayut ilalugit nunat atugutikhait ihivgiugutikhainik ovalo ihivgiuvikhait tunngaviit nunat pilutik, inikpiakhimayut unaligutait ihivgiugutainik pilihimayut pilutik, kungialugit ovalo ihivgiufaalugit pilihimayut mikhaanut unaligutait, aalanguligutait ovalo kuvitjutait katitigutainik hanalutik ovalo iniktigutait nunaini ihivgiugutait pilihimayut tunilugit NWBkunut ihivgiugiukatagiagani.

(b) Kungiagutikhait Imat Naamagutikhainik/Nakuutjutikhainik Atugutikhait

Miramar Hope Bay Ltd. Hanahimayut imat naamgutikhainik/imat nakuutjutikhainik atugutikhait munagiyaagani kuvitigutikhait imat kuviviinut tutkuktuivianut, (ilaa Kuviviit Tahik). Hamna atuktait hanahimayut piyaagani naamagutikhainik kuvihimayut imat

avataanulaitut Haviit Uyagakhiuktut Kuviviit Maligaliugutikhainut maligutikhainik ovalo Kanatami Katimayiit Ministat Hilakyualigiyit imat naamagutikhait maligutikhainik munagiyaagani imani umayut kugaani Doris Creek. Kanatami Inuligiyit nalungitut MHBLkut katitiniaktut hilat ovalo kuganik katitigutainik ilaulugit kungigutikhait pilihimayuinut. Pitkuhimayut MHBLkunut tuhaktitilugit NWBkut pinahuaktainik ilauniagutikhainik katitigutikhait katitiktukhat imat naamagutikhainik/imat nakuutjutikhainik atugutikhait. Iluani Junemi 2007 tuhagutikhait tunihimayut, MHBLkut tuhaktitiaktakhait "atugutikhait ihivgiufaagutikhainik piyukhat atugutikhainik akhut mikiyaagiagani katitigutikhainik Kuviviit Tahiinut ovalo takupkailutik pilaaktakhainik angiyut ikpinagutikhait imat munagitjtukhainik uktugutikhaini."

Ublumi, MHBLkut uktugumayut atugutikhainik pifaalugit avataanungakat 20%mik aalanguligutikhaini kaangani pilaaktakhait katitigutikhainik ikpinaktut ovalo angiyut atugutikhainik. Kanatami Inuligiyit pitkuhimayut NHBLkut pilutik tunilutik imat naamagutikhait ovalo imat nakuutjutikhait atugutikhait tuhaktakhainik tamaat pingahuni tatkikhiutini malguni ukiuni uyagakhiukviit havakiini. Atugutikhait ihivgiufaalaaktut inikata pingahut tatkikhiutini. Hamna pipkalaaktut ihumaalugingiyaagani imat naamagutikhait atugutikhait iniktigutikhainik ovalo kuvitjutait imat. Malilugit malguni ukiuni uyagkahiukviit havakviini, imat naamagutikhait ovalo nakuutjutikhait kungigutikhait pikatalilugit ukiuk tamaat.

(c) Nunani Atugutikhait Kungiagutikhait

Kanatami Inuligiyit pitkuhimayut Nunani Atugutikhait Kungiagutikhait ovalo Igitigutikhait Uyakat Tutkuvikhait Tuhaktakhat tunilutik NWBmut ukiuk tamaat. Hamna tuhaktakhat tuniniaktut ovalo ukalugit katitikhimayut ilauyut kuviviit naptuyunik, kuviviit imanik, cyanide ahiguktigutait ovalo igitukhat uyakat. Hamna tuhaktakhak piyukhat ihivgiukatagiagani naamagutikhait ovalo nakuutjutikhait kuviyut iluani hanayakhat ovalo naunaiyagiagani ikpinagutikhait nunamut.

(d) Igitukhat Uyakat Munagitjutikhait

Uktugumayut MHBLkut paknaiyakhimaitut atugutikhainik ataani nunat igitukhat uyakat hanatiglugit hanayakhait havaktigiigutikhainik (ilaa; apkotit, iklut hanavikhait, uhiiyakvikhait ovalo imanik nutkatugikhait) piyaagani aninaktut kuvivaktut uyakat atuktainik. Tamamik igitukhat uyakat kaaganunganiaktut nunanmut, ililugit hanahimayunik nutkavikhainut Igitukhat Uyakat ovalo utiktilugit ataani nunamut inikhakalikata utiktikvikhainut.

Kanatami Inuligiyit pitkuhimayut MHBLkut naunaiyaklugit igitukhat uyakat kanugitjutainik ovalo ataani naunaiyautainik kanugitut utiktivikhait Atuniaktait Igitukhat Uyakat ilivikhainut. Naniiniaktut igitukhat uyakat nalungitakhait utiktikhimayut ataani nunamut. Hamna pipkalaaktait MHBLkut ovalo NWBkut nalungiyaagani kanugitut utiktikhimayut igitukhat uyakat ovalo atulaagutikhainik ihivgiugutikhait pipkaitjutait ataani nunat uyagait

kuviviit pihakpata. Ovalo, tamamik igitukhat uyakat iliyukhat ataani nunamut ovalo atungilugit hanatjutikhainik ovaluniit kimaklugit kaagani nunat umiktilikata. Igitukhat uyakat kimakhimayut kaagani malgunik ukiuni havaktitlugit ihumagiyauyukhat uyakat kuviviit ovalo haviit kuviviit ihivgiugiagani ikpinagutikhait.

(E) Umiktigutait ovalo Utiktitjutikhait Maligutikhainik

Naituuniamat havagutikhait Doris North Hanayakhami, pitkuhimayut MHBLkut tunilutik naitumik Uyagakhiukviit Umiktigutikhait ovalo Utiktitjutikhait Paknaiyautikhainik siksini tatkikhiutini uyagakhiukvik hanalikata (tamamik hanayakhat inikata) ovalo Iniktigutikhait Uyagakhiukviit Umiktigutikhait ovalo Utiktitjutikhait Paknaiyautikhait 18ni tatkikhiutini uyagakhiukvik havalikata (siksini tatkikhiutini umiktititinagit uyagakhiukviit) NWBkunut ihivgiugiagani ovalo angigiagani. Tamamik Naitut ovalo Inikhimayut Paknaiyautikhait ilauniaktut ihuakhagutikhainut takuyaagani ublumi kanugitjutikhainik uyagakhiukviit hanatiligiyiit.

<u>Iniktigutait Ukautait</u>

Kanatami Inuligiyit aliahuktut ilaukatauyunut MHBLkut tunihimayut tamaat hilakyuat ihivgiugutainik ovalo maligaliuligiyit ihivgiugutainik Doris North Hanayakhami. Munagiyit nalungitut ihumaalugutait tunihimayut tuhaktitiyunit tamaat ihivgiuktauniaktut Nunavumi Imaligiyit Katimayiinit Iniktigutait Naalugutaini August 13mit 15mut, 2007, Ikaluktutiami, Nunavut. Kanatami Inuligiyit ilaukatauyumayut hamani naalaktilikata.

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1 Introduction

Miramar Hope Bay Ltd. (MHBL) is applying for a Type A licence to permit the use of water and disposal of waste material associated with the development of its Doris North Project, an underground gold mine. The Doris North Project is situated on the mainland of Nunavut's Kitikmeot region, at the general coordinates of 68°09' north latitude, 106°40' west longitude. Communities within the vicinity of this project include Cambridge Bay, 125 kilometres (km) to the northeast and Umingmaktok, 75 km to the southwest.

The Doris North Project is expected to be in operation for two (2) years, processing an average of 720 tonnes of ore on a daily basis. A total of 311,000 ounces of gold is anticipated to be processed from 460,000 tonnes of ore, extracted using underground mining methods. Mine development is scheduled to start in the third quarter of 2007 by collaring the mine's portal. Production mining is anticipated to begin in the third quarter of 2008 through to the end of 2010.

Indian and Northern Affairs Canada (INAC) has participated in the Nunavut Impact Review Board's environmental assessment of this project as per Article 12, Part 5 of the *Nunavut Land Claims Agreement* and will continue to be actively involved in this project's regulatory approval and operation due to the department's responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act.*

2 Licence Application Review

2.1 Overview

A listing of recommendations has been provided for consideration when writing licence terms and conditions for the proposed Doris North Project. These recommendations are based upon information provided in the April 30, 2007 revised water licence application, and supplemental information provided for review following the June 11-12, 2007 pre-hearing conference. Information circulated by the NWB up to July 19, 2007 has been considered in this intervention. Information provided after this date will be addressed at the final hearing if it affects areas of concern for the Department. Recommendations have been organized in a format which is reflective of a typical NWB mining licence. Issues of concern are presented by providing an explanation of why they should be addressed by the NWB at the Final Hearing followed by proposed licence terms and conditions. Please be advised that certain sections presented in this intervention do not provide recommendations because it has been determined unnecessary to do so (e.g., Part A: scope, definitions, and enforcement).

The common theme to all of INAC's issues pertaining to monitoring, management and reclamation is the short mine life. With only a two year window of operations, there will be limited opportunity to establish and verify trends in critical parameters. If problems arise they may appear with little warning and there could be inadequate data to determine the best strategy for resolution or insufficient opportunity to revise security provisions.

2.2 Part A: Scope, Definitions and Enforcement

Presently, INAC has not identified any recommendations associated with this component of the licence.

2.3 Part B: General Conditions

2.3.1 Annual Reporting related to Geotechnical / Permafrost Aspects

Comments/Rationale
It is recommended that the following geotechnical/permafrost issues associated with the proposed project be reported upon annually.

- Miramar Hope Bay Ltd. has committed to providing a protocol for distinguishing dike seepage from runoff and active zone groundwater seepage. In order to control the water quality downstream and manage the releases of water from Tail Lake, any seepage from Tail Lake should be collected and pumped back into Tail Lake. In addition, monitoring of the quantities of seepage will provide direct evidence that mitigation measures to cut off the seepage path(s) have been successful. Therefore, measuring and reporting the monthly and annual quantities of dike seepage from the North and South Dam should be included in the Annual Report.

- Under the Shoreline Adaptive Management Plan, proactive as well as reactive mitigation works will be undertaken by MHBL to prevent shoreline erosion. The application document has provided a proposed design for mitigating shoreline erosion. However, the design may be modified by a geotechnical engineer depending on actual site conditions. Therefore the as-built drawings of the mitigation works undertaken along the shoreline of Tail Lake should be included as part of the Annual Report.

- Geotechnical instrumentation installed by MHBL in the North and South Dams will be monitored to assess the performance of the dams. In addition, any

instrumentation, such as thermistors, installed at other locations are being monitored for specific purposes. The data collected from these instruments should be included as part of the Annual Report. The interpretation of these data should be summarized as part of the Annual Report.

- Miramar Hope Bay Ltd. has accepted that the Roberts Bay Jetty will require ongoing maintenance due to settlement and deformations related to the weak seabed foundation. Prior to the annual sealift, MHBL has committed to undertake bathymetric soundings to confirm water depths around the jetty. To track the condition of the Jetty and surrounding waters with respect to INAC's land lease obligations, INAC suggests that MHBL provide as-built details of the ongoing maintenance work carried out, as well as the annual bathymetric survey data as part of the Annual Report to the Nunavut Water Board.

Recommendations

The Annual Report should include, but not necessarily be limited to, the following:

a) The monthly and annual quantities in cubic metres of dike seepage from the North and South Dams pumped back into Tail Lake;
b) As-built drawings and a summary of the mitigation works undertaken along the shoreline of Tail Lake in response to erosion, as stipulated in the Shoreline Adaptive Management Plan;
c) A summary report, which includes all data and information generated from the monitoring of all project geotechnical instrumentation; and,
d) Confirmation that as-built drawings and a summary of the maintenance work pertaining to the Roberts Bay Jetty, including the annual bathymetric surveys conducted prior to shipping, were submitted to the appropriate regulatory authorities.

2.3.2 Annual Water Balance / Water Quality Model Reporting

Comments/Rationale

Miramar Hope Bay Ltd. outlined at the Pre-Hearing Technical Meeting that the water quality model is an integrated model, based on both site water quality and hydrometric data. As outlined in the Revised Support Document, actual water quality will be compared to that predicted by the model. If there is more than 20 percent deviation above the predicted concentrations for any of the critical or significant parameters the model will be rerun. This would include any new climate and hydrology data. The comparison of the actual water quality to the predicted will be communicated to the NWB as part of the monthly Surveillance Network Reporting.

As part of the June 2007 Information Supplement (#37), MHBL further clarified that "Model recalibration would only be required if the model significantly underestimates solute concentrations in Tail Lake and it is shown to potentially have a significant impact on the water management strategy."

Miramar Hope Bay Ltd. is correct in their comment that the water quality model is essentially based on a combination of both water quantity and the amount of constituents present that represent water quality. The 20 percent deviation is apparently meant to cover a multitude of factors in the models that could be viewed as having a range of possible values.

In the water quantity model precipitation, evaporation, coefficient of runoff, tailings inflow and re-cycled water may deviate significantly from what has been assumed at present.

The water quality model is one-dimensional, in that instant mixing throughout the lake is assumed, whereas, given the three-dimensional shape of the bathymetry, complete mixing may not occur, or at least not as quickly as assumed. The model inputs have been based on some assumptions and varied as a way of measuring the sensitivity of results to a range of inputs. It is assumed that the difference between predicted values and measured values at the barge-mounted pump at the inlet level is the intent of the trigger value for the 20 percent deviation value that has been proposed.

Recommendations

It is recommended that the water license stipulate that, during the two (2) years of mine operation, MHBL must confirm the adequacy of the water balance model for predicting actual lake levels. Further, MHBL must confirm the adequacy of the water quality model to predict actual conditions within the stipulated range. The water management plan for Tail Lake is to begin the release of Tail Lake water in the first year. Therefore, it is recommended that considerable effort be brought to bear on the development of reliable models that can be used after the completion of mining.

a) It is suggested that the proponent validate with a technical argument the proposition to adopt the proposed models if water quality predictions are within 20 percent of what actual current water quality.
b) It is recommended that for the two years of mining, the water balance model be re-calibrated every three months – satisfactory performance would be predictions of +/- 0.1 m within actual lake levels.
c) It is recommended that for the two years of mining the water quality model be re-calibrated every three months.
d) It is recommended that an annual report be provided that summarizes new baseline data and modeling results, together with the relative differences between modeled and actual values.
e) It is recommended that model performance should be evaluated at the end of two years with the expectation that re-calibration would likely be required only occasionally.

It is recommended that the baseline monitoring system at the beginning of mining and for up to two (2) years after mining has commenced would include the following, as a minimum:

- Tail Lake levels (continuous);
- Ice thickness (weekly);
- Snow depth in Tail Lake basin (water equivalent);
- Rainfall (continuous);
- Evaporation (Pan);
- Tailings inflow volumes (daily);
- Tailings density;
- Return flow (to processing mill);
- Sewage inflow volume (daily);
- Lake volume lost to tailings deposition;
- Tail Lake outflow;
- Water quality samples (at surface and mid-depth; samples distributed throughout lake area); and,
- Tail Lake bathymetry (annual).

The data collection program would be re-evaluated after two (2) years with the likelihood that it would probably be reduced.

2.3.2. Annual Reporting of Geochemical Monitoring

Comments/Rationale

The submission of an Annual Geochemical Monitoring and Waste Rock Storage Report as part of an Annual Report which provides information concerning tailings solids, tailings supernatant, the cyanide destruction circuit process, cyanide leach residue, and waste rock would allow for an increased understanding to the proposed gold mine's impact on its receiving environment.

Recommendation

It is recommend that the water license contain a term and condition related to the submission of an Annual Geochemical Monitoring and Waste Rock Storage Report for review as part of the Annual Report. This report could address the following:

- Tailings solids;
- Tailings supernatant;
- Cyanide destruction circuit monitoring;
- Cyanide leach residue; and
- Waste rock.

This report could also contain the following.

a) For the tailings solids:
   - All geochemical data appended;
   - All tonnage data appended, and locations of disposal;
   - Discussion of geochemical data (static and kinetic, if applicable) with relevant figures and calculation of NNP and NPR; and
   - Geochemical interpretation of data.

b) For tailings supernatant:
   - All geochemical data appended; and
   - Figures depicting time series of constituent concentrations and loads.

c) For waste rock:
   - Tonnages, reported according to lithology, of waste rock moved to surface and waste rock left underground; and
   - Tonnages, reported according to lithology, of waste rock moved from surface back to the underground.

d) For cyanide destruction circuit monitoring:
   - Raw monthly monitoring data for both the influent and effluent for the following: ph, total cyanide, WAD cyanide, chemical oxygen demand (COD), dissolved Fe, Cu, Zn, Cd, As and Ni;
   - Figures depicting time series for each of these aforementioned parameters; and
   - Reporting of the frequency, extent and concentration values associated with operational upsets.

e) For cyanide leach residue:
   - presentation of results of monthly underground inspection of the following:
     - Location of inspection;
     - Extent of freeze back of the cyanide leach residue;
     - Seepage from the cyanide leach residue; and
     - Geochemical and inspection data of any samples taken from seepage from the cyanide leach residue, including geochemical discussion of results.

2.4. Part C: Conditions Applying to Security

Comment/Rationale

Due to the short mine life, reclamation security requirements should be examined shortly after the initial extent of mine disturbance can be verified and again shortly prior to the expected end of operations.

Recommendation

It is recommended that conditions relating to security include the following.

a) Provision of security in the amount of $6,118,768 (future costs 2011-2020 not discounted) for water-related reclamation liability. This amount is based upon the total reclamation liability as detailed in the accompanied July 30, 2007 INAC INAC Doris North Mine Reclamation Cost Estimate. An updated security estimate and additional security as required is to be submitted to the NWB no later than six (6) months after the start of mining (once all constructed facilities are in place).
b) An updated security estimate and additional security as required is to be submitted to the NWB no later than eighteen (18) months after the start of mining (6 months before the expected end of mining).
c) Provision of a security in the amount of $12,325,067 (future costs 2011-2020 not discounted) for total project reclamation liability. This amount is based upon total reclamation liability as detailed in the accompanying July 30, 2007 INAC Doris North Mine Reclamation Cost Estimate. Water-related reclamation liability is to be held by INAC.

2.5. Part D: Conditions Applying to Construction

2.5.1. Construction of North and South Dams

Comments/Rationale

It is understood that a limited geotechnical investigation was carried out in 2006, but was cut short due to weather. Miramar Hope Bay Ltd. has agreed to carry out further geotechnical investigations during construction. Indian and Northern Affairs Canada understands that no additional geotechnical investigations will be carried out for the final design of the Tail Lake North and South Dams.

Miramar Hope Bay Ltd. agreed to obtain undisturbed samples from the dam foundations for the purposes of laboratory testing to determine site-specific deformation parameters. These will be used to confirm the design assumptions and improve the interpretation of deformation measurements obtained from the dam monitoring program.

Recommendations

It is recommended that the licence should include the following conditions.

a) The requirement to conduct subsurface investigations of the dam foundations during construction to obtain undisturbed samples for testing and to provide this information to the Board for review.
b) The requirement to conduct laboratory tests on the samples of foundation materials recovered during the construction site investigations and to provide this information to the Board for review.
c) Details of the geotechnical instrumentation and monitoring plan proposed to monitor the performance of the dams.
d) Results of subsurface investigations and laboratory analyses must be reviewed by MHBL and the dam design modified accordingly under the supervision of a Geotechnical Engineer. These results should be provided to the NWB for review.

2.5.2. Construction - Quarry Rock Monitoring and Management

Comments/Rationale

Miramar Hope Bay Ltd.'s proposed quarry monitoring program, as presented within the April 2007 Revised Support Document, had a solid framework. Indian and Northern Affairs Canada recommends the following additional conditions to strengthen this monitoring program:

- Twenty shake flask test extractions to a subset of the 100 ABA samples; and,
- Reporting of the quarry rock solids monitoring program.

Recommendation

a) It is recommended that, pending review of the July 30, 2007 update, the water license should include the following as part of any quarry rock construction monitoring and management plan. Miramar Hope Bay Ltd.'s proposed program is paraphrased with additional recommendations provided in bold and italics.
    - The monitoring plan will consist of visual monitoring of quarry rock by field geologists to confirm that the expected rock types are being exposed, along with sampling of placed quarry rock to verify that placed material has the expected ML/ARD characteristics. During construction, 100 samples of quarried rockfill will be collected from the various road and pad construction sites and sent to an accredited external laboratory for acid base accounting (ABA) analysis. ***A subset of 20 samples will be subjected to shake flask extractions with an emphasis on near surface rock.*** The objective is to collect 100 samples from across the site (spread to capture a representative cross-section of all rockfill used in site construction) to verify that the rock used in construction is non-acid generating. The data will be cross-referenced to a site infrastructure map. The following information will be collected for each sample collected:

- Location of sample point;
- GPS co-ordinates of sample point;
- Name of quarry from which the rockfill came from;
- Date rockfill was placed;
- The name of the person who performed the sampling;
- Date and time of sampling;
- Date of analysis;
- Name of person who performed the analysis;
- Analytical method or techniques used; and,
- Results of analysis.

- ***A report shall be compiled that presents the data collected, complete with a discussion geochemical data interpretation. This report shall be presented to the NWB for review, no less than six (6) months after the collection of the samples***.

b) In the unlikely event that potentially acid generating rock is identified at any of these sample locations, a more intensive sampling program will be conducted around the spot where the rock was discovered. Construction records will be checked to find any other locations where rock from that same quarry on the same date could have been placed. These will also be sampled. Any potentially acid generating rock located by this means will be tagged for removal and replacement during the next winter season. The material removed will be moved to the temporary waste rock stockpile, to ultimately be placed underground.

2.5.3. Roberts Bay Fuel Tank Facility

Comments/Rationale
The June 2007 Information Supplement, Item 2b- Fuel Storage and Handling Procedures, notes that the five (5) million litre capacity fuel tank facility will be constructed on exposed bedrock within the footprint of Quarry #1. Miramar Hope Bay Ltd. have not explicitly stated that there will be no active quarrying in Quarry #1 after the tank is installed.

Recommendation
The Licence should be conditional on the requirement that all Quarry operations in Quarry #1 cease once the fuel tank is in service.

2.5.4. All Weather Access Roads

Comment/Rationale
The June 2007 Information Supplement, Item #7- Replacement of Culverts by Coarse Rock Drains, indicates at total fill of 1.2 m based on SNC-Lavalin's design for the

GNWT Highway. Miramar Hope Bay Ltd. has proposed using a roadfill thickness of 1.0 m for the all-weather roads at Doris North. It is not clear if the road fill will be locally increased in thickness at the rock drains or if the overall thickness will be reduced to 1 m. In addition, the drawings no longer include the ditch detail shown in the version presented at the Pre-Hearing Technical Meeting. The use of ditches would not be acceptable at Doris North due to the potential for permafrost degradation of the underlying ice-rich glaciomarine soils.

Recommendation
It is recommended that, as part of the submissions for water licence approval, MHBL should provide construction drawings of the proposed all weather access roads showing the thickness of the various materials used at the coarse rock drain locations and for the general road fill. Details should also be provided for management of surface water adjacent to the access roads, including any contingency plans involving the use of culverts if the coarse rock drains fail to operate as predicted.

2.6. Part E: Conditions Applying to Water Use

Presently, INAC has not identified any recommendations associated with this component of the licence.

2.7. Part F: Conditions Applying to Water Management

2.7.1. Water Management Plan with Respect to Water Quantity

Comments and Recommendations
Indian and Northern Affairs Canada recommends that the Water Management Plan include, but not be limited to, the following considerations.

a) A requirement to continuously monitor Doris Lake levels and outflow during the two years of mining, and beyond, to confirm the findings of the water balance model as reported in their 2005 document. If there is a significant difference between modelled and measured values, the license should include a requirement to adjust the model inputs accordingly. Outflows from the lake will be an important component in the years after mining in establishing permissible Tail Lake releases, so having a reliable Doris Lake water balance model is necessary.

b) The establishment of a reliable, calibrated Tail Lake water balance model during the two (2) years of mining operation was discussed in Section 2.3.2. This model will be of greatest value if it is complemented by ongoing monitoring and

calibrating of the water quality model in the same time frame. The system and frequency of monitoring lake levels, inflows, outflows and water quality proposed by MHBL must be shown to be adequate to provide the necessary input for model calibration. It is recommended that ongoing monitoring and calibrating of the water quality model be included as a condition of any water license.

c) The June 2007 Information Supplement established that storm and snowmelt runoff from the mill and camp areas, as well as from the temporary waste rock and ore stockpiles could be directed to the proposed Pollution Control Pond if water quality is not acceptable for release as clean water flow to the tundra. It was also established that the pond has been designed to accommodate a 100-year, 24-hour storm volume. It is recommended that the license establish the system that would be put in place to continuously monitor pond level and outflow during the summer season, as well as to provide a plan to monitor snow accumulation in the pond, road ditches and drainage channels with the commitment to clear these drainage paths prior to the onset of the freshet season.

2.7.2. Design Freeboard Criteria

Comments/Rationale
Mirmar Hope Bay Ltd. committed to provide a summary table and supporting rationale providing the design basis for the crest elevation and top of geosynthetic clay liner (GCL) elevations for both dams. This will include freeboard requirements for maximum water levels and components of settlement.

Recommendation
It is recommended that Miramar Hope Bay Ltd. include a table describing Design Freeboard Criteria within the project's Site Water Management Plan.

2.7.3. Monitoring Doris Creek Flow Below Tail Creek Inflow

Comments/Rationale
Miramar Hope Bay Ltd. have committed to undertaking a site visit during July 2007 for the purpose of identifying a monitoring location on Doris Creek that would include Tail Creek inflow and to survey representative channel cross-sections.

Recommendations
It is recommended that the following information be provided as part of the water licence:

a) GPS identification of the selected site, together with a cross-section plot and a preliminary open water rating curve;

b) A technical assessment to confirm that Tail Creek inflows will not create a backwater impact upstream;
c) Continuous monitoring of Doris Creek and Tail Creek discharges; and
d) Monitoring of freeze-up and spring break-up characteristics, along with flow measurements where possible – add flow measurements and water levels to rating curve.

2.7.4. Tail Lake Shoreline – Geotechnical Inspection

Comments/Rationale
The mitigation works constructed along the shoreline of Tail Lake must be assessed for long term stability, especially if the works were not specifically designed by a geotechnical engineer. Therefore the annual geotechnical inspection should include the shoreline of Tail Lake, including all slopes, as well as mitigative works completed under the Shoreline Adaptive Management Plan.

Recommendation
An annual geotechnical inspection to include Tail Lake shoreline to assess stability of existing slopes and mitigation works constructed under the Shoreline Adaptive Management Plan is recommended.

2.8. Part G: Conditions Applying to Waste Management

2.8.1. Seepage from Downstream Side of North and South Dams

Comments/Rationale
Miramar Hope Bay Ltd. committed to a site inspection protocol that included checking the source(s) of seepage at the downstream side of Tail Lake's North and South Dams.

Recommendation
a) Indian and Northern Affairs Canada recommends that the Doris North Project's water licence contain a condition regarding the determination of whether seepage is occurring from Tail Lake's North and South Dams. When conducting its regular site inspections, MHBL should check for the presence of seepage along the downstream side of the North and South Dams and assess if it is originating from Tail Lake based on its developed protocols. If the assessment indicates leakage from Tail Lake, the geotechnical engineer of record should be contacted in writing as soon as possible so that corrective action can be implemented.

2.8.2. Annual Geotechnical Inspection

Comments/Rationale
The annual geotechnical inspection should include all site facilities, not just the dams at Tail Lake. Other site facilities include but are not limited to the Tail Lake shoreline, underground mine openings, all-weather access roads, the Robert's Bay jetty, landfills, landfarm facility, and fuel containment facilities.

Recommendation
Annual geotechnical inspection should include, but not be limited to: North and South Dams, review and assessment of instrumentation and monitoring data, Tail Lake shoreline (including natural slopes and areas where mitigation measures were constructed), underground mine workings with respect to rock temperature measurements and groundwater inflow, all-weather access roads, Roberts Bay Jetty, landfills, landfarm facility, and fuel containment facilities.

2.8.3. Demolition Landfill

Comments/Rationale
Material being disposed of in the demolition landfill should be placed according to the approved protocols developed by MHBL to minimize deformation of the cover and frost-heaving of buried materials. The materials placed should be photo-documented and a map produced showing the locations and volumes of the various types of materials.

Recommendations
a) It is recommended that Miramar Hope Bay Ltd. provide a protocol for the placement of material in the demolition landfill to minimize settlement, voids, and frost-heaving of buried materials.
b) An inventory of volumes and photo documentation of materials placed into demolition landfill, including map showing location of various types of materials should be provided to the Board as part of the Closure Plan.

2.8.4. Construction Discharge Standards

Comments/Rationale
Miramar Hope Bay Ltd.'s current monitoring program lacks detail with respect to construction monitoring. At the Pre-Hearing Technical Meeting, MHBL made a commitment to provide this information, which was carried forward to the NWB's list of commitments. In the June 2007 Information Supplement, MHBL provides more details on the proposed construction monitoring program (Item #35), which outlines the key aspects of the program including monitoring of sediment releases from construction areas. Miramar Hope Bay Ltd. does not provide any proposed Total Suspended Solids (TSS) licence limits for any of these discharges that may ultimately release directly to

the environment (i.e., runoff from quarries), other than those already covered in the existing SNP program (i.e., Camp/mill Sedimentation Pond).

Recommendation
The water licence should include discharge licence limits for TSS for all surface runoff during construction that is not already captured under the proposed water management facilities and SNP program. This should include maximum average and maximum grab sample concentrations.

2.8.5. Tundra Discharges

Comments/Rationale and Recommendation
See Section 2.12.13. (Tundra Discharge Monitoring).

2.8.6. Stormwater Discharge Standards

Comments/Rationale
Miramar Hope Bay Ltd. has proposed that stormwater discharge from the lined fuel transfer station, fuel tank farm, landfarm facility, and camp/mill pad sedimentation pond be managed through monitoring, and that the monitoring would occur daily when discharging onto the tundra, using monthly average concentrations for monitoring purposes. However, INAC contends that these discharges would be better regulated as grab samples rather than averaged monthly values.

At the Pre-Hearing Technical Meeting, MHBL agreed to include both maximum grab sample concentrations and monthly average concentrations as part of the licence terms and conditions for these types of discharges, but this commitment was not carried forward to the NWB's list of commitments and therefore, not specifically addressed in the June 2007 Information Supplement. In the Information Supplement (#49), MHBL commits to submitting an updated Follow-up and Monitoring Plan by July 30, 2007 to address the inconsistencies raised by the various reviewers. It is unclear whether this issue will be addressed in this revised plan.

In addition, MHBL clarified that if drainage is not applied to the land and the pond has reached capacity, it will be diverted to Tail Lake. This should be reflected in licence.

Recommendations
a) Pending review of the July 30, 2007 update, it is recommended that the water licence include both maximum grab sample concentrations and monthly average concentrations as part of the licence standards for discharges to the tundra from the landfarm, landfill, camp/mill sedimentation pond, fuel tank farm and fuel

transfer station. The monitoring program should include monitoring of the volumes discharged and/or transferred to Tail Lake, in addition to water quality monitoring.

b) If drainage does not meet permit criteria for discharge to the tundra, it is recommended that the water be diverted to Tail Lake.

2.8.7. Construction Sewage Discharge Standards

Comments/Rationale

During construction, sewage will be treated in the modular treatment plant and discharged to the tundra. The revised water licence application did not provide detailed information on the discharge location, proposed discharge limits, or the volume of sewage that will be discharged to the tundra. These would need to meet the 1992 NWT Wastewater Discharge Guidelines, which have been adopted by the NWB.

At the Pre-Hearing Technical Meeting, MHBL agreed to submit this information and was carried forward into the NWB's list of commitments. In the June 2007 Information Supplement, MHBL provides proposed maximum average discharge limits for the sewage discharge during construction. As well, detailed information about the location of the discharge, design of discharge including armouring, and the proposed monitoring program including a licence compliance point for this discharge (discharge pump box) and a receiving water sample point (Doris Lake near the freshwater intake). These two (2) additional points/stations have not been included in the updated SNP table provided in response to commitment 32. In the June 2007 Information Supplement (#49), MHBL commits to submitting an updated Follow-up and Monitoring Plan by July 30, 2007 to address the inconsistencies raised by the various reviewers. It is unclear whether this issue will be addressed in this revised plan. The proposed monitoring program also includes daily visual monitoring of the land application point to ensure that erosion protection is working and that the outflow does not cause erosive damage.

Recommendation

a) It is recommended that the water licence SNP program include the two (2) new sampling stations for the construction sewage discharge:
   - construction Sewage Discharge Compliance point (discharge pump box); and,
   - Receiving Water Sample point – Doris Lake near the fresh water intake.

b) The licence discharge standards for the construction sewage discharge should include both maximum grab sample concentrations and monthly average concentrations.

2.8.8. Tail Lake Discharge Standards

Comments/Rationale
During operations treated sewage will be discharged to Tail Lake along with the mill tailings. Although the relative contribution to Tail Lake from the sewage is small compared to the mill effluent, the end-of-pipe criteria for the Tail Lake discharge should be expanded to include sewage-specific water quality parameters. Specifically, Biological Oxygen Demand (BOD_5) and Faecal Coliforms should be added to the list of licence water quality parameters and to the Tail Lake SNP program. The requirement for this stems from the need to ensure protection of the downstream receiving environment and its users.

Recommendation
a) The list of end-of-pipe Discharge Standards for all discharges from Tail Lake should be expanded form that proposed in the revised Table 6.4 (Item #18 June 2007 Information Supplement) to include biological oxygen demand (BOD_5) and Faecal Coliforms.
b) The SNP program for Tail Lake should be expanded from that proposed in the revised table 5.1 (Item #32 of the June 2007 Information Supplement) to include monthly measurements of biological oxygen demand (BOD_5) and Faecal Coliforms.

2.9. Part H: Conditions Applying to Waste Management Plans

2.9.1. Quarry Rock Management

Comments/Rationale
In Supporting Document S7, Geochemical Characterization of Quarry Materials, MHBL indicated that if a quarry sample is classified as potentially acid generating (PAG), it will be placed underground as backfill or returned to the quarry (Section 4.3, paragraph 2). Miramar Hope Bay Ltd. later confirmed that PAG quarry rock would be placed in the underground and not in the quarry (April 2007 Revised Water License Application).

Recommendation
It is recommend that the water license include a provision that if any quarry rock is characterized as PAG, it should be placed in the underground, and not placed back in the quarry.

2.9.2. Quarry Rock Seepage Management

Comments/Rationale
At the Pre-Hearing Technical Meeting, MHBL clarified that if seepage from quarry rock is determined to be unacceptable, it will be collected and transferred to Tail Lake.

Clarification is required from MHBL with regard to how the seepage is characterized as acceptable or unacceptable. This should be reflected in the water management plan.

Recommendation
The water license should include a provision that if quarry rock seepage is determined unacceptable, as determined by, but not exclusively, the quarry rock seepage monitoring program, the seepage shall be transferred to Tail Lake.

2.9.3. Waste Rock Management

Comments/Rationale
Characterization of ore and waste rock to date has not been robust, but was considered acceptable because of the proposed mitigation (placing all waste rock back underground), the assumption of freezing conditions in the underground workings, and the short mine life (2 years). Any significant extension to the mine life would increase the uncertainty associated with potential impacts from materials stored underground. Thus, it is considered prudent to link samples that have been analyzed for geochemical characteristics with the material they represent and to document their final placement in underground locations. Monitoring of where specific waste rock is permanently placed underground has not been proposed by the proponent.

This issue was discussed at the Pre-Hearing Technical Meeting, with MHBL being amenable to general sorting of waste rock on the storage pad by lithology or source location relative to distance from the ore body (i.e., early ramp material separate from cross-cuts or materials located near the ore body).

Recommendation
It is recommended that the water license consider or include the following.

a) All waste rock should be identified by general lithology and underground location and placed accordingly on the Temporary Waste Rock Pile Pad.
b) All waste rock should placed underground and should not be used for construction or left on surface either subaerially or subaqueously, at closure. Waste rock remaining on the surface after two years of operations should be characterized for acid rock drainage and metal leaching (ARD/ML) to assess outstanding risks. It is recommended that sampling be at a rate of one sample per 5,000 tonnes, and it should be demonstrated that the 5,000 tonnes is generally all from one rock lithology and underground location. Characterization should consist of:
    - Acid base accounting (with total sulphur and sulphate);
    - Total inorganic carbon (TIC);
    - A full suite of trace metals by ICP; and
    - Effective NP.

Indian and Northern Affairs Canada recommends that the water licence should not allow any provisions which would make it possible for waste rock to be used for construction purposes. The current characterization proposes to use the characterization criteria of NPR > 3 to define rock that is deemed suitable for construction purposes. In using this criteria, the current characterization program is insufficient to demonstrate that any of the waste rock would not leach metals or generate net acidity and therefore not create adverse impacts. Should the proponent desire to seek authorization to use materials from the underground for construction, the following data for each desired lithology should be provided to the NWB for review and consideration:

- Humidity cell and field kinetic test (e.g., barrel) geochemical data; and
- Static geochemical program, including determination of effective NP.

2.10. Part I: Conditions Applying to Modifications

2.10.1. As-built Drawings of North and South Dams

Comments/Rationale

Although not previously raised as a technical issue, MHBL should produce as-built drawings of the North and South Dams as well as for all the shoreline protection measures for Tail Lake. This information is usually requested as a water licence condition and is included here as a reminder to the Nunavut Water Board for drafting the licence.

Recommendation

The water licence should include the requirement for:

a) As-built plans for the North and South Dams; and
b) As-built plans for Tail Lake shoreline protection measures implemented proactively prior to raising lake level, as well as those implemented in response to subsequent erosion under the Shoreline Adaptive Management Plan.

2.10.2. Expansion of Project Beyond Proposed Two-Year Mine Life

Comments/Rationale

Should the mine operate beyond its approved two (2) years, risks associated with storage of waste rock on the surface and the storage of cyanide leach residue and waste rock underground will increase. As well, it can be expected that the quality of the underground water will decrease. In this event, it is likely that the impact significance assessments concluded during the project's environmental assessment would no longer be accurate and MHBL would revise its impact predictions accordingly, providing a copy of its analysis to the NWB for review.

Recommendation
It is recommended that the water license should include a clause that if MHBL propose's to operate the mine beyond the approved two (2) years, the following recommendations be implemented six (6) months prior to such an application.

a) The water quality model be re-run, using actual monitoring data and any additional data to update the model.
b) Geochemical characterization for the following:
   - Waste rock remaining of surface;
   - Exposed underground wall rock;
   - Exposed waste rock and cyanide leach residue in underground.
c) Temperature status provided of waste rock and cyanide leach residue stored in underground.
d) An assessment of impacts associated with Doris North mine materials for the extended period of operations.

The above studies should be submitted, for review and approval, to the NWB prior to an extension being granted.

2.11. Part J: Conditions Applying to Contingency Planning

Presently, INAC has not identified any recommendations associated with this component of the licence.

2.12. Part K: Conditions Applying to General and Aquatics Effects Monitoring

Comments/Rationale:
Under the *Nunavut Waters and Surface Rights Tribunal Act,* INAC will be responsible for inspecting and monitoring compliance with the water licence to be issued by the NWB. Indian and Northern Affairs Canada considers it to be necessary for an Inspector designated by the Minister under Section 85(1) of the Act to work in cooperation with representatives of MHBL to select appropriate SNP locations for the monitoring of the project's impact on the freshwater quality of its receiving environment.

Recommendation
Indian and Northern Affairs Canada recommends that upon completion of a detailed site inspection by an Inspector and representatives of MHBL, a report detailing final SNP locations (i.e., specify the actual global positioning system (GPS) locations) used by the Inspector be provided to the NWB for review. This report should be provided by MHBL with the consent of Indian and Northern Affairs Canada.

2.12.1. Camp /Mill Pad Sedimentation Pond

Conditions/Rationale
Indian and Northern Affairs Canada notes that MHBL has not revised its Proposed SNP Monitoring Stations, Sampling Frequency, and Monitoring Parameters table provided in the June 2007 Information Supplement (Item #32, Table 5.1) to include nitrates and nitrites as monitoring parameters at the Camp Mill/Pad Sedimentation Pond SNP site ST1. Miramar Hope Bay Ltd. committed to expanding its water quality analysis program at this site to include nitrites and nitrates at the NWB Pre-Hearing Technical Meeting under commitment Item #36.

Recommendation
Miramar Hope Bay Ltd. should ensure that the Doris North Project's Camp/Mill Pad Sedimentation Pond be monitored for nitrates and nitrates in addition to pH, total suspended solids, total ammonia, total sulphate, total CN, total oil and grease, Al, As, Cu, Fe, Pb, Ni, and ZN under its surveillance network program.

2.12.2. Temporary Waste Rock Pollution Control Pond

Conditions/Rationale
The Temporary Waste Rock Pollution Control Pond, SNP site ST2, will have its water quality sampled on a monthly basis during open water conditions for pH, total suspended solids, total ammonia, total sulphate, total CN, total oil and grease, alkalinity, chloride, Al, As, Cu, Fe, Pb, Ni, and Zn. Indian and Northern Affairs Canada recommends that these parameters be expanded to include nitrates, nitrites, and a full trace metal suite by ICP scan to provide a more complete understanding of the possibility for acid rock drainage / metal leachate to emanate from the collected waste rock. This information is valuable to understanding the Temporary Waste Rock Pollution Control Pond's impact on Tail Lake, should its water be discharged to Tail Lake, due to its designation as a source term in the project's water quality model.

Recommendation
The Temporary Waste Rock Pollution Control Pond's monthly SNP site assessment during open water conditions should have its water quality sample parameters expanded to include nitrates, nitrites, and a full suite of trace metals by ICP scan. Volumes of water sent to Tail Lake in addition to volumes of water sent to Tail Lake, if any, should be recorded. Data should be reported annually, with discussions on trends and implications to waste rock management and mitigation measures.

2.12.3. Underground Water Quality Monitoring

Comments/Rationale
Water from the underground is one of the source terms in MHBL's water quality model, on which their water management discharge strategy is based. Monitoring of the water from the underground will provide geochemical information from which the modeled source term can be compared against. When the model is updated, the results from monitoring underground mine water can be used to update the model.

Recommendation
The water license should expand the current proposed SNP monitoring plan to include monthly monitoring of the underground mine water at the final sump prior to transfer to Tail Lake. The following parameters should be analyzed:

- Volume;
- Flow rate;
- Ph;
- TSS;
- Total ammonia;
- Nitrate;
- Nitrite;
- Sulphate; and
- Full suite of dozens of trace metals by ICP scan.

2.12.4. Quarry Construction Rock Seepage Monitoring and Management

Comments/Rationale
The April 2007 Revised Support Document proposes a quarry seepage monitoring program. At the Pre-Hearing Technical Meeting, INAC requested that MHBL provide information related to the following issues:

- How the current monitoring plan addresses metal leaching with using only ph;
- The rationale for using a ph of < 5.0 or >8.0 as an indicator of potential impacts; and,
- A consideration of the addition of field electrical conductivity (EC) or other indicator parameters to address other potential impacts, and/or more thorough analyses of a seep sample upset.

Miramar Hope Bay Ltd. was amenable to expanding their monitoring program to include field EC. However, secondary evaluations of the seepage would only be performed if seepages were considered acidic or alkaline, as per their proposed criteria. At the Pre-Hearing Technical Meeting, INAC requested that the following information be provided by MHBL to resolve this issue (please note that was not included in the NWB list of commitments arising from the Technical Meeting):

- Updated monitoring plan to include field EC;

- Expanding the existing program to include monitoring of drainage from proposed rock drains; and,
- pH of standing water on tundra at site.

Furthermore, MHBL proposed that a seepage assessment be performed at monitoring stations. However, seepage flow paths can be ephemeral, therefore, the monitoring locations should have a level of flexibility to accommodate this fact. At the Pre-hearing Technical Meeting, MHBL clarified that the quarry monitoring program of seepage will be conducted on ephemeral seepage and not at fixed seepage stations. This clarification should be provided in the monitoring plan.

At the Pre-Hearing Technical Meeting, INAC made some additional recommendations to MHBL's program to make the program more robust, namely:

- Addition of field EC to the monitoring program;
- Monitoring stations are to be based on ephemeral drainage;
- Provisions for secondary geochemical characterization;
- Inclusion of a program to monitor the rock drains in the road; and,
- Reporting of the seepage monitoring program.

Recommendations

a) Pending review of MHBL's updated program, the water license should include specific sections of the construction quarry rock seepage monitoring and management plan. Miramar Hope Bay Ltd.'s proposed program is paraphrased with additional recommendations, as bolded and italicized text.

- A seep survey will be conducted in the first spring freshet following the major earthworks construction (Spring of 2008) along the roadways and beside the pads to measure pH and ***electrical conductivity (EC)*** levels in the precipitation runoff and snowmelt that comes in contact with this rock. A total of 100 samples will be collected for each sampling program in any given year from across the site (spread to capture a representative cross-section of all rockfill used in site construction) to verify that the rock used in construction is non-acid generating and non-metal leaching. ***The quarry rock seepage program shall be conducted on ephemeral seepage present at the time of the quarry rock seepage monitoring program and not at pre-determined seepage stations.*** The data will be cross-referenced to a site infrastructure map. The pH and EC of each seep will be measured using field pH and EC meters, with the following data recorded:
  - Location of sample point;
  - GPS co-ordinates of sample point;
  - The name of the person who performed the sampling;
  - Date and time of sampling;

- Date of analysis;
- Name of person who performed the analysis;
- Analytical method or techniques used; and,
- Results of analysis.

- In any location where the field pH is measured to be below 5.0 or above 8.0, a water sample will be collected and submitted for secondary analysis, specifically:
  - pH;
  - Total Sulphate;
  - Total Ammonia;
  - Nitrate;
  - Alkalinity;
  - Acidity; and
  - Full trace metal suite by ICP.
- ***At least 20% of the total sample set will be submitted for secondary analysis, regardless of the values of measured field pH and EC.***
- This seep survey will be repeated in the spring freshet of 2009 and 2010.
- ***The Quarry Construction Rock Seepage Monitoring Program shall be expanded beyond the 100 samples to include monitoring of all rock drains associated with the roads.***
- ***A report shall be compiled that presents the data collected, complete with a discussion geochemical data interpretation. This report shall be presented to the NWB for review, not more than six (6) months after the collection of the samples.***

b) Any potentially acid generating rock located by this means will be tagged for removal and replacement. The material removed will be moved to the temporary waste rock stockpile, to ultimately be placed underground.

2.12.5. Waste Rock Monitoring

Comments/Rationale

Characterization of ore and waste rock to date has not been robust, but was considered acceptable because of the proposed mitigation (placing all waste rock back underground), the assumption of freezing conditions in the underground workings, and the short mine life (2 years). Any significant extension to the mine life would increase the uncertainty associated with potential impacts from materials stored underground. Thus, it is considered prudent to link samples that have been analyzed for geochemical characteristics with the material they represent and to document their final placement in underground locations. Monitoring of where specific waste rock is permanently placed underground has not been proposed by the proponent.

This issue was discussed at the Pre-Hearing Technical Meeting, with MHBL being amenable to general sorting of waste rock on the storage pad by lithology or source location relative to distance from the ore body (i.e., early ramp material separate from cross-cuts or materials located near the ore body).

Recommendation

Pending review of the July 30, 2007 update, the water license should include the following waste rock monitoring plan:

a) Monitoring of lithologies and tonnages placed on Temporary Waste Rock Pile Pad; and,
b) Monitoring of lithologies and tonnages removed from the Temporary Waste Rock Pile Pad to the underground, detailing the location where waste rock is deposited by respective their lithology.

2.12.6. Tailings Solids Monitoring

Comments/Rationale

The monitoring plan for the solid-phase milling waste products (i.e., combined tailings stream, and cyanide leach residue) prescribes sampling frequencies but not geochemical parameters or characterization criteria. Previous geochemical test work of the tailings humidity cell residue confirmed that the presence of siderite, which suggested that the Sobek NP overstates the effective neutralizing potential (NP) of the tailings.

According to the June 2007 Information Supplement, MHBL is addressing the issue of effective NP for leach residue generated by the latest metallurgical program. Results should be available prior to July 30, 2007.

Recommendation

Pending review of the July 30, 2007 update, the water license should include the following tailings solids monitoring plan:

a) Monthly monitoring at SNP station TL6 (Combined Tailings Discharged into Tail Lake, Solid Component) – taken from the discharge end of the mill tailings pumps) of the following parameters:
   - Tonnage and its makeup, i.e., tonnage of rougher tails and tonnage of cyanide leach residue,
   - Acid Base Accounting (ABA), including total sulphur and sulphate;
   - A full suite of dozens of trace metals by ICP scan;
   - Total inorganic carbon (TIC); and,
   - Monitoring of effective NP should be conducted if tailings from future deposit are to be placed on top (i.e. use of Tail Lake for other projects).

2.12.7. Tailings Supernatant Monitoring

Comments/Rationale

Miramar Hope Bay Ltd. committed to providing an updated monitoring program for the tailings supernatant at the June 2007 Pre-Hearing Technical Meeting, but this item was never included in the NWB's list of commitments. Pending review of the updated monitoring plan, recommendations are offered below.

Recommendation

Pending review of the update, the water license should include the following monitoring plan:

a) Monitoring at SNP station TL5 (Combined Tailings Discharged into Tail Lake, Water Component) – taken from a valve at the discharge end of the mill tailings pumps) of the following parameters initially on a daily basis, reduced to weekly after three (3) months of operation:
   - Volume;
   - pH;
   - TSS;
   - Free cyanide;
   - Total cyanide;
   - WAD cyanide;
   - Total ammonia;
   - Nitrate;
   - Nitrite;
   - Sulphate; and
   - A full suite of trace metals by ICP scan.

b) In addition, monitoring of thiocyanate and cyanate should be conducted weekly initially, and reduced to monthly after 3 months of operation.

2.12.8. Cyanide Leach Residue Monitoring

Comments/Rationale

Indian and Northern Affairs Canada understands from previous discussions with the proponent that further metallurgical work is underway. Cyanide species characterization on the various waste streams, including the leach residue solids from that testwork would provide characterization data appropriate to the current mill flow sheet well in advance of operations, which would allow further refinement of current management plans and also demonstrate that target cyanide levels in treated water quality can be achieved.

Miramar Hope Bay Ltd. has agreed to submit a geochemical monitoring plan for the cyanide leach residue, which is to be provided for review in anticipation of the Public Hearing.

According to supplementary information submitted by MHBL in June 2007 (item #9), geochemical test work of the treated cyanide leach residue solution and cyanide leach residue solids (both after cyanide destruct) is currently in progress. Cyanide is not being determined for the leach residues solids. Indian and Northern Affairs Canada has requested MHBL to perform this analysis (email to Larry Connell dated July 7, 2007). Results are expected ahead of the July 30th date for final submissions for the public hearing process. It is MHBL's opinion that geochemical characterization of the leach residue prior to placement underground is not required given that all PAG material will be mitigated through eventual freezing once placed. The cyanide leach residue is a relatively new project component, having been introduced to the project plan following the NIRB approval of the EIS. Therefore, geochemical data are limited and the ARD/ML characteristics of the cyanide leach residue are largely uncertain. Accordingly, Indian and Northern Affairs Canada is recommending monitoring. Geochemical results of the cyanide leach residue are pending, which depending on the data, may or may not modify the following recommendation.

Recommendation
Pending review of the July 30, 2007 update, it is recommended that the water license include the following.

a) Monthly monitoring at SNP station TL7 (Filtered Cyanide Leach Residue sent underground as backfill) of the following parameters:
   - Tonnage;
   - Acid base accounting (ABA), including total sulphur and sulphate;
   - Total inorganic carbon (TIC);
   - A full suite of dozens of trace metals by ICP scan;
   - Effective NP (e.g., mineralogy, acid base characteristic curves, siderite corrected NP);
   - Cyanide (total and WAD); and
   - Moisture content.

b) A humidity cell on a representative sample of cyanide leach residue shall be initiated as early as possible. The termination of the humidity cell is at the discretion of the NWB. Furthermore, the humidity cell cannot be terminated while the underground is in operation (i.e., if the mine life continues beyond the anticipated two years, the humidity cell must continue running).

c) On a monthly basis, the cyanide leach residue placed underground shall be inspected for the extent of freezing and presence of seepage. If seepage is observed, the following information should be colleted for each sample:

- Location of sample point, including cross reference with site infrastructure;
- Name of underground area from which the seepage was located;
- Date cyanide leach residue was placed;
- The name of the person who performed the sampling;
- Date and time of sampling;
- Flow rate;
- Date of analysis;
- Name of person who performed the analysis;
- Analytical method or techniques used; and
- Results of analysis.

d) A sample of seepage, if any, shall be taken and analyzed for the following parameters:
   - pH;
   - Electrical conductivity (EC);
   - Full suite of dozens of trace metals suite by ICP scan;
   - Alkalinity;
   - Acidity;
   - Sulphate;
   - Cyanide (total and WAD); and
   - Nutrients (total ammonia, nitrate and nitrite).

2.12.9. Cyanide Destruction Circuit Monitoring

Comments/Rationale

To determine whether the cyanide destruction system is functioning as predicted, MHBL plans to conduct operation monitoring of the cyanide destruction circuit, including cyanide species (total CN, WAD CN), and key metal species (iron, copper and others), but will only make these data available if the water quality model is updated (when there is greater than a 20% deviation from the predicted results). Miramar Hope Bay Ltd. is of the opinion that data from the SNP program (discharge from the mill to Tail Lake) should be sufficient for regulatory purposes.

Indian Northern Affairs Canada notes that the cyanide bleed is a key source term of the project's water quality model. Since the proposed SNP station at the final discharge to the tailings facility does not allow for identification of the specific source of any noted problems, it is recommended that the influent and effluent be sampled monthly for pH, total cyanide, WAD cyanide, chemical oxygen demand (COD), dissolved Fe, Cu, Zn, Cd, As and Ni, and that collected data be provided in Annual Reports. The Annual Report should also report on the frequency, extent and concentration values associated with operational upsets.

Recommendation
Effluent from the cyanide destruction circuit should be analyzed monthly for pH, total cyanide, weak-acid dissociable cyanide, chemical oxygen demand (COD), dissolved Fe, Cu, As, Zn, Cd and Ni, and the result submitted to the NWB for review.

2.12.10. Tail Lake Monitoring

Comments/Rationale
Indian and Northern Affairs Canada understands that MHBL is of the opinion that monitoring of dissolved oxygen is unnecessary and that an increase in nitrogen species such as nitrate, nitrite and ammonia would serve as a proxy to diminishing oxidative capacity in Tail Lake. Furthermore, MHBL believe that monitoring of dissolved oxygen to be unwarranted and accordingly, that reduction / oxidation reaction redox would be a more appropriate parameter to measure in the field.

However, INAC considers monitoring of dissolved oxygen and/or redox to be prudent given the cyanide and nitrogen species loadings in Tail Lake resulting from milling. The water quality model assumed that Tail Lake will remain oxic, which is critical for the processes of cyanide, ammonia, nitrate and nitrite degradation. Use of meta-bisulphide in the SO_2/Air cyanide destruction circuit can result in low oxygen levels in the treated discharge, which may influence oxygen levels in Tail Lake. Monitoring of in-situ oxygen in Tail Lake would assist in testing this assumption. Furthermore, it will allow greater anticipation of potentially required changes to proposed effluent discharge management should oxygen levels decrease. Dissolved oxygen is a relatively simple parameter to determine in the field.

Recommendation
The water license should include dissolved oxygen and/or redox monitoring (in situ) in Tail Lake at SNP station TL5 (Combined Tailings Discharged into Tail Lake, Water Component) and reclaim stations once every two (2) months.

2.12.11. Stormwater Discharge Monitoring

Comments/Rationale

Miramar Hope Bay Ltd. plan to discharge collected precipitation runoff from the landfarm facility to the tundra which meets the outlined discharge criteria, but there is no information of the quantity of material that will be discharged. The same issue exists for the discharge from the landfill, camp and mill pad sedimentation pond, fuel transfer station, and fuel tank farm. Miramar Hope Bay Ltd. originally planned to measure only water quality at all of these locations, and did not plan to measure water quantity.

At the Pre-Hearing Technical Meeting, MHBL committed to adding water quantity to the SNP program, but this commitment was not carried forward to the NWB's list of commitments and therefore not specifically addressed in the June 2007 Information Supplement. In the Information Supplement (#49) MHBL commits to submitting an updated Follow-up and Monitoring Plan by July 30, 2007 to address the inconsistencies raised by the various reviewers. It is unclear whether this issue will be addressed in this revised plan.

Recommendation
Pending review of the July 30, 2007 update, it is recommended that the water licence include the monitoring of flow during periods of discharge to the tundra from the landfarm facility, landfill, camp/mill sedimentation pond, fuel tank farm and fuel transfer station.

2.12.12. Construction Sewage Monitoring

Comments/Rationale and Recommendations
Refer to Section 2.8.7 (Construction Sewage Discharge Standards)

2.12.13. Tundra Discharge Monitoring

Comments/Rationale
Miramar Hope Bay Ltd.'s current monitoring program needs to be expanded to include the following:

- A more detailed discussion of construction monitoring; and,
- A component to monitor downstream of the discharges to tundra, specifically for erosion.

At the Pre-Hearing Technical Meeting MHBL committed to providing this information, but only the requirement for more details on construction monitoring was carried forward into the NWB's list of commitments. Other than a discussion provided under Item #16 for Construction Sewage Treatment in the June 2007 Information Supplement, no additional information was provided with respect to the inclusion of monitoring the discharges to the tundra. Under Item #16, MHBL outlines how the land discharge point for construction sewage will be armoured with riprap to prevent erosion of the tundra. In addition, daily visual monitoring of the land application point will be carried out to ensure that erosion protection is working and not resulting in erosive damage. This erosion protection and monitoring should also be applied at all the other tundra discharge locations.

Recommendations
The water licence should require:

a) Daily visual monitoring, while discharging, of all discharges to the tundra including the fuel transfer station, fuel tank farm, landfarm facility, camp/mill pad sedimentation pond and construction sewage discharge; and
b) All tundra discharge locations to be suitably armoured to prevent erosion of the tundra.

2.12.14. Tail Lake Discharge Monitoring

Comments/Rationale and Recommendations
Refer to Section 2.8.8 (Tail Lake Discharge Standards)

2.12.15. Tail Lake Shoreline Erosion Monitoring

Comment/Rationale
Miramar Hope Bay Ltd. has set up several erosion monitoring stations along the shoreline of Tail Lake to obtain baseline data. As part of the adaptive management plan, any shoreline areas undergoing erosion will be mitigated during operations. A key trigger to identifying areas where erosion is taking place is the presence of clouds of turbidity in the water. Visually noting the presence of suspended solids in the water at each of the erosion monitoring is already being done by MHBL and should be continued during operations as part of the regular SNP monitoring protocol.

Recommendation
The existing erosion monitoring stations around Tail Lake should be included as part of the SNP. The monitoring protocol should include a visual assessment of suspended sediment in the water at each location. The shoreline erosion monitoring stations should be included as part of the Annual Geotechnical Inspection.

2.12.16. Geotechnical Monitoring

Comments/Rationale
Due to the precedent setting nature of the North and South Dams, observation of the performance of these structures by various types of instrumentation is critical to assessing if the dams are behaving as predicted in design. The monitoring program should include thermal, as well as deformation measurements.

Recommendation
It is recommended that the Licensee measure and record all temperature and deformation measurements on instrumentation installed in the North and South Dams. This information should be summarized and assessed by MHBL in the Annual Report

as well as being provided to the geotechnical engineer conducting the annual geotechnical inspection for review and comment with respect to the design versus performance of the dams.

2.12.17. Thermal Monitoring

Comments/Rationale

Miramar Hope Bay Ltd. has already installed thermistors to measure ground temperatures at various locations within the project area including:

- The shoreline of Tail Lake;
- Between Tail Lake and Doris Lake; and,
- Between Doris Lake and the underground mine workings.

The data collected from these instruments provides baseline conditions prior to mining activities and should be included in the site monitoring plan so that any changes due to mining activities are detected. Miramar Hope Bay Ltd. plans to install additional thermistors in the North and South dams and Roberts Bay Jetty. In view of MHBL's intention to ventilate the mine using ambient air, it is also recommended that MHBL monitor rock temperatures around the underground workings, particularly in the pillar between the mine and the Doris Lake talik. Additional thermistors should be installed underground to supplement the surface thermistor data already being obtained. Miramar Hope Bay Ltd. has identified two major geological structures that extend between the Doris Lake talik and the underground mine workings that may act as pathways for seepage into the mine if the permafrost was not present. Increased seepage into the mine would be a concern due to the need to pump and potentially treat this water in order to maintain water quality in Tail Lake so that it can be released according to the discharge scenarios.

At closure, the temperature data collected will be required to support the assessment of the long-term stability of the underground workings.

Recommendation

As part of the General Monitoring Plan, MHBL should include additional thermistors to monitor rock temperatures surrounding the underground mine openings, particularly in the pillar adjacent to the Doris Lake talik. The data collected by the thermal monitoring program should be summarized in the Annual Report. In addition, MHBL should provide this data to the geotechnical engineer conducting the annual geotechnical inspection for review and comments regarding the thermal stability and permafrost regime at each location.

2.12.18. North and South Dam Seepage Monitoring

Comment/Rationale
Any seepage at the downstream toe of the dams must be noted and monitored. If seepage is occurring through the dam, then mitigation measures must be implemented as soon as possible to prevent thermal erosion of the frozen core or foundation. It is, therefore, important for the geotechnical engineer to assess if the seepage is related to runoff or seasonal thaw, or seepage through the dam.

Recommendation
a) Miramar Hope Bay Ltd. should provide a protocol for monitoring and assessing seepage along the downstream side of the North and South Dams to identify and report seepage originating from Tail Lake to the geotechnical engineer of record so that appropriate mitigative and monitoring measures can be implemented.
b) The above seepage monitoring and reporting protocol should be incorporated into the Site Monitoring and Follow-up Plan.

2.13. Part L: Conditions Applying to General and Aquatics Effects Monitoring Plans

2.13.1. Quality Assurance / Quality Control Plan

Comments/Rationale
Miramar Hope Bay Ltd. committed to providing an updated Quality Assurance / Quality Control (QA/QC) plan to edit out the inconsistencies noted by reviewers at the Pre-Hearing Technical Meeting by July 30, 2007 (#49). As well a further update of this plan will be submitted prior to operations (anticipated to be in March 2008 according to Gantt chart provided in June 2007 Information Supplement #3). The list of parameters to be measured on and off-site will be provided prior to the Public Hearing (Commitment #43). As part of the June 2007 Information Supplement, MHBL has revised Table 3.10 in the April 2007 Revised Application Support Document and Table 5.8 in the April Monitoring and Follow-up Plan to indicate what analytical parameters will be measured on-site and off-site. Miramar Hope Bay Ltd. clarifies that, although there will be on-site analytical capability, all compliance samples will be sent to a commercial accredited laboratory.

Miramar Hope Bay Ltd., as part of the June 2007 Information Supplement (#42) has provided an outline of the contingency plan should the on-site laboratory become inoperable. This includes the termination of the discharge of water from Tail Lake until the key environmental data can be obtained from an outside laboratory. Miramar Hope Bay Ltd. will maintain critical spare parts on site to reduce this risk.

Recommendation
The water licence should contain a term and condition for the submission of a QA/QC Plan, as suggested:

Miramar Hope Bay Ltd. shall submit for review and approval, prior to operations, an updated QA/QC Plan that builds on the existing preliminary plan submitted as part of the April 2007 Revised Water Licence Application Support Document and includes the following:

- A detailed plan outlining the set up, calibration, operations and maintenance of the laboratory, including contingencies that will be put in place during periods when the on-site laboratory equipment is not operational;
- List of parameters that will be measured onsite and off-site;
- Details on how the results of the off-site analysis (including ammonia, nitrate and nitrite) will be incorporated in the calculation of the optional ADVR, given the longer turn around time for off-site analysis; and,
- The method detection limits (MDL's) that will be used for all parameters, analyzed both on-site and off-site.

The timing of the submission of the Quality Assurance / Quality Control (QA/QC) Plan must provide sufficient time for review and approval prior to operations.

2.14. Part M: Conditions Applying to Closure and Reclamation

2.14.1. Mine Closure and Reclamation Plan

Comments/Rationale
The Mine Closure and Reclamation Plan submitted with the Revised Support Document is not to a level of detail that INAC considers meets the standard for final closure. Ideally, such a document is submitted two (2) years before the end of mining.

Recommendation
Given the short life of the Doris North mine, it is recommended the MHBL submit an Interim Mine Closure and Reclamation Plan no later than 6 months after the start of mining (once all constructed facilities are in place) and a Final Mine Closure and Reclamation Plan no later than 18 months after the start of mining (6 months before the expected end of mining). Both the Interim and Final plan are to incorporate revisions which reflect the current status of the mine development.

The Interim and Final Plans should provide more detail in at least the following areas of the report:

- approach to re-vegetation;
- post-closure monitoring;
- QA/QC for landfill disposal;

- an assessment of the long-term stability and creep deformations of the North Dam;
- landfarm facility design and performance, with prediction of future activities; and,
- completion of a risk assessment on the discharge of Tail Lake water to the receiving environment breaching the North Dam.

2.14.2. Disposal of Waste Rock

Comment/Rationale
Miramar Hope Bay Ltd. has committed to placing all waste rock back in the underground mine workings at the end of operations. Other disposal options such as the tailings pond have been debated and rejected. The underground workings are a physically and geochemically secure disposal option.

Recommendations
a) It is recommended that the reclamation security include a provision to ensure that this is done. A provision is included in the INAC estimate of reclamation liability.
b) The option of placing PAG rock underwater in Tail Lake at closure should be specifically excluded unless a more fully developed proposal is submitted for review and approved by the NWB.

2.14.3. Security Pertaining to Shoreline Erosion

Comment/Rationale
Thawing of the marine soils around the tailings impoundment is likely to occur. There is little geotechnical precedent for this problem. Miramar Hope Bay Ltd. has acknowledged this and has provided an acceptable strategy and financial assurance for the problem. Three aspects of shoreline erosion will be difficult to predict: extent of problem areas, time of onset of thawing and/or demonstrated performance of control measures, and the scope of control measures. Consequently, there may be prolonged uncertainty as to when the thaw instability has been adequately addressed.

Recommendation
It is recommended that all security pertaining to shoreline erosion be held until MHBL can demonstrate that no further erosion, settlement, or release of solids is likely to occur. The proponent should submit shoreline monitoring data along with details about the scope of any mitigation measures for review in the Annual Report to the NWB.

Also see recommendations related to Section 2.12.15 (Tail Lake Shoreline Erosion Monitoring)

2.14.4. Stability of Underground Mine Openings

Comments/Rationale
Upon completion of mining, some of the underground openings may not be completely backfilled. The stability of the underground workings should be evaluated at closure. A major consideration is the rock temperature and the permafrost regime.

Recommendation
The Mine Closure and Reclamation Plan submitted by MHBL should include an assessment of the stability of any underground mine openings that will remain open at closure. The assessment should consider rock mechanics, permafrost and hydrogeological factors based on data collected during operations and potential long term effects of global warming. Underground mine plans and sections, including the identification of areas of backfill, the type of material placed and volumes should also be included.

2.14.5. Disposal of Contaminated Soils Underground

Comment/Rationale
Miramar Hope Bay Ltd. intends to dispose of contaminated soils as backfill within the underground workings. The locations, types of material and volumes placed should be documented.

Recommendation
The Closure and Reclamation Plan should provide details of the protocol for disposal of contaminated soils underground. Underground disposal should only be considered after land-farming has been utilized to the maximum possible extent and alternative treatment options have been determined to be impractical (i.e., transfer of contaminated materials to an approved hazardous treatment facility). The underground disposal protocol should address the criteria for disposal, such as contaminants present, concentrations (i.e., no free phase hydrocarbons) and method of placing. The locations, types of materials and volumes placed should be documented.

2.14.6. Demolition Landfill

Comment/Rationale
Material placed into the demolition landfill will consist of inert, non-hazardous demolition debris. To minimize the potential for voids within the waste, it is necessary to adopt specific measures to breakdown the waste components prior to placement, as well as placement methods within the landfill. Miramar Hope Bay Ltd. have provided preliminary information in this regard with the June 2007 Information Supplement.

Recommendation
The Mine Closure and Reclamation Plan should provide a protocol for dismantling, sorting and cutting materials into manageable sizes for transport and placement in the demolition landfill to minimize voids and settlement of the cover. In addition, photo documentation of the materials placed into the landfill and a map showing the location of the various classes of materials should be provided.

See also Section 2.14.1 (Mine Closure and Reclamation Plan).

2.14.7. Pore water

Comment/Rationale
Given the short period of mine operations before the implementation of final closure plans, INAC previously proposed that a pore water monitoring program be incorporated into the closure plan to provide insight into additional contaminants that may release from tailings into the Tail Lake water after closure. Miramar Hope Bay Ltd. assessed the potential for diffusion and the transport mechanism and determined that due to the low concentration gradient of water quality parameters (e.g., metals) in the tailings pore water and Tail Lake, the potential for the flux of metals from the pore water to the overlying water column will be insignificant. Miramar Hope Bay Ltd. believes that the current proposed Tail Lake monitoring program will detect any changes in water quality due to contaminant release from the tailings pore water and as a result, pore water monitoring during closure is not required. However, INAC is of the opinion that the proposed Tail Lake monitoring is too general to detect the influence of pore water on contaminant loading to Tail Lake.

Recommendation
The water license should have a term that when reviewing the next version of the closure plan, MHBL should either demonstrate that pore water monitoring at closure is unnecessary or include it as a monitoring activity

3 Conclusion

Indian and Northern Affairs Canada is appreciative of the cooperation extended by MHBL to its personnel and consultants (refer to Appendix A to view those involved in INAC's contribution to this licence review). The Department is confident that issues identified within this intervention statement can be addressed at the upcoming final hearing and/or within licence terms and conditions. This intervention has addressed but is not limited to, a review of issues associated with surface and permafrost disturbance,

water quality and quantity assessment, waste management, project abandonment and reclamation.

Indian and Northern Affairs Canada is assured that MHBL is capable of successfully managing its Doris North Gold Mine in a manner that will provide rewarding socioeconomic opportunities for Nunavummiut while demonstrating responsible environmental stewardship.

4 Appendix A – Indian and Northern Affairs Canada Review Team

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