GIANT MINE
Oversight Board

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Attention: Shannon Allerston

November 7, 2019

MV2019X0007 and MV2007L8-0031 - DIAND-GIANT – Water Licence and Land Use Permit Applications

The Giant Mine Oversight Board (GMOB) has reviewed the material provided with regard to the Water Licence and Land Use Permit application submitted by the Giant Mine Remediation Project Team.

GMOB has fully participated in the technical review process and the attached submission includes our recommendations and relevant rationale.

GMOB will make the formal presentation of this intervention at the public hearing and respond to any questions which the MVLWB, the Project Team, and/or the public may have concerning the issues raised in this submission.

If there are any questions or concerns about this submission, please contact the GMOB office directly.

Sincerely,

Dr. Kathleen Racher
Chair, Giant Mine Oversight Board

Written Intervention

for the

Giant Mine Remediation Project

MV2007L8-0031/MV2019X0007

Prepared by:

The Giant Mine Oversight Board

Submitted November 7, 2019 to:

Mackenzie Valley Land and Water Board

7th Floor - 4922 48th Street

Yellowknife, NT

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Acronyms and Abbreviations

Abbreviation	Definition
AEMP	Aquatic Effects Monitoring Program
CBM	Community Based Monitoring
CRP	Closure and Reclamation Plan
DAR	Developer's Assessment Report
DFO	Department of Fisheries and Oceans Canada
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EEM	Environmental Effects Monitoring
EQC	Effluent Quality Criteria
ETP	Effluent Treatment Plant
Agreement	Environmental Agreement
GNWT	Government of the Northwest Territories
GMOB	Giant Mine Oversight Board
GMRP	Giant Mine Remediation Project
HHERA	Human Health and Ecological Risk Assessment
IPRP	Independent Peer Review Panel
IR	Information Request
MAC	Maximum Average Concentration
MCM	Main Construction Manager
MDMER	Metal and Diamond Mining Effluent Regulation
MGC	Maximum Grab Concentration
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board

NSMA	North Slave Metis Alliance
OMP	Operational Monitoring Program
PCP	Perpetual Care Plan
PHC	Petroleum Hydrocarbon
PMF	Probable Maximum Flood
POPC	Parameter of Potential Concern
QRA	Quantitative Risk Assessment
SDE	Surface Design Engagement
SNP	Surveillance Network Program
SSWQO	Site Specific Water Quality Objective
TCA	Tailings Containment Area
WQO	Water Quality Objective
WTP	Water Treatment Plan
YKDFN	Yellowknives Dene First Nation

Introduction

Measure 7 from the Environmental Assessment (EA) of the Giant Mine Remediation Project (GMRP or the Project) provides for the negotiation of a legally binding Environmental Agreement (Agreement) for the establishment of an Independent Oversight Body for the Project, i.e. the Giant Mine Oversight Body (GMOB). The Agreement identifies the role of GMOB as being to:

1. Promote public awareness of the Project, disseminate information about the Project, and promote public engagement in processes related to the Project;
2. Provide such independent advice to the Co-Proponents on the management of the Project as the Oversight Body considers appropriate;
3. Provide such independent advice to regulatory authorities, the Parties, the public, and to whomever else the Oversight Body considers appropriate, on the monitoring and management of the Project; and
4. Manage the program for research toward a permanent solution for dealing with arsenic at the Giant Mine site as set out in Article 7 ("Active Research Toward a Permanent Solution for Arsenic") and section 8.2 ("Research Results").

The Agreement directly provides for GMOB participation in the GMRP water licensing process. Participation also satisfies the third component of GMOB's role. The other components of GMOB's role are considered when providing comments and recommendations for the Board's consideration. GMOB's overarching intent is to help ensure that stakeholders in the process have the information they need to make informed decisions about the Project.

As a participant in the water licensing process, GMOB has reviewed the Updated Project Description and Water Licence Application, participated in the two technical sessions and reviewed the information request responses arising from these sessions. Within this technical report, GMOB provides a discussion of remaining concerns regarding the following topics:

- The freeze program, including considerations for future research and reversibility;
- Pit filling;
- Engagement Plan and communications;
- Site runoff;
- Effluent quality criteria;
- Aquatic effects monitoring;
- Plan content and approvals;
- Licence term.

Where possible, GMOB has provided recommendations to the Board to assist with the decision-making process.

GMOB would like to acknowledge the constructive participation of the GMRP Team through this process. To date, the licensing process has included a large number of requests for additional information and clarification. As the process evolved, GMOB was encouraged by the increasing willingness of the GMRP Team to engage in meaningful discussion on topics of concern to reviewers and

to actively consider modifying their submissions and ideas when warranted. Ultimately, a collaborative approach to developing the licence should facilitate efficient regulation of the Project as it proceeds.

1.0 Freeze Program - Future Research and Reversibility

At the center of this Project is the proposal to contain the 240,000 tonnes of arsenic trioxide by freezing it in place. During the Environmental Assessment (EA) process, the freeze was characterized as a temporary solution, with a permanent solution to be identified and implemented in the future. The Review Board recommended a set of measures intended to increase the possibility of identifying a better solution:

- Limit the Project to a maximum of 100 years;
- Require periodic review of the Project every 20 years; and
- Facilitate ongoing research in emerging technologies towards finding a permanent solution.

The work to identify a permanent solution is not part of the current Project scope, but forms a key part of GMOB's mandate. GMOB is actively facilitating research toward a permanent solution for dealing with arsenic trioxide dust at the Giant Mine site, and this role guided how GMOB participated in the regulatory process. GMOB pursued two lines of inquiry:

1. We sought to understand the need for the freeze given that it is intended as only a temporary management solution for keeping the environment safe from the stored arsenic trioxide dust.
2. In order to implement the results of this research program, actions taken during the remediation will need to be reversible, i.e. remediation measures should not make it impossible to access the arsenic materials.

It is important to note that although the need for reversibility has been discussed predominantly in the context of the arsenic trioxide dust already stored underground, the Project Team also plans to freeze other arsenic impacted waste that is currently stored on surface. This additional waste includes 16,000 m^3 of process residuals (and other materials and machinery contaminated with soluble arsenic), as well as approximately 52,000 m^3 of heavily contaminated granular fill from around the perimeter of the Roaster Complex. The Project Team plans to put this waste into the (currently empty) chamber 15 and in a portion of B1 pit that will be frozen due to its proximity to the other freeze zones. Depending on the permanent solution discovered for the arsenic trioxide dust through GMOB's research program, it may be possible to remediate the additional arsenic-impacted waste such that freezing is not necessary.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- MVEIRB - Report of Environmental Assessment and Reasons for Decision, Giant Mine Remediation Project, EA0809-001, June 20, 2013.

Proponent's Conclusion

Rationale for freezing

The GMRP Team has indicated that the current strategy of freezing the arsenic trioxide dust is a responsible method for managing the material using current technology. Freezing the dust underground provides additional containment for the material, while retaining the ability to apply a different management strategy in the future if better solutions are identified[1]. This position is articulated in the following quote from the July 11, 2019 Technical Sessions:

> *" The freeze program, we believe, is a very good solution for as long as we need it. We can hope for something else, for another option. It could be the next twenty-five (25) years, a hundred years, a hundred and twenty-five (125) years, five hundred (500) years, but the material that we have aboveground and below ground, I think I -- or we have the responsibility to do the best we can with it using the proven methods that we know today. So today, it's a unique problem. We have a unique solution. We've run some pretty unique tests through the FOS optimization study in the last half-dozen years, and -- and we are pretty confident that today, this freeze program provides some redundancy and resilience to the project overall, both above ground and below ground that solves or -- or kind of addresses some of the project uncertainties that we have."*

GMOB's understanding is that a major risk associated with keeping the arsenic underground is that the material will become flooded. Other on-site activities will largely address this risk, however creating the frozen shell will provide an additional level of security. The need for redundancy was described by the GMRP at the July 11 Technical Session in response to a line of questioning from GMOB[2]:

> *"...I like when you said zero probability. I don't believe it's zero probability. We still have a lot of uncertainty in our models, right? The climate models, we could have other failures, bank failures, the berms could fail, you know, if we think back to -- so if society fails us the pumps are down, water levels rise, we got 20 years for somebody to figure this out, it's just the prudent, right thing to do with all the uncertainty on the project up and down."*

The frozen shell is also expected to reduce the amount of arsenic and other contaminant loading to the underground minewater. These contaminants must be removed through treatment before the minewater can be discharged, and the expected reduction due to the freeze has been modelled at 80%[3].

Reversibility

Reversibility is included as an objective for the freeze program and was considered when developing designs for this component. This is explicitly described in the closure criteria and approach[4].

- Closure Objective F2: Reversibility for future technology developments in remediation has been maintained.

[1] Technical Session Transcripts, July 11 2019, pp. 185-188.
[2] Technical Session Transcripts, July 11 2019, p. 215.
[3] Technical Session Transcripts, July 10 2019, pp. 254-255.
[4] Technical Session 2 IR Response, Appendix 5.0A, Table 5.0A-3, October 2019.

- Criteria F2-1: Design engineering drawings are signed and stamped by a Qualified Professional and the specifications outlined therein are met, such that reversibility for future access is maintained.
- Criteria F2-2: Each chamber, stope, drift or pit filled with arsenic trioxide dust and/or arsenic-impacted waste is contained in a frozen shell, which can be reversed by thawing and/or excavation.
- Criteria F2-3: Backfill at minimum 100 kPa strength can be excavated to access chambers.

Updates to Closure Activities were provided in IR responses for the September Technical Sessions. These activities include additional clarifications regarding how containerized arsenic wastes will be placed underground (i.e., document where it is placed) to help to maintain reversibility. A new long-term underground mine access portal will be established. This access will be sealed once access to the underground is confirmed to no longer be required. However, the updated Closure Activities confirm that the portal will be sealed in such a manner that access can be re-established if required.

GMOB's Position

A key element of GMOB's role and mandate is to facilitate a research program toward a permanent solution for the arsenic trioxide. Actions taken by the Project today should not adversely impact implementation of a permanent solution in the future, and GMOB wants to ensure that the concept of reversibility is considered in all aspects of the remediation. This is not to imply that each component must in and of itself be reversible, but that actions taken to address any component should not impact the overall ability to implement a permanent solution for the stored arsenic materials.

Through the process, GMOB has asked questions about whether it is really a good idea to implement the freeze given that it is a temporary management solution and GMOB is working on new treatment technologies for the arsenic trioxide dust. The initial cost estimate for the freeze was high, and it was not clear that the cost compared to the potential benefit supported proceeding with the freeze, and whether the funds could be spent in a more constructive manner. GMOB notes that the recent cost estimates are lower than the original budget, and additional work has been completed to more clearly identify how the freeze program will benefit site management over the Project life (100 years).

Evidence provided by the GMRP shows that the freeze is not absolutely necessary for stabilizing the underground or preventing flooding, rather the frozen shell adds a layer of redundancy and robustness to the overall remediation objective of ensuring no further contamination to the receiving environment. To this end, having the arsenic in a frozen state would be beneficial in the event a flood event did occur, and freezing the arsenic will significantly reduce the loading of arsenic underground, which should result in lower treatment costs. Containing, rather than treating, the arsenic will also limit the production of additional arsenic containing materials (i.e., process residuals) which should make it easier to implement a future management option.

Discussion occurred at the Technical Sessions and at the September Closure Workshop regarding the reversibility of the freeze. GMOB's understanding is that creating a frozen shell around the arsenic dust will not prevent or complicate future access. The freeze could be reversed by thawing (either naturally, or by introducing heat through the thermosyphons), but it would also be possible to access the material

while it is cold. In addition, the proposed closure objectives and criteria for the freeze explicitly identify that reversibility has been considered.

Reversibility is also an important consideration for the contaminated materials intended for disposal in Chamber 15 and B1 pit. The demolition debris, in particular, will need to be placed in a manner that will not unnecessarily complicate removal. Detailed records of the additional materials placed including descriptions of how the materials could be removed should also be provided for use by future generations. The closure objectives and criteria table has been updated to reflect the requirement to document material placement which GMOB considers to be an important Project improvement. GMOB also would like to see the commitment to placing contaminated debris in an orderly fashion reflected in the appropriate management plans, along with a conceptual extraction strategy.

Recommendations

Recommendation 1

The Waste Management Plan should be updated to include the commitment to place arsenic-impacted materials into the pits and Chamber 15 in a manner that fully documents the type, quantity, location and placement of the materials and to develop an extraction strategy. The Waste Management Plan should describe where this information will be found after construction is complete (for example, in the As-Built reports and/or the Reclamation Completion Report).

2.0 Pit Filling

A total of eight pits were developed during the historic operation of the Giant Mine. The main reclamation objectives for this component of the closure plan are: 1) to reduce the potential for flooding of the underground by way of the pits; 2) to reduce safety risks to the public, workers and wildlife; and 3) to ensure that any materials used to fill the pits do not, themselves, become a source of contamination to the environment[5] .

The GMRP has proposed several activities in order to meet the first two objectives including:

- Reduce flooding potential:
    - Re-aligning Baker Creek and accommodation of the PMF in the new channel;
    - Install water diversions/berms where necessary;
    - Install scour protection between water courses and the pits; and
    - Install engineered cover over pit where needed to protect underground water quantity or quality.
- Reduce risks to the public, workers and wildlife:
    - Backfill underground voids connected to the pits, as required;

[5] Technical Session 2 IR Response, Appendix 5.0A, Table 5.0A-4, October 2019.

- Fully or partially fill pits and recontour the smaller B4 pits;
- Recontour remnant high walls above A1 and A2 pits; and
- Cap each pit with clean coarse material of large size to discourage public and animal use.

The CRP[6] notes some additional reasons for filling the pits including:

- To provide a potential disposal location for contaminated material;
- To provide additional controls to prevent a Baker Creek flood from entering the underground; and
- To address the preference, identified during the Surface Design Engagement (SDE) process, of some affected parties for filling the pits during the SDE.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- GMRP – Engagement Plan, January 2019;
- GMRP – Appendix 5.3B Open Pit Closure Options Analysis, October 2018.

Proponent's Conclusion

The Developers Assessment Report (DAR) proposed that fencing and berms would be used to close the pits. This evolved to the current closure activity of filling the pits largely in response to two factors[7] :

- Input from some parties during the EA (resulting in Suggestion 13) and then the Surface Design Engagement (SDE) that identified a preference for filling the pits; and
- Baker Creek Probable Maximum Flood Analysis, and the remaining residual risk of Baker Creek flooding and entering the pits remains.

Overall, the benefits to fully or partially filling the pits include the following[8]:

- Appropriate placement of fill in pits eliminates or significantly reduces the physical hazards associated with steep pit slopes, unstable pit slopes, most openings to surface in and around pits, partially backfilled stope breakthroughs, and crown pillars;
- Pits provide a potential disposal location for some contaminated material;
- Pit fills can be placed in such a manner as to create additional controls to prevent a Baker Creek flood from entering the pits or the underground, even under extreme flooding conditions (addressing Measure 11). This may include placing fill to backfill pits, construct berms, or both; and
- Some affected parties preferred filling pits, as opposed to leaving them unfilled, to reduce risk. This input was documented in the Report of EA (Suggestion 13) and during SDE.

[6] Giant Mine Remediation Project, Closure and Reclamation Plan, January 2019, p. 5-62.
[7] Giant Mine Remediation Project, Closure and Reclamation Plan, January 2019, p. 5-62.
[8] Ibid. pp. 5-62 -5-63.

GMOB's Position

GMOB notes that, while the GMRP has identified benefits to filling the pits, there are also potential disadvantages: the borrow requirements will be significant; the required quarries will create additional disturbed areas; and all of these activities will result in a currently unknown amount of environmental cost such as through habitat loss and additional greenhouse gas emissions. Throughout the process, GMOB has submitted questions to the GMRP regarding the decision to fill the pits, with the intent of providing greater clarity regarding the basis for filling the pits.

At this time, there is still uncertainty with respect to the GMRP's final approach. Final designs for the pit fill are not complete (e.g., undecided whether to fully or partially fill the pits, not certain what the final volume of contaminated material placed into the pits will be, etc.) so uncertainty remains regarding the total fill required. However, the CRP estimates that up to 1,395,000 m^3 of borrow material could be required[9]. During the water licence pre-submission technical workshop, the area of disturbance to produce this volume of borrow was described as on the order of 25 to 30 soccer/football fields, none of which is likely to be restored to a pre-disturbance condition. Additional disturbance will occur due to re-contouring of the highwalls above the A1 and A2 pit which could be cut back a distance of approximately 500 m[10] and would have a significant impact on the aesthetics of the area as viewed from the Great Slave Lake.

Comments raised during the review of the water licence submission and during the technical sessions indicate that there is much public concern with the additional disturbance required to generate fill for the pits. The City of Yellowknife, the YKDFN, the NSMA, Ecology North, Yellowknife Historical Society, Yellowknife Climbing Club and members of the general public all identified issues with the locations of the proposed quarries as well as the re-contouring of the A1 and A2 Pit highwalls.

Discussion during the technical sessions confirmed that, since the Baker Creek realignment was designed to convey the Probable Maximum Flood (PMF), the likelihood of a flood event overtopping the flood protection structures and flooding the pits will be very close to zero[11]. This suggests to GMOB that there is not a strong technical rationale for filling the pits with regards to flood protection.

However, GMOB acknowledges that the GMRP has received input during the SDE process and technical sessions that supports a preference from some sectors of the public for filling the pits. For example, at the September 2019 Technical Sessions, a YKDFN representative noted that the QRA process identified an additional consideration related to pit fill and cover: the desire to "keep clean water clean". The YKDFN representative clarified that, ideally, they would want the pits completely filled and a cover installed such that no precipitation would enter the pits and, eventually, end up in the underground where the clean surface water would become contaminated[12]. However, GMOB notes that consultations regarding pit filling did not include descriptions of the adverse impacts associated with pit filling (e.g., impacts to previously undisturbed areas of the site).

[9] Ibid. Table 5.3-5, p. 5-77.
[10] Ibid. Figure 5.3-6.
[11] Technical Session Transcripts, July 10 2019, pp. 48 - 49.
[12] Technical Session Transcripts, September 12 2019, pp. 44 - 47.

Given that the plan to fill the pits appears to be in response to stakeholder input from some sectors, and in keeping with GMOB's communications role and mandate, GMOB wants to ensure that all the implications of filling the pits are well communicated and understood by all parties to the process before final decisions are made. The potential health and safety benefits and public preference of filling the pits should be balanced against the additional disturbance and greenhouse gas emissions that would result from quarrying the material needed for fill.

In response to GMOB's pre-engagement comments[13] the GMRP indicated that pit filling or partial pit-filling was being considered on a pit by pit basis; that the Project was sensitive to the fact that increases to pit fill result in increased needs for borrow and was balancing the minimization of borrow requirements against the needs to improve safety and provide flood protection. GMOB is encouraged by these statements and believes that additional public engagement surrounding the decisions related to filling the pits is necessary to inform final decisions.

Recommendations

Recommendation 2

There should be further discussion and engagement regarding the closure of the pits prior to the GMRP submitting its final Design Plan for this component. Further discussions would be informed by:

- ***Information from the QRA process that is relevant to pit filling;***
- ***Updated estimates of the amount of borrow that would be needed for different pit-filling scenarios (e.g., partial fill, fully filled);***
- ***Additional information on the consequences of additional quarrying - including new disturbances outside the minesite, water contamination from blasting, the need to reclaim the new quarry sites, greenhouse gas emissions, etc; and,***
- ***With respect to the preference of some parties to fill and cover the pits in order to prevent clean surface water getting into the underground, a trade-offs analysis that considered the following factors could be helpful:***
    - ***The amount of water that will go into the pits and underground versus the impacts caused by quarrying (both during operation and post-closure);***
    - ***The total reduction of infiltration (and, therefore, the contamination of clean water) over the site and the relative amount of water changes.***

3.0 Engagement Plan and Communication

As noted previously in this intervention, one of GMOB's roles outlined in the Environmental Agreement is to "Promote public awareness of the Project, disseminate information about the Project, and promote public engagement in processes related to the Project". Through the process, GMOB has identified

[13] ORS Comment Response, Package 2, GMOB 36, June 25 2019.

several areas of concern related to ensuring adequate engagement and communication; these topics are grouped together in this section of GMOB's Intervention.

3.1 Engagement Plan

The MVRMA specifically identifies the need for the MVLWB to ensure that the concerns of Indigenous people are understood and considered during board processes. The MVLWB meets this objective by working with proponents, affected parties (including Indigenous organizations/governments), and other parties (e.g., other boards and government agencies that issue associated authorizations) to ensure that potential impacts of proposed projects are understood and carefully considered before decisions are made with respect to the issuance of land use permits and water licences. The key outcomes of an effective engagement program are that affected parties are able to:

- Develop an understanding of a proposed project or component of a project;
- Provide feedback during the engagement process on issues of concern with regards to a project; and,
- Work towards building relationships with proponents that are operating in an area.

The MVLWB has developed an Engagement and Consultation Policy as well as Guidelines to assist proponents in conducting effective engagement. The GMRP Team has developed an Engagement Plan with reference to both of the Board documents and submitted this plan for approval with their Water Licence Application. The plan includes a table summarizing engagement triggers and methods that describes the Primary Purpose, Primary Participants and Primary Methods of engagement triggered in response to Project milestones or events.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- GMRP – Engagement Plan, January 2019.
- MVLWB – Engagement and Consultation Policy, June 1, 2013.
- MVLWB – Engagement Guidelines for Applicants and Holders of Water Licences and Land Use Permits, September 2014.

Proponent's Conclusion

The GMRP Team has submitted Version 1 of its Engagement Plan for approval at licence issuance. The plan was developed specifically for the Giant Mine Remediation, and in consultation with the Giant Mine Working Group and Giant Mine Advisory Committee. The GMRP has undertaken engagement with community members and affected parties on many aspects of the Project, dating back to 2001. These engagement efforts will continue into the future through the life of the Project.

Some key topics identified for further engagement during Day 3 of the September 2019 Technical Sessions include[14]:

[14] Technical Session Transcripts, September 13 2019, pp. 13 - 14.

- Borrow sources;
- Baker Creek;
- Long term communications regarding residual risk and administrative controls;
- Community based monitoring; and
- Health effects monitoring.

The GMRP has committed to reviewing the Engagement Plan annually and updating it as required.

GMOB's Position

The communications component of the process is of particular relevance to GMOB. Part of GMOB's mandate, as outlined in the Environmental Agreement, is to monitor and report on "the nature and quality of the Co-Proponents' engagements with the public regarding the Project and the effectiveness of the Co-Proponents public communication about the Project". GMOB agrees with the GMRP Team that engagement and communication are activities that will continue for the life of the Project.

While discussion at the Technical Session regarding the Engagement Plan itself was relatively brief, the topic of engagement and the need for it to continue was brought up repeatedly throughout each day of the Sessions. The use of Engagement Triggers, as summarized in Table 7.1 of the GMRP's Engagement Plan, is a useful tool for clearly identifying how engagement will occur for some of the larger Project milestones. However, there are a number of activities where engagement and public input around the design should occur, but which are not currently captured in this table, such as:

- Discussions with the Sailing Club, Yacht Club and City (as representative of the broader boating public), regarding ways of remediating the boat launch area while still allowing them to be used to launch boats;
- Discussion regarding the location of the borrow pits and specifics regarding their reclamation (e.g. level of revegetation, SW5-1);
- Additional discussion and communication regarding specific closure criteria such as remediation of the pits: (P2-3) highwall recontouring, (P2-4) settlement of fill in pits, (P3-3) pit cover criterion, (SW4-1) public engagement activities;
- Submission schedule for design plans and what pre-engagement is necessary; and
- Construction schedule updates to be shared with the public.

Discussion at the September 2019 Technical Session suggested that the GMRP would consider updating Table 7.1 to include more specific triggers. GMOB suggests that the activities listed above should be considered for inclusion in any updated table.

GMOB expects that the proposed annual review and update of the Engagement Plan will be adequate as the Project progresses. However, there are a number of engagement issues, such as those noted above, that could influence the design plans or construction schedules and which should be incorporated while there remains an opportunity to influence the detailed design process. GMOB understands that remedial works could begin prior to 2021, so the Engagement Plan should be updated within a short period after licence issuance.

Recommendations

Recommendation 3

GMOB believes there are a number of pending engagement activities that are not well captured within the current Engagement Plan. The Engagement Plan should be re-submitted within six months and include an updated Table 7.1 that includes specific engagement triggers related to items that could influence the design plans.

3.2 Quantitative Risk Assessment

During the Environmental Assessment, the Review Board identified issues with the risk assessment conducted by the GMRP, including[15]:

- Focusing only on "credible" events;
- Lack of public involvement in scenario analysis and in evaluating risk acceptability;
- Inadequate consideration of problems due to social instability and governance in the perpetual sense;
- Separation of engineering, long term and toxicological risks, making it difficult to understand the overall integrated risks of the Project over its perpetual life;
- Lack of basis for the validity of the probabilities used in its predictions; and
- The scale selected for the likelihood index, resulting in a bias towards optimistic results in the risk evaluation.

In response, the MVEIRB recommended the following measure:

Measure 5: In order to mitigate significant adverse impacts that are otherwise likely, the Developer will commission an independent quantitative risk assessment to be completed before the Project receives regulatory approvals. This will include:

1. *Explicit acceptability thresholds, determined in consultation with potentially affected communities;*
2. *An examination of risks from a holistic perspective, integrating the combined environmental, social, health and financial consequences;*
3. *Possible events of a worst-case/ low frequency high consequence nature; and*
4. *Additional considerations specified in Appendix D of the Report of EA*

From this, the Developer will identify any appropriate Project improvements and identify management responses to avoid or reduce the severity of predicted unacceptable risks.

The results of the QRA were not available when the water licence application was submitted, so relevant results have not yet been incorporated into the design of the Project.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- MVEIRB – Report of Environmental Assessment and Reasons for Decision, Giant Mine Remediation Project, EA0809-001 – June 20, 2013.

[15] Mackenzie Valley Review Board, Report of Environmental Assessment and Reasons for Decision, Giant Mine Remediation Project, EA0809-001, June 20 2013, pp. 52 - 55.

Proponent's Conclusions

Work on the QRA was initiated in 2018. To date, the Project Team has held multiple sessions on risk identification, consequence criteria, and acceptability thresholds, and results of the QRA will be carried forward in future versions of Management Plans and Design and Construction Plans as required[16]. This will be achieved by including a reference in the management plans for any mitigations that were identified in the QRA to make sure that those assumptions remain valid and in place. There was discussion during Day 3 of the September 2019 Technical Sessions on this topic. The GMRP Team indicated that any changes required based on the QRA results will be documented in the management plans. For example, in the event a risk is identified as exceeding acceptability thresholds, and this risk is then mitigated through management, both the identified risk and mitigation measure will be documented in the management plans. The Design Plans will also include a piece that reports any relevant findings from the QRA for that component[17].

The GMRP Team does not anticipate needing to update the CRP with the results of the QRA[18].

GMOB's Position

Given that the QRA is explicitly identified in the EA, GMOB believes that the QRA should be formally incorporated into the water licence. Measure 5 states that the QRA must be completed prior to the Project receiving regulatory approvals, and that the results of the QRA will be used to identify potential improvements that can be incorporated into the Project. The results of the QRA have not yet been reported, so it is difficult to make specific recommendations on how the results should be incorporated.

The GMRP has suggested two methods for integrating the QRA findings into the Project: documenting any QRA related changes in the Management Plans and reporting on the relevant QRA findings in the Design Plans. GMOB agrees with these suggestions, but believes that, in addition, the water licence should include a specific requirement to provide a summary of the QRA either as a standalone report or within the CRP to describe how relevant results have or will be incorporated into the Design Plans and the Management and Monitoring Plans as necessary. This would serve as an accountability measure that would specifically demonstrate how public input was addressed and would also ensure that all the ideas are captured fully so that future generations know what factors influenced remediation decisions.

Recommendations

Recommendation 4

The water licence should require the Design Plans and the site-wide Management and Monitoring Plans to contain a section describing how relevant QRA results have been incorporated/addressed.

Recommendation 5

[16] GMRP, Updated Project Description, January 2019, Table 3-1.

[17] Technical Session Transcripts, September 13 2019, pp. 75 - 76.

[18] Ibid. pp. 77 - 78.

The water licence should require the CRP to include a section summarizing the results of the QRA as a whole and describing how relevant results have or will be incorporated into the Design Plans and Management and Monitoring Plans. Alternatively, the water licence could require a standalone report summarizing the QRA results; in this latter case, the report would not need to be for Board approval.

3.3 Contaminated Soils

Soils on the Giant site contain elevated concentrations of both metals and hydrocarbons that need to be managed appropriately. The site was divided into three different categories for the purposes of evaluating management options: developed areas, bedrock/forest/wetland terrain, and Baker Creek. Different strategies, from soil/sediment removal to in-situ risk management, are proposed for each area.

Developed areas are those locations that were established to support mining operations such as the mill/roaster area, townsite/marina, roadway network and various laydown areas.
Bedrock/forest/wetland are areas that were not disturbed during mine operations; however, aerial deposition from the roaster has resulted in elevated arsenic at these locations.

Generally, the three areas will be remediated as follows:

- Developed areas of the site will be remediated to at least industrial standards (the townsite/marina/shoreline lands, including undisturbed zones within those areas, will be remediated to residential standards);
- The undisturbed areas will be risk managed and not physically remediated (with the exception of shoreline lands near the foreshore tailings and the area downgradient of Dam 3); and
- Baker Creek will have contaminated sediment removed and replaced.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- GMRP – Engagement Plan, January 2019;
- GMRP – Appendix 5.4A Remedial Strategy for Contaminated Soil and Sediment, January 2019.
- GMRP – GMRP Response to Reviewer Comments, Contaminated Soils Response, June 25, 2019.

Proponent's Conclusion

Operations at the site have resulted in widespread contamination of surficial soils and sediments, largely resulting from the aerial discharge of arsenic rich roaster stack emissions, but with lesser contributions from the deposition and blending of contaminated granular fill and re-mobilization of contaminants from the Tailings Containment Areas (TCAs). Petroleum Hydrocarbons (PHCs) are also of concern, but areas of PHC contamination are typically co-located with areas of arsenic contamination[19] and will be

[19] Golder Associates Ltd., Remedial Strategy for Contaminated Soil and Sediment, Giant Mine, NT, January 2019, p. 17.

managed together. Different management strategies will be applied to the disturbed and undisturbed areas of the site[20].

Disturbed areas will be managed to at least industrial standards through a combination of excavation and disposal in designated pits or TCAs or capped in place (selected areas where the contamination extends to a depth that makes excavation impractical). Contaminated sediment located along the shoreline of Yellowknife Bay, adjacent to the Townsite/Marina and Shoreline Lands, (i.e., nearshore sediment) will be partially excavated and an engineered cover constructed. Soils in the townsite/marina will be remediated to residential guidelines, which is a higher standard than was proposed in the DAR. Contaminated sediments in reaches 0 to 6 of Baker Creek will be excavated and replaced with clean fill. Investigations are on-going into an area downgradient of Dam 3 impacted by historical discharge of water from the North Pond.

Additional information on the level and extent of contamination across the site was gathered subsequent to the EA and arsenic concentrations exceeding industrial standards were identified in areas of the site that had not been disturbed by mining operations. Options for addressing these areas were discussed during the SDE process. Options that were supported allowed for the forested, bedrock and wetland (i.e. undisturbed) soils to be risk-managed as long as it was confirmed through additional sampling and the HHERA that there were no significant risks to human health or the environment[21].

A fence will be installed to restrict public access to the majority of bedrock/forest/wetland terrain where soils have been most impacted by arsenic from former stack emissions. The location of the fence has been developed to establish a zone with a low risk of human exposure to contaminated soils. Multiple lines of evidence were considered when locating the fence, with confirmation through the HHERA that the fence will result in low to very low risks to human health. Information on communicating risks into the future will be contained within the Perpetual Care Plan (PCP), and consultation and engagement will occur as the PCP is developed.

The GMRP acknowledges that risks associated with the legacy of the Giant Mine extend beyond the scope of the current Project and that it is sensible to strive to align the approach to risk management between the Project Boundary and surrounding lands.

GMOB's Position

The proposed scope of the closure actions for contaminated soils have been modified from those proposed in the DAR. During the process, GMOB expressed some concerns with the remediation approach adopted by the GMRP for the undisturbed areas. As stated in the GMRP's June 25, 2019 Contaminated Soils Response: "The DAR presented the Site at the end of remediation as a site that met industrial soil quality guidelines for arsenic without any physical barriers, with the exception of a small area of infrastructure that would have limited public access by means of a fence." Subsequent to the DAR and EA process, additional information became available regarding the extent and level of arsenic impacts both across the site and regionally.

[20] Technical Session 2 IR Response, Appendix 5.0A, Table 5.0A-5, October 2019.

[21] GMRP, Response to Reviewer Comments (June 25, 2019) Contaminated Soils Response.

Generally, disturbed areas of the site will be remediated to at least industrial standards. Undisturbed areas on the site with arsenic concentrations above approximately 3,000 mg/kg will not be remediated but will be enclosed within a fence. Undisturbed areas off-site and on-site with arsenic concentrations less than approximately 3,000 mg/kg will not be re-mediated or fenced, with the exception of an area downgradient of Dam 3 and some shoreline areas. This has led to questions from parties regarding the change in the level of environmental and public protection provided by the current strategy compared to that proposed in the DAR.

The level of risks for humans who use the unfenced areas of the site is characterized in the following summary of findings from the HHERA[22]:

- The 2018 HHERA evaluated the range of contamination in the bedrock/forest/wetland terrain that would be outside the proposed Core Industrial Area fence and assumed that there will be public access to these soils with an arsenic concentration of 750 mg/kg (represented by the 95% Upper Confidence Limit on the Mean). This concentration is about twice the industrial criterion. Nonetheless, the HHERA concluded that risks to humans are very low, assuming limited use of the area for recreational purposes. It is assumed that the limited use will occur on the weekend during the summer months, or for 2 days a week, 10 weeks a year. Half a day of soil ingestion was considered for the recreational soil exposures. Similar to outdoor soils, dermal exposures were assumed to occur one event per day of exposure.

Some parties raised a concern regarding whether the level of use assumed in the HHERA was sufficiently conservative - for example, the HHERA usage scenario would not adequately represent exposure were someone to set up a camp on this land.

Since areas with relatively high arsenic concentrations will be left exposed, it was recognized that risk management and risk communication will be required. The Perpetual Care Plan was identified as the location where this will be housed, but as the Perpetual Care Plan will not be drafted until after the water licence is issued, GMOB is concerned that all the information required to make definitive plans on risk management activities (e.g., fence locations, risk communication) is not available to inform the water licence.

Given the level of uncertainty and residual concern that remains regarding contaminated soils management, additional engagement is required to ensure that the public understands the assumptions regarding acceptable uses of the site and adjacent areas. At minimum, GMOB expects the engagement should:

- Confirm that risk assessment scenarios are appropriate for the expected level of use in the future;
- Clearly communicate the risk assessment scenarios and outcomes to all parties; and
- Establish a strategy for communicating the level of risk to future generations.

There is also the issue of legacy contamination located outside the Project boundary, since soils affected by the historic aerial deposition of arsenic trioxide dust cross the lease lines. At times in both Technical Sessions, the GMRP Team acknowledged that some of the decisions about managing some contaminated areas (e.g., bedrock/wetland areas with arsenic levels <3000 mg/kg) and where to locate the fence lines should be consistent with actions taken in the off-lease areas. That is, it wouldn't make

[22] GMRP, Response to Reviewer Comments (June 25, 2019) Contaminated Soils Response.

sense for similarly impacted areas to be managed differently on and off lease. GMOB agrees and encourages the GNWT, as a co-proponent, to continue actively working on this component.

Recommendations

Recommendation 6

The GMRP should conduct additional engagement to ensure that the public at large fully understands the level of use assumed under the current HHERA. The outcomes of this engagement should be reported in the Design Report for this Project component.

Recommendation 7

Management strategies for on-site soils should align with strategies used for off-site areas that are impacted to a similar level. This approach should be described in the CRP and ultimately documented in the Post-Closure Monitoring and Maintenance Plan.

3.5 Construction Schedule

Proponent's Conclusion

Detailed Project scheduling will occur during development of the Project Implementation Plan which will be developed with the Main Construction Manager[23].

GMOB's Position

GMOB would like to ensure that adequate engagement occurs around the implementation of the closure activities. During the Technical Sessions, members of the Sailing Club and the Historical Society raised concerns about the potentially significant impact of the remediation on their activities in the townsite/marina area of the site.

GMOB understands there has been additional discussions between the GMRP and these and other parties subsequent to the Technical Sessions, and it appears that mitigations are being considered, as identified in an October 20, 2019 letter from the GMRP to the City discussing staging of work and construction of a boat launch to reduce disturbance to boating activity. Going forward, it seems likely that similar situations will arise, i.e. activities on the site will have the potential to adversely impact a user group. It would be useful to have a process for proactively identifying when these situations will occur and documenting what steps the GMRP has undertaken to minimize impacts on affected groups.

GMOB expects that these discussions could occur when the construction schedule for each activity is being developed. A summary of the engagement discussions, including a description of how the GMRP attempted to minimize the impacts of construction on residents, should be included in the Construction Plans. Given that many of the construction activities will have impacts on local residents, it would be helpful if the GMRP updated their construction schedule once per year and shared this information with the public.

[23] Technical Session Transcripts, September 13 2019, pp. 139 - 142.

Recommendations

Recommendation 8

The GMRP Team should proactively engage with members of the public potentially affected by remediation activities to identify methods for reducing impacts during construction. A summary of how the GMRP has attempted to address resident's concerns about construction activities and scheduling should be provided in the final Construction Plan for each Project component.

Recommendation 9

The GMRP should update its construction schedule at least once a year and share this information with the public. The updated construction schedule should also be either a standalone requirement of the water licence or required as part of the Annual Water Licence Report.

4.0 Site Runoff

Runoff from disturbed and undisturbed areas of the site may contain elevated concentrations of arsenic and other contaminants. The GMRP is proposing to compare runoff quality from remediated areas against MDMER limits to determine whether the runoff must be collected and treated, or whether it can be allowed to discharge directly to the receiving environment. Run-off from undisturbed areas will not be controlled.

MDMER limits are less conservative than the EQC proposed for regulating treated effluent discharge.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- GMRP – Water Management and Monitoring Plan, January 2019.

Proponent's Conclusion

Run-off from engineered structures such as tailings covers will be collected and treated until concentrations are confirmed to meet surface runoff quality criteria. Direct discharge to the receiving environment will be established once these criteria are consistently achieved. The proposed criteria were set equal to the MDMER limits, in accordance with the requirement for water meeting the definition of "effluent" (b), under Part 1 of the MDMER[24]. A limit for total petroleum hydrocarbons was also added due additional traffic at the site during closure.

[24] Technical Session Transcripts, September 11 2019, p. 110.

GMOB's Position

GMOB notes that the GMRP has not provided a strong rationale for using the MDMER limits to assess surface run-off water quality from engineered structures. The MDMER concentrations are generic standards and are less conservative than the effluent quality criteria proposed for the either the existing or the new effluent treatment plants. GMOB is concerned that simply applying a generic standard may not adequately represent the runoff water quality that is achievable at the site or that might be required to achieve remediation goals. Additional work should be carried out to identify appropriate runoff water quality criteria.

Once the existing Effluent Treatment Plant stops discharging effluent to Baker Creek, run-off will become the primary mechanism for Project related impacts to the creek. While GMOB acknowledges that much of the on-going contaminant loading to Baker Creek will originate upstream of the Project, site runoff will still provide a contribution. GMOB expects that best management practices for setting site run-off criteria would be to select levels such that overall contaminant loadings to Baker Creek will achieve the closure objective for Baker Creek such as BC-4 and BC-5. This should be demonstrated by providing the following additional information:

1. Consideration of the need for site-specific criteria that are protective and representative of potential water quality issues at the site;
2. A rationale for the selected criteria;
3. The SNP locations where the criteria are met; and
4. A discussion regarding the achievability of the criteria (i.e., number of samples over time/seasons etc.) and a process for determining when the criteria have been achieved and monitoring can be discontinued.

At this stage in the process, it will not be possible to include site specific criteria within the body of the licence. However, including them in an update to the Water Management and Monitoring Plan, for Board approval, would ensure that any proposed criteria would be reviewed. In addition, a licence clause should be included requiring Inspector or Board approval prior to allowing the run-off to enter the receiving environment directly. This clause would be consistent with the requirements of other similar water licences.

GMOB also remains concerned regarding the quality of the runoff from unremediated portions of the site. These areas will have elevated concentrations of arsenic and potentially other contaminants from dust deposited during roaster operation. ECCC has identified that runoff from these areas is not considered effluent under the MDMER and is therefore not subject to that Regulation. However, ECCC did note that this runoff would be subject to the general prohibition under the *Fisheries Act*.

During the Technical Sessions, it was confirmed that most of the runoff from unremediated areas on the property will report to Baker Creek[25]. As such, monitoring in Baker Creek will serve to confirm that run-off from unremediated areas is not having an adverse effect on the receiving environment. This specific use of the Baker Creek monitoring results will need to be considered when designing the overall Baker Creek monitoring program.

[25] Technical Session Transcripts, September 13 2019, p. 38.

Recommendations

Recommendation 10

The water licence should include a requirement that run-off from engineered structures be collected and treated until criteria in the approved Water Management and Monitoring Plan are met and approval of the Inspector be required prior to allowing direct discharge of site run-off to the environment.

Recommendation 11

The GMRP should do additional work to identify and support appropriate site-specific criteria for assessing run-off quality. This work should be included in the Phase 2 update to the Water Management and Monitoring Plan. At a minimum, information in the Water Management and Monitoring Plan regarding these criteria should include the following:

1. ***Considerations for site-specific criteria that are protective and representative of potential water quality issues at the site;***
2. ***A rationale for the selected criteria;***
3. ***The SNP locations where the criteria are met; and***
4. ***A discussion regarding the achievability of the criteria (i.e., number of samples over time/seasons etc) and a process for determining when the criteria have been achieved and monitoring can be discontinued.***

5.0 Effluent Quality Criteria

Water licence effluent quality criteria (EQC) are an important component of the regulatory structure in the NWT. Two sets of EQC have been proposed by the GMRP:

- EQC for the existing Effluent Treatment Plant (ETP) - will be in place until the new plant is commissioned in about 2026. The ETP discharges to Baker Creek.
- EQC for the new Water Treatment Plant (WTP) - which will be commissioned in about 2026 and will discharge into Yellowknife Bay.

The MVLWB uses its Water and Effluent Quality Management Policy and its Effluent Mixing Zone Guidelines to guide decisions on EQC.

References:

- GMRP – Technical Session – Responses to IR's and Comments;
- GMRP – Effluent Quality Criteria Report, Version 1, January 2019.

Proponent's Conclusion

Minewater is currently treated and discharged into Baker Creek, using a water treatment plant commissioned in 1981. During the EA, both effluent discharge location and quality were considered, and the Report of EA includes Measures 14 and 15 that stipulate requirements for both. Based on these Measures, the GMRP is required to treat minewater using an ion exchange process, discharge effluent through a near shore outfall and meet drinking water guidelines at that outfall.

The existing ETP will be operated until the new WTP is constructed, at which point all minewater will be treated and discharged through the new plant. The ETP will meet, at a minimum, MDMER limits for discharge quality, and the new WTP will meet EQC that comply with the EA Measures. Due to the age of the current ETP, only minor upgrades are being considered, and investment will be placed in commissioning the new WTP[26].

GMOB's Position

<u>EQC for the ETP:</u>

Originally, the GMRP proposed EQC for the existing Effluent Treatment Plant (the ETP) that were equivalent to the MDMER limits; their rationale was that it was consistent with the previous water licence for the site. In response to our pre-submission comments, however, EQC are now proposed for copper, lead, nickel and zinc that are lower than MDMER but still achievable by the ETP. Without significant upgrades to the system, the ETP would not be able to lower arsenic discharge levels below the 0.3 mg/L required by the MDMER. The GMRP would prefer not to make upgrades to the ETP because it only needs to operate for a few more years, and evidence from long-running fish monitoring programs indicate that the current levels of arsenic discharged by the ETP are not having an adverse effect on fish in Baker Creek.

GMOB accepts that resources would be better directed towards commissioning a new WTP and not towards significantly upgrading the existing ETP. However, there are several currently unregulated parameters that GMOB believes should have EQC, including chloride, sulphate and ammonia. GMOB notes that EQC could be developed for these parameters without necessitating upgrades to the plant.

Chloride and sulphate levels are very high in the current discharge and should be considered parameters of potential concern (POPC). According to MVLWB policy and post decisions, POPC should have EQC.

In addition, TDS (comprised largely of chloride and sulphate in GMRP effluent) has demonstrated an upward trend in recent years. The GMRP indicated that the reasons for this increase are not fully understood. Potential factors are thought to include: recent dry conditions, use of dust suppressants on the site and use of ferric sulphate in the treatment process[27]. Two of the potential reasons for the increasing trend are Project specific activities, which means that the GMRP can exert a level of control over the concentrations. GMOB believes it is reasonable to regulate POPC over which a project has some control.

[26] GMRP, Effluent Quality Criteria Report, January 2019, p. i.

[27] ORS Comment Response, Package 6, MVLWB:Shannon Allerston 10, June 25 2019.

With regards to ammonia, there will be a lot more blasting when remediation starts and so higher ammonia and nitrate levels are to be expected going forward. GMOB notes that it is standard practice to regulate these contaminants with EQC in other mining water licences in the NWT.

At the September 2019 Technical Sessions, the MVLWB's consultant asked the Project Team about the above concerns and the Project Team agreed to an Information Request to propose EQC for chloride, sulphate and ammonia for the ETP that are achievable. Information Request responses were provided on October 10, 2019.

The GMRP proposed both Maximum Average (MAC) and Maximum Grab Concentrations (MGC) for sulphate for the ETP. The MAC (1310 mg/L) is 5% above the maximum sulphate concentration measured in effluent between 2011 and 2018, and the MGC (1440 mg/L) is a 15% above this maximum value. These values were selected to provide a nominal increase above the current condition to allow for flexibility to continue closure works, including the addition of ferric sulphate to remove arsenic[28].

For chloride, the GMRP has proposed a MAC (660 mg/L) of 15% over the maximum chloride concentration measured in effluent between 2011 and 2018. A higher percentage was selected for chloride compared to sulphate due to greater chloride variability in the mine pool. A chloride concentration of 633 mg/L was measured at the Akaitcho pumps in 2019. The MGC was set at 720 mg/L using a derivation from the Iowa Department of Natural Resources that considers the toxicity modifying effect of hardness and sulphate. Both of these concentrations exceed the CCME short term guideline for chloride, which does not consider toxicity modifying factors.

Effluent sulphate concentrations from 2019 to 2026 are predicted to be very similar to concentrations from 2011 to 2018. There is predicted to be an increase in sulphate in 2026, but the GMRP has stated that water will be carefully managed during the ETP/WTP transition period in 2026 to ensure that EQC are met. The proposed EQC exceed the CCME short term guideline, but GMOB accepts that the CCME guidelines are intended to be met within the receiving environment, and that toxicity modifying factors have been applied when deriving EQC at other mine sites in the north. While there have been some sub-lethal toxicity results in effluent samples collected from 2004 to 2018, toxicity tests on water from Baker Creek have not returned results that showed toxicity definitively related to effluent discharge. As such, the sulphate and chloride EQC proposed by the GMRP are likely adequate. However, in the event that toxicity testing begins to suggest that conditions are changing, then these values should be reviewed.

The GMRP also proposed EQC for nitrate (13 mg/L and 25 mg/L) and ammonia (pH dependent table). The rationale and calculation methodology provided by the GMRP for these values is consistent with that for other parameters. GMOB notes that there may be issues with achieving the proposed EQC for these parameters under several explosives handling scenarios (high powder factor and high wastage rates), so the GMRP will need to ensure that blasting protocols are followed[29].

<u>EQC for the WTP:</u>

[28] Technical Session 2 IR Response, IR 03, October 2019.

[29] Technical Session 2 IR Response, IR 06 and 07, October 2019.

The technology for the new WTP, to be commissioned in about 2026, adds an ion-exchange column to the process used at the ETP to achieve the 10ug/L arsenic discharge levels required by the EA. The proposed EQC still include the MDMER parameters but at concentrations that are achievable by the WTP.

In this case, the GMRP has used a three-step screening process for identifying POPC that will be regulated using EQC under the water licence. GMOB has noted some inconsistencies with how this process has been applied with respect to chloride, sulphate, radium-226 and cyanide.

- Although the screening process for POPC identified chloride and sulphate as POPC, the GMRP did not propose EQC for them. The reasoning is that 1) predicted concentrations at the edge of the mixing zone are below water quality objectives (WQO) for the protection of aquatic life (129 mg/L for chloride and 128 mg/L for sulphate); and 2) effluent chloride is predicted to remain below the acute toxicity guideline of 640 mg/L. (Note that there is no acute toxicity guideline for sulphate and there are no health based drinking water guidelines for either parameter). Therefore, the GMRP expects that water quality beyond the mixing zone will allow for current and future uses, and the GMRP proposes to regulate ions through monitoring, tracking and reporting through the SNP/OMP and AEMP.
- Although radium-226 and cyanide are expected to be below detection limits even in the influent to the WTP, the GMRP has proposed EQC for these parameters because they are required by the MDMER.

GMOB does not believe it is appropriate to develop additional screening steps in order to remove chloride and sulphate from the list of POPC requiring EQC.

For the same reasons as for the ETP, EQC for chloride and sulphate and ammonia should also be required for the WTP. At current levels, it does not seem reasonable to include an additional treatment process to reduce chloride and sulphate concentrations in the WTP effluent. In response to reviewer comments, the GMRP noted that options, although limited, for reducing the contributions of these parameters in dust suppressants and WTP reagents do exist. Further exploration of these options should be considered if concentrations of chloride and sulphate in WTP effluent continue to increase.

In response to an IR request from the Board, the GMRP Team provided information on concentrations of chloride and sulphate in the effluent that would cause exceedances of their respective WQOs in Yellowknife Bay as well as predicted chloride and sulphate concentrations in the new WTP effluent. The GMRP reported that, for both parameters, concentrations of approximately 5,000 mg/L in the WTP effluent would result in concentrations at the edge of the mixing zone approaching WQOs. The highest predicted concentration of sulphate is on the order of 1,150 mg/L and the highest predicted chloride concentration is approximately 325 mg/L. Concentrations of both parameters are predicted to decrease with time, and the GMRP notes that influent and effluent concentrations are expected to be similar[30].

Based on these results, it appears that sulphate EQC for the WTP could be set at the same level or slightly lower than that for the ETP. The chloride EQC for the WTP could likely be set lower than for the ETP.

[30] Technical Session 2 IR Response, IR 05, October 2019.

The GMRP also proposed EQC for nitrate (13 mg/L and 25 mg/L) and ammonia (pH dependent table). The rationale and calculation methodology provided by the GMRP for these values is consistent with that for other parameters. GMOB notes that there may be issues with achieving the proposed EQC for these parameters under several explosives handling scenarios (high wastage rates), so the GMRP will need to ensure that blasting protocols are followed[31].

Cyanide and radium-226:

Available monitoring data (effluent, Baker Creek and Yellowknife Bay) indicate that concentrations of both radium-226 and cyanide are very low. The majority of samples analyzed for these parameters were less than the method detection limits (MDLs), and the remaining results were just above the MDLs. GMOB expects that, so long as effluent concentrations remain low, concentrations of these parameters in the receiving environment will not increase as a result of Project activities. However, the GMRP has proposed to include EQC for radium-226 and cyanide in the Water Licence on the basis that these two parameters are regulated under the MDMER.

GMOB agrees that the GMRP will be responsible for monitoring and reporting radium-226 and cyanide concentrations to ECCC under the MDMER, but notes that this is a federal requirement. There does not appear to be a need to regulate these parameters to prevent unwanted changes to the receiving environment. GMOB also notes that there is no requirement for the Board to regulate MDMER parameters using EQC in a water licence. The Board has the discretion to identify parameters of concern on a project specific basis, and to regulate these parameters through EQC if required. As such, GMOB does not currently see any reason to regulate these parameters using EQC in the water licence; having EQC for these parameters may, in fact, cause unnecessary public concern if people believe these are POPC when they are not.

Recommendations

Recommendation 12

In addition to the EQC already proposed by GMRP, EQC should be included in the water licence for chloride, sulphate, nitrate and ammonia for the ETP. The concentrations proposed by the GMRP in the October 10, 2019 Information Request Response appear to be adequately protective of Baker Creek.

Recommendation 13

In addition to the EQC already proposed by GMRP, EQC should be included in the water licence for chloride, sulphate, nitrate and ammonia for the WTP. The sulphate EQC for the WTP could be set at the same level as for the ETP. Lower EQC could be considered for chloride based upon model predictions from 2026 onwards. The nitrate and ammonia EQC proposed by the GMRP in the October 10, 2019 Information Request Response appear to be adequately protective of Yellowknife Bay.

Recommendation 14

[31] Technical Session 2 IR Response, IR 06 and 07, October 2019.

The Board should consider whether EQC for cyanide and radium-226 are necessary given they do not seem to be parameters of potential concern.

6.0 Aquatic Effects Monitoring Program

Aquatic Effects Monitoring Programs (AEMPs) are typically required for projects or undertakings where changes or effects to the aquatic environment are expected. AEMPs test EA and water licence predictions regarding aquatic impacts by directly measuring the type and extent of project-related effects during construction, operation and closure. A key difference between AEMPs and other aquatic monitoring programs, such as EEM under the MDMER, is the inclusion of an adaptive management feedback loop that can be used to modify project activities if unacceptable effects are identified in the local environment.

Two different AEMP's were submitted with the Water Licence application: one for Baker Creek to be conducted while effluent is discharged into Baker Creek from the existing ETP and one for Yellowknife Bay for when the new WTP starts discharging directly into the Bay. Both AEMPs are designed to monitor impacts from effluent discharge, and not potential improvements to the receiving environment resulting from remediation activities. However, review comments and discussion during the technical session identified that parties are also interested in monitoring environmental improvements.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- GMRP – Aquatic Effects Monitoring Program Design Plan – Baker Creek, January 2019.
- GMRP – Conceptual Aquatic Effects Monitoring Program Design Plan – Yellowknife Bay, January 2019.
- GMRP – Appendix 2D, Giant Mine 2017 MMER/EEM Annual Report, March, 2019.
- MVLWB/GNWT – Guidelines for Aquatic Effects Monitoring Programs, March 2019.

Proponent's Conclusion

The GMRP has submitted two AEMP documents with their water licence application package: the Aquatic Effects Monitoring Program Design Plan – Baker Creek, and the Conceptual Aquatic Effects Monitoring Program Design Plan – Yellowknife Bay. Both documents were developed following the MVLWB/GNWT Guidelines for Aquatic Effects Monitoring Programs, and focus on detecting potential impacts to the receiving water environment arising from project activities, i.e. discharge of treated effluent. During the September 2019 Technical Session, the GMRP Team clarified they were not necessarily intending that there be two distinct monitoring programs for the Project. Rather, there could be a single AEMP that would evolve to include other areas as the effluent discharge point is changed from Baker Creek to Yellowknife Bay[32].

[32] Technical Session Transcripts, September 13 2019, pp. 161 - 162.

Improvements to the receiving environment resulting from the remediation will not be monitored under the AEMP. The GMRP proposes that remediation success will be monitored and reported under other plans such as performance monitoring reports, construction monitoring plans and the Fisheries Act Authorization.

GMOB's Position

GMOB's initial concerns with the AEMPs provided by the GMRP related to there being two distinct programs, and not considering measuring improvements in the study designs. Two distinct programs would make it difficult to provide a comprehensive assessment of the aquatic receiving environment and GMOB also considers that an environmental improvement could be considered a Project related effect. In response to comments and through discussions at the technical sessions, it became apparent that the GMRP was not proposing that there be two distinct AEMP's, but rather that the Project was envisioning an AEMP that would evolve with the project, however the GMRP continues to maintain that the focus of the AEMP's should be on the impacts of discharges from the site.

GMOB supports the approach of developing a single AEMP for the Project that adapts as the Project progresses. This program would initially focus on Baker Creek but evolve to include Yellowknife Bay once the new WTP is commissioned. GMOB accepts that the initial iteration could mirror the current EEM monitoring as that will provide continuity with current monitoring and site activities, but a new design plan should be developed in response to planned remediation activities on the site.

Though a number of parties' comments and discussion during the technical sessions identified an interest in also measuring environmental improvements resulting from the remediation, the GMRP does not propose to do this in the combined AEMP. The GMRP argued that this is not the intent of an AEMP, but that monitoring under other programs such as the DFO Authorization and Community Based Monitoring would serve to measure and report on improvements[33].

GMOB is aware of the following initiatives with relevance to aquatic monitoring for the Project:

- Baker Creek design criteria;
- DFO authorization (including offsetting projects);
- Community-based monitoring (CBM) ideas for Yellowknife Bay;
- Current EEM program;
- Yellowknife Bay AEMP and special study; and
- Proposed Aquatic Engagement Group and a CBM Steering Committee – engagement efforts would begin early 2020 for Baker Creek Design and late 2020 for CBM and the AEMP

Ideally, there would be one comprehensive aquatic monitoring program for Baker Creek and Yellowknife Bay that tracks and reports on both impacts and improvements resulting from the remediation of the site. GMOB expects the AEMP will form an important component of any overarching aquatic monitoring program. As specifics of these studies are not yet available, it is difficult to provide specific recommendations regarding potential tie-ins to the AEMP. However, to facilitate overall integration of aquatic monitoring programs, the AEMP Annual Reports should include a summary of the results of the

[33] ORS Comment Response, Package 6, ECCC 10, June 25 2019.

other studies, as well as a discussion regarding whether the results of any of these studies have influenced interpretation of the AEMP results or future re-designs.

Recommendations

Recommendation 15

A single AEMP should be developed for the entire Project. This program can evolve as the discharge from the Project moves from the current ETP and Baker Creek to the new WTP and direct discharge into Yellowknife Bay.

Recommendation 16

The overall aquatic monitoring for the Project should be designed to measure improvements to the aquatic receiving environment as well as potential impacts. Improvements to the aquatic environment may be reflected in monitoring conducted under other programs, e.g. DFO authorization or Community Based Monitoring; the results of these programs should be summarized in the AEMP Annual Reports.

7.0 Plan Content and Approvals

7.1 Accounting for Greenhouse Gas Emissions

Although the effects of climate change on the Project, in particular on the Freeze program, were discussed at length during the water licensing process, there was little or no acknowledgment of how closure decisions might impact climate change or whether the assessment of closure options included weighing emission costs. Different closure options and activities are likely to cause the emission of different levels of greenhouse gases (GHGs). While GHGs are only one consideration in deciding on the most appropriate closure option for a given site component, we do believe that it is an important one given Canada's commitment to reduce emissions and, hopefully, slow the rate of climate change globally.

Ideally, the consideration of GHGs in closure decisions would have been a topic of discussion over the past several years, but minimizing GHG emissions did not, to our knowledge, become a priority during the EA and may not have been advanced by any party during the period between the EA and Water Licence submission. GMOB is also not aware of an MVLWB policy requiring proponents to explicitly consider the potential effects of their projects on climate change. Regardless, we believe an evaluation of GHGs should be included as a consideration for future decisions (e.g., when finalizing plans for pit filling).

Recommendation 17

Future decisions related to closure options and activities should include an assessment of the relative GHG emissions of different remediation scenarios. Selected options should demonstrate that emissions have been minimized to the extent feasible.

7.2 Design Plans and Construction Plans

Design Plans will be developed for each component of the CRP and will include final information related to the closure of each component. In reference to Schedule 2, Condition 1 in the GMRP's proposed water licence, the Design Plans would include:

- Summary and relevant background information;
- Design details, including criteria;
- Monitoring for the post-construction period and adaptive management; and
- Contingency, action levels and response.

Construction Plans will be developed for the different activities required to address each component, but more than one Construction Plan may be required to address the different closure activities for each component. In reference to Schedule 2, Condition 1 in the GMRP's proposed water licence, the Construction Plans would include:

- Summary;
- Construction considerations;
- Activity specific monitoring for the construction period;
- Operational requirements and anticipated maintenance; and
- Quality control plan.

References:

- GMRP – Technical Sessions – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;

Proponent's Conclusion

The information contained within the Design Plans will build upon what has been presented in the CRP and will supersede the CRP with regards to specific details on the closure of each component. The Design Plans will include the following:

- Relevant background information;
- Summary of supporting information on existing conditions - geotechnical, geochemical, rock and soil characterization and updates of any additional site investigations since the CRP;
- Design details - including the closure objective, activities and criteria associated with the component;
- Description of how the design meets component and site wide objectives
- Engagement and Traditional Knowledge that has informed the design since the CRP
- How the EA measures have been met (if applicable)
- QRA Results;
- Design drawings and specifications;

- Component performance monitoring for the post-construction period and adaptive management;
- Operational considerations and anticipated maintenance requirements; and
- Contingency, action levels and response activities based on monitoring results.

These plans would be submitted for a 90 day review, and there would be the opportunity to make refinements to the design based upon reviewer comments. However, substantive changes in response to review comments would likely not be possible without affecting overall Project timelines.

The Construction Plans will be developed to support the Design Plans, and there may be multiple Construction Plans within each design. Information in the Construction Plans will include the information regarding how the design plan will be implemented, including specific information regarding mitigation, such as where erosion and sediment control features will be placed. This will include:

- Timing, sequencing and schedule;
- Demonstration of compliance with the site-wide management and monitoring plans; and
- Quality control plan.

The GMRP was intending that these plans would be submitted for approval, but indicated at the second technical session that they would be open to considering whether or not these plans would require Board approval.

GMOB's Position

At the September 2019 Technical Sessions, there was general agreement that Design Plans would be for Board approval, but less certainty as to whether or not the Construction Plans needed to be submitted for approval. There are several items related to the design and construction process that GMOB would like to see included in a Board approved document, but GMOB believes they could be contained within the Design Plans. In which case GMOB would not oppose having the Construction Plans not for approval.

The Design Plans were discussed extensively during the Technical Session. Based on these discussions and GMOB's current understanding of the Project, GMOB has identified several additional outstanding topics that would fit well in these plans. These would be in addition to what is currently identified in the schedules of the draft water licence submitted with the application and include:

- A description of how the QRA results have been incorporated into the designs (in addition to the results themselves);
- A summary of pre-engagement done with affected parties (e.g., how they worked with the Sailing and Yacht Clubs and broader boating public to minimize disruption);
- A summary of the Independent Peer Review Panel's opinion[34] regarding the closure approach adopted by the GMRP; and

[34] Note that GMOB is interested in seeing the IPRP's conclusions on the final Project much earlier than after detailed designs are completed and reported in each Design Plan. Therefore, GMOB has requested this documentation outside of the water licensing process. Nonetheless, including a summary within each Design Plan should help reviewers to understand the experts' opinions when evaluating the plans during the term of the water licence.

- How the design addresses site wide closure criterion SW3-1 to “minimize perpetual care requirements”.

The first two bullets relate to documenting how public and stakeholder input was incorporated into the execution of the Project. As discussed previously in this intervention, GMOB believes that effective communication will be critical to the successful delivery of the Project. The recommended additional discussion will help to document all the factors that led to specific design decisions, which will be important for future generations to understand.

Parties have expressed concern regarding the potential volume of material that will be submitted for Board approval and associated public review. The GMRP is proposing a 90 day timeline for most submissions. GMOB notes that, while the GMRP may want a 90 day turnaround, the Board has the ability to establish a timeline that it feels is most appropriate. In general, more complex submissions receive a longer review period then less complex reviews. At the end of the review process, if the Board determines that a submission should not be approved, then the original review timeline becomes irrelevant (i.e., construction cannot begin until the Design Plan is approved, no matter how long that approval process takes).

One of the considerations that GMOB expects could factor into the review period would be the requirement for organizations to obtain external expertise to assist with their review. There are realities regarding availability of qualified external reviewers as well as contracting arrangements that can mean that longer timelines are required. GMOB notes that the Project Team has already established an Independent Peer Review Panel that has provided input into the Project design. A summary of this advice as it relates to each Project component, included with the Design Plans, as well as whether or not this advice was adopted (with rationale) would provide reviewers with valuable insights into the technical aspects of each design decision, and could assist with aligning review timelines with GMRP preferences.

Finally, GMOB’s opinion is that designing to minimize perpetual care requirements is an important design element and that the Design Plans should clearly articulate how this will be achieved.

Recommendations

Recommendation 18

In addition to the content that the GMRP Team has already proposed, Design Plans should include the following additional information:

- ***A description of how the QRA results have been incorporated (in addition to the results themselves);***
- ***A summary of pre-engagement done with affected parties (e.g. how they worked with the Sailing Club to minimize disruption);***
- ***A summary of the Independent Peer Review Panel’s opinion regarding the closure approach adopted by the GMRP; and***
- ***How the design addresses site wide closure criterion SW3-2 to “minimize perpetual care requirements”.***

7.3 Closure and Reclamation Plan

The GMRP has submitted a Closure and Reclamation Plan for the Project, developed using the Board guidance document: *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (November 2013). The Project has been divided into 10 major closure components:

- Underground mine workings;
- Freeze program;
- Open pit mine workings;
- Contaminated soils and sediments;
- Baker Creek and surface water drainage;
- Tailings containment areas;
- Borrow material;
- Water treatment plant and outfall systems;
- Buildings and site infrastructure; and
- Landfill.

Closure goals and objectives for the components have been established, but some of the closure criteria are still being developed. Final designs are also still under development and will be submitted as part of Design Plans prior to initiating construction. Our interpretation of the initial application was that the CRP would be updated and re-submitted about six months after licence issuance, but subsequently we have come to understand that the GMRP prefers that the CRP be approved upon licence issuance.

References:

- GMRP – Technical Sessions – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- GMPR - Proposed Type A Water Licence for the Giant Mine Remediation Project; January 2019.

Proponent's Conclusion

The GMRP Team is requesting that the CRP be approved upon licence issuance. This would provide the GMRP with sufficient certainty in the closure concepts to commence with the final design process. The final designs will be described in the Design Plans, which will be submitted for Board approval, and the Construction Plans will outline how the design plans will be implemented. Large scale changes to the overall plan are not anticipated as a result of the Design Plan review, but any large changes would make it difficult to maintain the Project schedule.

GMOB's Position

GMOB has concerns with approving a final closure plan when uncertainty remains with regard to several specific closure activities. For example, the decision has not been made whether to completely or partially fill the pits. The final decision on how the pits will be filled will have an impact on other components of the closure plan such as borrow material and potentially the surface water drainage, underground mine working and contaminated soils components as well. This could lead to a lack of integration of the options, and the risk that decisions made regarding one component could limit how

remediation of another component can be carried out. If all options are understood at the outset, then it is possible to choose options that will lead to an efficient overall outcome.

In addition to the question of efficiency and integration, there are also potential regulatory challenges to approving a plan with remaining uncertainty. It is difficult to regulate something when you don't know exactly what it is, and there is the risk that conditions written into the licence will not be appropriate for the actual activity that is taking place.

For these reasons, GMOB cannot recommend blanket approval of the entire CRP at this time. GMOB's preference is to limit approvals to those activities that don't have strong interdependence with the other aspects of the Project. These include the following components:

- Freeze Program;
- Water Treatment Plant and Outfall Systems;
- Buildings and Site Infrastructure; and
- Landfill.

The remaining components are more strongly linked, e.g. the decision to fully or partly fill the pits will impact the amount of borrow that is required and may affect contaminated soils disposal options. GMOB's opinion is that these components should all be fully developed before being approved.

Recommendations

Recommendation 19

Only sections of the Closure and Reclamation Plan where the closure approach is more final and that describe activities that are independent of the other sections of the plan should be approved upon licence issuance. These include the:

- ***Freeze Program;***
- ***Water Treatment Plant and Outfall systems;***
- ***Buildings and Site Infrastructure; and***
- ***Landfill.***

7.3.1 Water Treatment Plant Discharge Location

Effluent from the new Water Treatment Plant will be discharged through an outfall into Yellowknife Bay.

References:

- GMRP – Technical Session – Responses to IR's and Comments;
- GMRP – Effluent Quality Criteria Report, Version 1, January 2019.

Proponent's Conclusion

The new WTP will discharge through an outfall into Yellowknife Bay. This option was selected based on Measure 14 in the Report of Environmental Assessment which explicitly required that effluent be released using a near shore outfall immediately offshore of the Giant mine site. The specific outfall location was determined through community engagement sessions.

GMOB's Position

The EA measures recommended by the MVEIRB were intended to work together to provide a cohesive environmental protection strategy for the Project. Changes made to the Measures during the approvals process may have reduced the efficacy of that overall strategy. One of the original measures in the EA assumed that Baker Creek would be diverted to avoid the minesite and discharge into the northern portion of Yellowknife Bay. Subsequently, a decision was made not to proceed with this strategy. This decision has changed the contaminant loading scenario in Yellowknife Bay from what was considered during the EA. Under the EA scenario, the location of the discharge from Baker Creek would have been moved northwards, and the discharge from the new WTP would then have been into a relatively clean receiving environment.

Since Baker Creek will not be re-routed, it will continue to discharge contaminants into the same area that the WTP will discharge treated effluent into. In most cases, the WTP discharge will be of better quality than the flow from Baker Creek.

However, the relatively good quality of the effluent provides a potential opportunity to improve overall water quality in Baker Creek, particularly during periods of low flow. The clean effluent could be discharged at the upstream end of Baker Creek, which would improve water quality in Baker Creek at the mouth, and potentially improve aquatic habitat.

GMOB acknowledges that this scenario was not considered during the Environmental Assessment, and that there are process and regulatory risks to changing the current discharge strategy. However, GMOB contends that the intent of the NWT regulatory system is not to lock a proponent into doing something a certain way if a better option becomes available. GMOB would support the GMRP undertaking a conceptual review to assess the pros and cons of discharging WTP effluent into upstream Baker Creek during parts of the year. This could be undertaken as a Reclamation Research Plan.

Recommendations

Recommendation 20

A Reclamation Research Plan should be developed to assess whether there would be benefits to discharging WTP effluent upstream in Baker Creek during portions of the year.

7.4 Site Wide Management and Monitoring Plans

In addition to the Closure and Reclamation Plan, the GMRP has submitted an Aquatic Effects Monitoring Program and seven site wide management and monitoring plans to support its water licence application:

- Water Management and Monitoring Plan;
- Waste Management and Monitoring Plan;
- Spill Contingency Plan;
- Dust Management and Monitoring Plan;
- Erosion and Sediment Management and Monitoring Plan;
- Tailings Management and Monitoring Plan; and
- Wildlife and Wildlife Habitat Management and Monitoring Plan.

These documents describe the overall environmental monitoring and management activities that will occur on the site. The plans contain information relevant to all three phases of the Project: Phase 1 - care and maintenance; Phase 2 - active remediation; and Phase 3 - post closure monitoring and maintenance.

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;
- GMRP - Site-wide Management and Monitoring Plans, January 2019.

Proponent's Conclusion

The Site-wide Management and Monitoring Plans are intended as umbrella documents that provide the framework for all of the environmental management and monitoring that occurs on the site. The GMRP intends that these plans be approved at licence issuance in order to immediately bring the site into compliance with the water licence.

The Plans would be updated prior to entering Phase 2 of the Project and the start of active remediation. These updates would include the direction and feedback provided during the water licencing process, as well as any modifications resulting from finalization of engineering designs. The Plans would be updated again prior to the Project entering Phase 3, post closure monitoring and maintenance.

Information in the site wide plans will inform the activity specific management and monitoring that will be described in greater detail within the Construction Plans.

GMOB's Position

The site-wide Management and Monitoring Plans submitted with the Water Licence application include elements of all three phases of the Project. Phase 1 activities are currently occurring on the site, so are well understood and can be clearly defined in the Management and Monitoring Plans. Phase 2 and 3 activities are not yet fully developed, and so the Management and Monitoring Plans will need to be updated.

Blanket approval of the Management and Monitoring Plans on issuance is complicated by the fact that the plans include information relevant to Phases 2 and 3 of the Project as well as Phase 1. GMOB's opinion is that only those components of the Management and Monitoring Plans that are fully developed and applicable to current activities should be approved at this time. Approval should not be given for the elements of the Project that have not been fully confirmed since, as noted in a previous section of this intervention, it is difficult to effectively regulate an activity when the full scope of the activity is not known.

To assist with interpreting which parts of the plans could be approved, the licence should include clear definitions for each of the three phases.

Recommendations

Recommendation 21

Definitions of Project Phases 1, 2 and 3 should be integrated into the water licence. Possible wording could be:

- ***Phase 1: phase of the Project in which activities are undertaken to support the care and maintenance of existing site conditions prior to submission of the construction plans and commencement of remediation;***
- ***Phase 2: phase of the Project in which approved closure activities are undertaken; this phase includes detailed design of engineered components, component-specific remediation/construction activities, and monitoring to confirm component performance;***
- ***Phase 3: post-closure monitoring and maintenance phase of Project which begins after all site components have been remediated as per the approved CRP and submission of the Final Closure and Reclamation Report.***

Recommendation 22

Portions of the site-wide management and monitoring plans relating to Phase 1 of the Project could be approved upon issuance of the water licence. Alternatively, a condition could be added to the water licence that current care and maintenance activities (i.e., Phase 1 work) could be continued without requiring approval of the management plans. The sections relating to Phases 2 and 3 should not be approved pending further updates that incorporate the results of the water licence process.

7.5 Post Closure Monitoring and Maintenance Plan

A Post-Closure Monitoring and Maintenance Plan will be submitted at the end of Phase 2, prior to completion of remediation activities and as a transition into Phase 3 of the Project. The details of the post-closure monitoring programs will be informed by the results of monitoring that is conducted during Phase 2[35].

References:

- GMRP – Technical Session – Transcripts, Responses to IR's and Comments;
- GMRP – Closure and Reclamation Plan, January 2019;

[35] GMRP, Closure and Reclamation Plan, January 2019, p. 5-289.

Proponent's Conclusion

Once active remediation is complete and monitoring indicates the site is performing as intended, the Project will enter Phase 3. At this point the Project transitions from a remediation project to a post-closure and maintenance project. The purpose moving forward through Phase 3 will be to monitor the site to ensure it meets closure criteria and continues to reflect the site objectives for the 100-year term of the project.

As the GMRP nears the end of active remediation (Phase 2), a Post-closure Monitoring and Maintenance Plan will be developed. This plan will outline the updated post-closure long-term monitoring program and any foreseeable maintenance. Monitoring frequencies, with anticipated changes over time, will be detailed and a robust process for responding to contingencies, post-closure, will be defined.

The scope, duration, and frequency of a final detailed post-closure monitoring program will be largely developed based upon the results of monitoring during Phase 2. As such, the post-closure monitoring presented as part of the CRP should be considered conceptual. A Post-closure Monitoring and Maintenance Plan (PCMMP) will be submitted at the end of Phase 2, prior to completion of remediation activities and as a transition into Phase 3.

GMOB's Position

There is insufficient information available to identify what needs to be included in a post-closure monitoring and maintenance plan at this time. As noted by the GMRP in Section 5.12 of the CRP, results from Phase 2 monitoring will be used to guide the development of the Post-Closure Monitoring and Maintenance Plan. In addition to the monitoring results, GMOB notes that there are other factors that will influence the contents of the plan such as:

- Issues that occurred during remediation that need to be specifically addressed;
- What is included in the Perpetual Care Plan;
- Long term funding agreements; and
- The status of research into a permanent solution.

Given all of these unknowns, it is difficult to define exactly what should be in the plan at this time. GMOB notes that it will be a number of years before the required information starts to become available.

Discussion during the July 2019 Technical Sessions suggested that the GMRP would be open to the idea of submitting a proposed Table of Contents (TOC) for the Post-Closure Monitoring and Maintenance Plan for review and approval[36]. GMOB supports this idea as the most realistic approach for developing an appropriate and effective plan. Submitting a table of contents prior to the actual document will allow parties to provide comments on the direction of the plan before the GMRP Team commits a significant amount of work to developing it.

GMOB expects that it will take time to develop a robust Post-Closure Monitoring and Maintenance Plan, and work this document should begin relatively soon. There are strong linkages between the Post-Closure Monitoring and Maintenance Plan and the Perpetual Care Plan (PCP). The PCP is in development, with the first draft expected in June 2020. Once the PCP has been written, it should be

[36] Technical Session Transcripts, July 9 2019, p. 119.

possible to develop a TOC for the Post-Closure Monitoring and Maintenance Plan, and GMOB expects that a reasonable submission date for the TOC would be 2025. With the TOC approved, it should then be possible to provide a first draft of the actual plan within a year of so of approval of the Design Plans.

Recommendations

Recommendation 23

The water licence should contain a requirement for submission of a Table of Contents for a Post-Closure Monitoring and Maintenance Plan to the Board for review and approval in 2025.

8.0 Licence Term

References:

- GMRP - Post-EA Information Package for Water Licence MV2007L8-0031, April 2019.

Proponent's Conclusion

The GMRP is requesting a 20 year licence term[37]. We note that in the July 2019 Technical Sessions, the GMRP identified that they would be submitting a post-closure licence which, if remediation was on schedule to be completed in 10 years, would mean that they planned to do 10 years of monitoring before transitioning to Phase 3.

GMOB's Position

The *Water's Act* provides allowance for licence terms of up to 25 years, or not more than the duration of the undertaking. The GMRP has requested 20 years, but GMOB is uncertain regarding the specific rationale for the requested term length.

GMOB's view is that there are benefits to issuing a licence with a term shorter than 20 years. The licence renewal process provides a useful check on how a project is progressing and provides an opportunity to adjust licence terms and conditions that are not effective or no longer appropriate. The specific activities that need to be regulated evolve as a Project moves through different phases, such as from active remediation to post-closure, and the licence should reflect these changes. The current Project schedule has defined a switch from active remediation to post-closure, when the Project moves from Phase 2 to Phase 3, and this would be an appropriate point to transition from a reclamation to a post-closure licence.

In addition, final remediation details will be finalized after licence issuance[38]), so it is not feasible to include water licence conditions at this time that will accurately reflect all aspects of the final Project.

[37] GMRP, Type A Water Licence Application Form, Supplementary Information, March 2019, p. 7.
[38]GMRP, Cover Letter - Re: Post-EA Information Package for Water Licence MV2007L8-0031 and Corresponding Land Use Permit Application for Remediation of the Giant Mine Site, April 1 2019, p. 3.

GMOB acknowledges that, under the current regulatory system, there is the opportunity for licence clauses to be amended outside of a renewal process. However, GMOB notes that amendments to a Type A water licence also trigger a Board process that includes a hearing (mandatory when the use, flow or quality of waters, or the term of the licence, would be altered and optional when these factors aren't affected but it would be in the public interest), so the level of effort required for an amendment is very similar to that for a renewal. As such, GMOB views that setting a shorter licence term for the Project would not be expected to result in a significant additional regulatory burden for the GMRP.

Recommendations

Recommendation 24

The licence term should align with the active remediation of the site, and a new licence should be required when the site transitions to post-closure (Phase 3). This would mean a term of 12 to 15 years for MV2007L8-0031.