Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Water Resources Division
Resource Management Directorate
Nunavut Regional Office
P.O. Box 100
Iqaluit, NU, X0A 0H0

Your file - Votre référence
3AM-GRA1624

January 28, 2021

Our file - Notre référence
CIDM#1292532

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
sent via email: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada's technical review of Sabina Gold & Silver Corp.'s amendment application for water licence #2AM-BRP1831 for the Back River gold mine

Dear Mr. Dwyer,

Thank you for your December 17, 2020 invitation for technical review comments on the above referenced application. The Water Resources Division of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the application and the results of our review are provided in the enclosed memorandum for the Nunavut Water Board's consideration.

Comments have been provided pursuant to CIRNAC's mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*. If there are any questions or concerns, please contact me at (867) 975-3876 or by e-mail at sarah.forte@canada.ca or Bridget Campbell at (867) 975-4282 and bridget.campbell @canada.ca.

Sincerely,

Sarah Forté

Sarah Forté
Water Management Specialist

Canada

Technical Review Memorandum

To: Richard Dwyer, Manager of Licensing, Nunavut Water Board

From: Sarah Forté, Water Management Specialist, Water Resources Division, Crown-Indigenous Relations and Northern Affairs Canada

Date: January 28, 2021

Re: Crown-Indigenous Relations and Northern Affairs Canada's technical review of Sabina Gold & Silver Corp.'s amendment application for water licence #2AM-BRP1831 for the Back River gold mine

Region: ☒ Kitikmeot ☐ Kivalliq ☐ Qikiqtani

A. BACKGROUND

Sabina Gold & Silver Corp. (Sabina) have applied to the Nunavut Water Board (NWB) to amend their Type A water licence 2AM-BRP1831 for the use of water and deposit of waste for the Back River gold mine project in the Kitikmeot region of Nunavut.

The licensed project allows for the operation of four open pits and four underground mines at the Goose property, a marine laydown area on Bathurst Inlet, and a 160 km long winter road. The amendment currently under review by the Nunavut Water Board is called the 2020 Modification Package and includes requests for changes in the following areas:

1. Goose Property
    - Goose Property airstrip extension
    - Umwelt Underground extension
    - Goose Property total water use increase
2. Goose Property changes to waste and water management infrastructure
3. Marine Laydown Area (MLA)
    - MLA Fuel Transfer Area
    - MLA Airstrip extension.
4. Marine Laydown Area – Shoreline Pad extension
5. Winter Ice Road (WIR)
    - WIR subbase upgrade
    - WIR service/emergency camps
    - WIR total water use increase.

Sabina requests that "*the scope of activities in Part A, Item 1 of licence, 2AMBRP1831, remain unchanged, … and that the new scope of activities associated with the 2020 Modification Package will be added to the licence as part of this amendment application.*"

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) submitted an information request on November 13, 2020 as part of the completeness check. The applicant provided detailed responses on November 30, 2020.

B. DOCUMENTS REVIEWED

Water Licence 2AM-BRP1831 amendment application documents reviewed include the following:

1. Amendment Application Cover Letter, dated October 13, 2020;
2. NWB Application for Water Licence Amendment Form, dated October 9, 2020;
3. Compliance Assessment Table, dated October 1, 2020;
4. Back River Project 2020 Modification Package, Version 2, dated October 2020, including:
    - Plain Language Summary (English);
    - Appendix A – 2020 Modification Package Figures;
    - Appendix B – Water Management Plan, dated October 2020, including:
        - Appendix C: Saline Water Management Plan
        - Appendix E: Water and Load Balance Report;
    - Appendix C – Goose Property Water Availability Memo, dated March 13, 2020;
    - Appendix D – MLA Shoreline Pad Extension Memo, dated June 5, 2020;
    - Appendix E – WIR Water Increase Memo, dated March 11, 2020;
5. Back River Project Responses to Information Requests for Water Licence (2AM-BRP1831) Amendment, dated November 30, 2020, including:
    - Attachment IR-D: Tailings Management Plan;
    - Attachment IR-E: Waste Rock Management Plan;
    - Attachment IR-F: Borrow Pits and Quarry Management Plan.

C. RESULTS OF REVIEW

CIRNAC Water Resources developed the following comments and recommendations with the help of Tetra Tech Canada Inc. They are provided for the Board's consideration:

1. Saline water pond balance

Comment

Managing saline groundwater in the short and long term will be one of the challenges of this project. The present plan involves storing saline groundwater in a saline water pond (SWP) for the first three years of operations and subsequently using the mined out Umwelt pit. The mined out pit will also serve as a permanent storage location as a meromictic pit lake (lake having layers with no intermixing), so understanding the inputs to the Umwelt pit/reservoir are important for confirming how meromictic conditions will develop.

CIRNAC's information request (IR) 14 requested more information on the SWP salinity at the time of filling the pit lake, and a discussion on how the final salinity might vary in the SWP both under the present mine plan and in a situation where operations paused for a period of time.

Sabina's response includes figure CIRNAC 14-2 which raises some questions. The dashed line in this figure shows the volume of water in the SWP over time. In the first three years of operation, Umwelt is an operating pit rather than a reservoir able to accept saline water. There should be no outflow other than evaporation from the SWP. Applying the annual evaporation rate of 324 mm stated in the Water and Load Balance model to an estimated lake area of 480,000 m^2 produces only ~155,000 m^3 of evaporation. The SWP volume drops by 200,000 m^3 after year 1 and 250,000 m^3 after year 2, according to the graph's time axis. The increase in pond volume in the third year is also far greater than prior years – presumably due to deeper works intercepting more groundwater. The reasons for the large annual variability in the pond volumes shown in the figure CIRNAC 14-2 in the response document should be examined and better explained.

Recommendations

1.1) CIRNAC recommends the applicant:

- Detail the reasons for SWP volume decrease prior to the planned transfer of saline water to pit storage in Year 3; and
- Confirm the reasons for the increased rate of SWP filling in the third year.

1.2) CIRNAC recommends the annual comparison of measured groundwater inflow rates to model predictions described in Section 5.1 of the Saline Water Management Plan be included in the annual reports. The Nunavut Water Board could consider adding this requirement to Appendix B of the water licence.

2. Hydrodynamic model

Comment

Part E, Item 15 b of the current water licence requires Sabina to submit an updated hydrodynamic model. This technical review period is a good opportunity to review the updated model. Additionally, the model results would help validate assumptions used in the Water and Load Balance, such as metal concentrations in Goose Lake.

Recommendation

2) CIRNAC recommends the applicant provide an updated hydrodynamic model, which they have committed to do on or before February 15, 2021.

3. Arsenic concentration in tailings beach sediments

Comment

The Water and Load Balance is used to calculate concentrations of parameters of interest throughout the water system using estimated parameter concentrations for geochemical source terms. The concentration of arsenic in the tailings beach is 5.1 mg/L in Table 4-4 of the 2020 model and 0.54 mg/L in Table 4-4 of the 2017 model. This appears to be a potential typographical error.

Recommendation

3) CIRNAC recommends the applicant confirm that the correct value can be found in Appendix C of the report and furthermore that the correct value was used in the modelling.

4. Criteria for segregating PAG and non-PAG rock

Comment

The 2020 Mine Waste Rock Management Plan and the 2020 Borrow Pit and Quarry Management Plan describe how potentially acid generating (PAG) and non-PAG rock are to be identified. Though both plans use total sulphur (S) and neutralization potential ratio (NPR – also NP/AP neutralization potential to acid potential) as criteria, the definition of PAG is not consistent between the plans, as presented in the table below.

Management Plan	Section	PAG	Non-PAG
Mine Waste Rock	Table 5.3-1	NPR < 3	NPR > 3 or total S <0.15%
Borrow Pit and Quarry	Figure 8.3-1	NPR < 3 and total S >0.15%	NPR > 3 or total S <0.15%

Recommendation

4) CIRNAC recommends the applicant clarify why both NPR and total sulphur are used to define PAG in the Borrow Pit and Quarry Management Plan, and only NPR is used in the Mine Waste Rock Plan.

5. Use of containment ponds as tailings facilities

Comment

The 2020 Modification Package introduces the use of Llama pit to store tailings, which is within the scope the project certificate. The use of mined out pits as tailings storage facilities was considered in general during the initial water licence application. In section 5.2.6 of the 2020 Water Management Plan, Sabina states: "*that all open pits, Umwelt Lake, and other containment ponds may be utilized for mine waste disposal. The licence amendment should be revised to include all four open pits (Umwelt, Llama, Goose Main, and Echo), Umwelt Lake, and other containment ponds as potential tailings facilities.*"

Containment pond design criteria as described in sections 6.2 and 6.4 of the Water Management Plan are dependent on the pond's intended use. Broadening potential tailings facilities to all containment ponds could result in storage of tailings in ponds which were not designed and built to an appropriate standard.

Recommendation

5) CIRNAC recommends any amended water licence require any ponds converted to tailings facilities be designed for that purpose. CIRNAC notes that additional tailings facilities would need to be captured in the Closure and Reclamation Plan and reclamation cost estimate.

6. Temporary PAG stockpiles

Comment

Updates to the 2020 Borrow Pits and Quarry Management Plan include modifications to section 7.1 "Identification, segregation and placement of quarry rocks", which was section 6.2 in the 2017 version of the plan. Both versions of the plan state PAG will be avoided, but should it be encountered, the new plan proposes: "*PAG quarry rock will be hauled to one of the designated Waste Rock Storage Areas for disposal (per the Waste Rock Management Plan) or temporarily stockpiled until it can be incorporated into these areas.*"

No information was found on how long a temporary stockpile might be kept, or what measures for collecting run-off would be in place. Though tests indicate there should be a lag before acid generation from PAG rock, field results may be different and it would be prudent to monitor the situation.

Recommendation

6) CIRNAC recommends the applicant provide constraints on the temporary PAG stockpiles they propose, if this is to be an element of their Borrow Pit and Quarry Management Plan. These might include maximum duration of stockpiling or water monitoring measures.

7. Quarry site development plans

Comment

The 2020 updated Borrow Pit and Quarry Management Plan no longer includes a description and commitment to produce rock quarry development plans before the start of development for each rock quarry. Section 4.5.1 of the 2017 Plan specified a detailed procedure "*will be provided to the NWB 60 days prior to construction*" and listed the information to be included in the site layout and setup.

These quarry specific plans are helpful in understanding specific arrangements for each quarry and used by Water Resources Officers during site inspections.

Recommendation

7) CIRNAC recommends the applicant modify the Borrow Pit and Quarry Management to keep their commitment to sharing with the Nunavut Water Board development plans specific for each rock quarry.

8. Additional approved infrastructure in Tailings Management Plan

Comment

Several updated management plans have been provided with this amendment application. Most updated plans include a section on infrastructure approved under the water licence, but not in the current mine plan. Since those potential infrastructure are not addressed in the current version of the management plans, the section describing them typically includes a statement such as: "*infrastructure that may be reintroduced and reintegrated into the Mine plan*".

The Tailings Management Plan does not include such a section, and it would be helpful for the reader to envisage other tailings infrastructure which have already been considered and approved.

Recommendation

8) CIRNAC recommends the applicant include a section on other approved infrastructure in the Tailings Management Plan the next time they update it.

9. Saline Water Management Plan title

Comment

The title above the table of the contents of the Saline Water Management Plan is "Mine Waste Rock Management Plan", which could lead to confusion.

Recommendation

9) CIRNAC recommends the applicant use a plan title consistent with the content and how the plan is referred to the next time they update the plan.