April 19th, 2022

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O Box 119
Gjoa Haven, Nunavut
X0B 1J0

RE: Meliadine Mine Design Reports & Operation and Maintenance Manual for water licence 2AM-MEL1631

Dear Mr. Dwyer,

Agnico Eagle Mines Limited (Agnico Eagle) thanks the Nunavut Water Board (NWB) for the opportunity to address interveners comments on the *Design Report for the Saline Effluent Treatment Plant (SETP-WTC) and related Operation & Maintenance Manual* submitted by Agnico Eagle to the NWB on February 21st and February 22nd, respectively.

Please find attached Agnico Eagle's answers to the recommendations and comments contained in the below documents, shared by the NWB on April 5th, 2022:

- *220323 2AM-MEL1631 Meliadine Mine Design Reports & Operation and Maintenance Manual CIRNA Comments-IMLE*
- *220324 2AM-MEL1631 Meliadine Mine Design Reports & Operation and Maintenance Manual ECCC Comments-IMLE*
- *220331 2AM-MEL1631 Meliadine Mine Design Reports & Operation and Maintenance Manual KIA Comments-IMLE*

Should you have any questions or require further information, please do not hesitate to contact us.

With our best regards,

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AGNICO EAGLE
MELIADINE

Kivalliq Inuit Association (KivIA)

Design Report Saline Effluent Treatment Plan (SETP-WTP)

KivIA Comment/Question 1

Please confirm the daily capacity of the SETP-WTC.

While the discfilter polishing can run at a maximum capacity of 20,000 m3/day, both intake lines (chlorine breaking and TSS removal) are limited to 12,000 m^3/day. During normal operation, will the chlorine breaking and TSS removal lines each run at 10,000 m^3/day? Is it anticipated that both lines will operate continuously, or will the breakpoint chlorination line be deactivated as needed?

Agnico Eagle Answer

The maximum capacity of the SETP-WTC is 20 000 m^3/day. The flow rates of the break point chlorination line and the total suspended solids (TSS) removal line will be set depending on the final ammonia concentration target and also on the raw water ammonia concentration.

The break point chlorination has a maximum hydraulic capacity of 12 000 m^3/day and the TSS removal line has a maximum capacity of 12 000 m^3/day. It means that if the break point chlorination line is operated at 12 000 m^3/day, then the TSS line can be operated at 8 000 m^3/day if the maximum capacity of the SETP-WTC is targeted (20 000 m^3/day).

Breakpoint chlorination line will be operated if ammonia removal is required. If not required, the breakpoint chlorination can indeed be deactivated. However, this line also includes a TSS removal section (Actiflo), with a maximum capacity of 12 000 m^3/day. If the breakpoint chlorination is not required, this line can still be used to keep the maximum discharge capacity of the SETP-WTC.

KivIA Comment/Question 2

When will the plant be operating at full capacity?

Tough commissioning of the SETP-WTC is expected summer 2022, will the plant be running at full capacity immediately?

Agnico Eagle Answer

The SETP-WTC commissioning is expected to be performed in summer 2022 and summer 2023 in recirculation mode (treated water will be discharged in the saline water ponds). The plant is not expected to run at full capacity during the commissioning period. It is expected that the SETP-WTC will be operating at full capacity once the waterline is finished, and discharge to sea is ongoing.

KivIA Comment/Question 3

Will there be reservoir of treated water stored at SP3 for eventual pipeline discharge to Melvin Bay?

If not, would short, unanticipated downtime of the SEPT-WTC compromise the ability of the pipeline to discharge at full capacity?

Agnico Eagle Answer

The water from the SETP-WTC will be discharged into the pumping station tank for discharge through the water line. SP3 is not anticipated being used to act as a storage of treated water. Maintenance of the SETP-WTC will be performed outside the discharge season to limit need of shut down. However, there will be downtime due to regular maintenance of the SETP-WTC during operation.

KivIA Comment/Question 4

Will the SETP-WTC be operational year-round, or only during the saline discharge?

Agnico Eagle Answer

The discharge to sea is planned to be performed only during open-water season. However, the SETP-WTC may be operated outside this period in recirculation mode only.

KivIA Comment/Question 5

Please describe the sludge management process in more detail.

In the document, Agnico Eagles states, “Sludge produced in the SETP-WTC system will be stored in the sludge tank prior to being disposed in saline contact water ponds according to the site Water Management Plan.” In which contact water ponds will sludge be stored? What is the plan for the sludge during closure and reclamation? What is the anticipated annual volume of sludge produced?

Agnico Eagle Answer

The sludge is produced by the removal of TSS within the Actiflos from SETP-WTC and EWTP-WTC. Sludge will be discharged into a sludge tank prior being stored into the saline contact water storage pond (Tiriganiaq Open Pit 2 (Tiri2), Saline Pond 1 (SP1), or other ponds dedicated to the storage of saline water). It is not intended to store sludge in surface contact water containment pond (CPs).

The volume of sludge produced is highly dependent on the TSS concentration in water feeding the EWTP-WTC and SETP-WTC and is estimated at:

- EWTP-WTC: approximately 50 m^3/d at 1-5% w/w solid;
- SETP-WTC: approximately 442 m^3/d at 2% w/w solid.

Note that as the sludge settles in the saline ponds, its volume will be further reduced. Considerations on sludge management upon closure will be included in future updates of the Interim Closure and Reclamation Plan (ICRP) as needed.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

CIRNAC 2 – Volume of Sludge from SETP-WTC and EWTP-WTC

Comment

As part of the solid waste management strategy described in section 3.9 of the Design Report – Saline Effluent Treatment Plant (SETP-WTC), AEM states that *"Sludge produced in the SETP-WTC and EWTP-WTC system will be stored in the sludge tank prior to being disposed in saline contact water ponds according to the water management plan"*.

CIRNAC notes that Schedule B, Item 7, of the Water Licence 2AM-MEL1631 requires AEM to provide details of the storage capacity for saline water including its associated components (e.g., sludge) in the Annual Reports.

Thus, Schedule B, Item 7 states, *"The Annual Report referred to in Part B, Item 2 shall include: Discussions on the available storage capacity for both saline and fresh Water, including the volumes of Water transported to Melvin Bay and the volumes of Water discharged into Meliadine Lake, as well as the projected volumes of water requiring storage in the upcoming year".*

Based on this Water Licence condition, CIRNAC requests that AEM maintain records of sludge produced in the SETP-WTC and EWTP-WTC systems by tracking daily/monthly/yearly volumes before it is stored in the sludge tank prior to disposal in saline contact water ponds in accordance with the water management plan.

Recommendation

(R-02) CIRNAC recommends that AEM maintain records of sludge produced in the SETP-WTC and EWTP-WTC system by tracking daily/monthly/yearly volumes before it is stored in the sludge tank and report this information in its Annual Reports.

Agnico Eagle Answer

AEM will maintain records of sludge produced in the SETP-WTC and EWTP-WTC and will report this information in future annual reports.

CIRNAC 3 – Designation codes

Comment

The saline water management strategy, as described by AEM in section 2.4 of the Design Report – Saline Effluent Treatment Plant (SETP-WTC) indicates that AEM intends to transfer the saline water from underground mines to storage and pre-mixing ponds before feeding saline water to SETP-WTC for treatment. Thus, AEM's description states: "Saline water from the underground

mine is transferred at the surface to the saline contact water pond storage. The saline water, as well as other contact water, will be pumped to the SETP- *WTC (raw water source) through an in-line blending system, or will alternatively be fed to premixing pond, which will be used as a feed source for the SETP-WTC. Treated water exiting the SETP-WTC is discharged to the water line towards Melvin Bay".*

CIRNAC acknowledges that Part F, Item 2 of the Water Licence 2AM-MEL1631 requires AEM to direct all Contact Water from Collection Ponds to CP1. While CIRNAC understands that the described saline contact water storage and pre-mixing pond may qualify as "Collection Ponds" under Water Licence 2AM-MEL1631. The Licence Terms and Conditions highlight the specific designation code for each of these storage ponds that will be used to store the saline water before treatment. Using these codes would make it easier for reviewers such as CIRNAC to follow the description. There was no mention of any specific designation code (e.g., CP1, MEL-14 etc.) attached to; (a) the alternative pre-mixing pond; and (b) saline contact water pond storage; in the description that AEM provided.

CIRNAC requests that AEM provide information on the location(s) of the saline water storages and pre-mixing ponds that will be used to store the saline water before treatment, along with their specific designation codes in order to facilitate CIRNAC Inspectors in locating them and carrying out routine inspection duties.

Recommendation

(R-03) CIRNAC recommends that AEM provide information on the location(s) of the saline water storages and pre-mixing pond designated for storage of saline water before treatment in the Meliadine mine site map, along with their specific identification codes and report this information in its Annual Reports.

Agnico Eagle Answer

The saline contact water storages are mainly Tiri2 pit and SP1 or other location stated in the Water Management Plan. Tiri2 is intended to be the main reservoir of saline water and SP1 is intended to be the premixing pond if the in line feeding of saline and surface contact water is not in operation; however, these locations may change with future water management plans and mine plans. The figure below presents the location of SP1 and Tiri2 pit. The location of the saline storage and premixing pond, if in use, will be reported in the annual report every year.

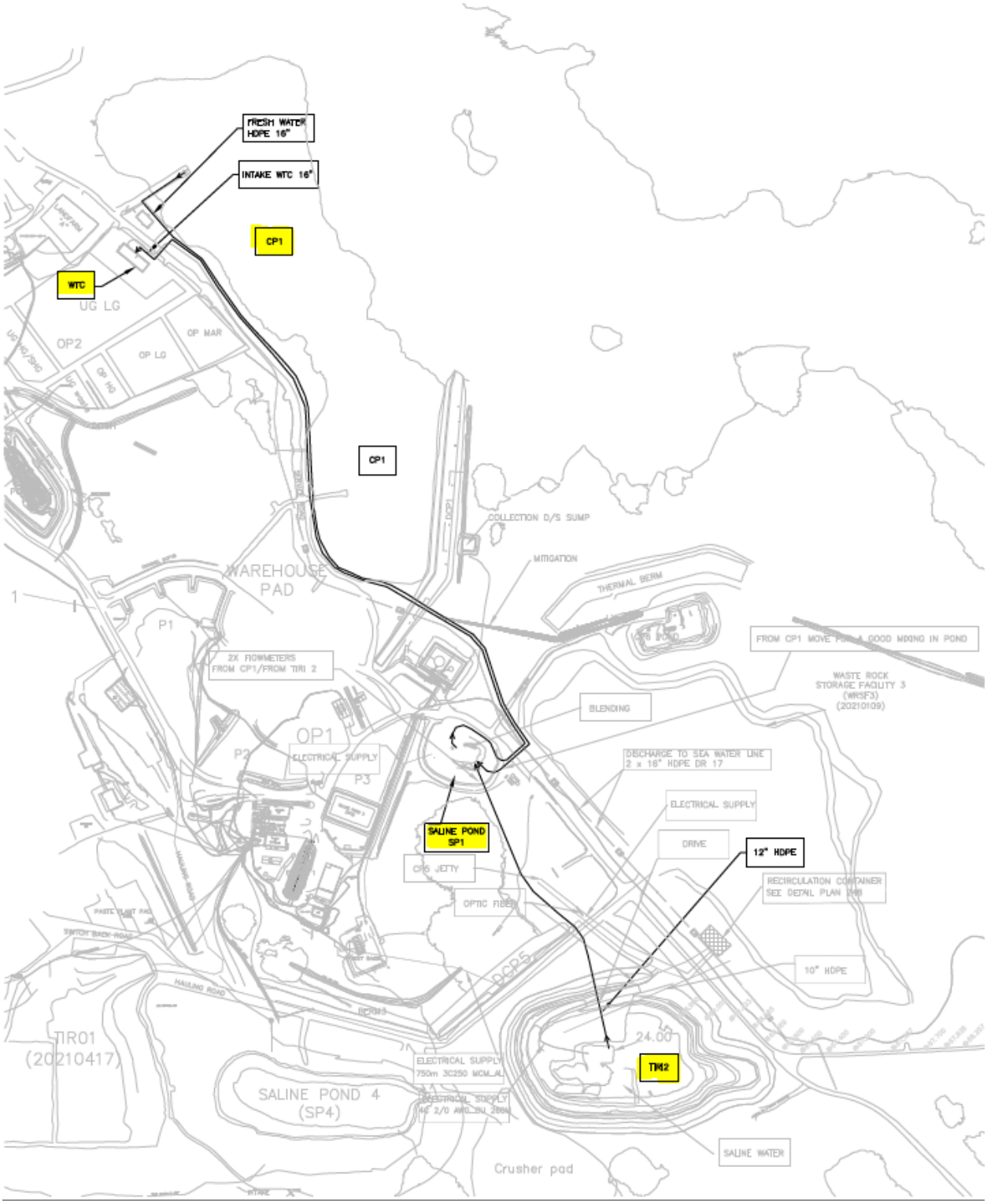

Figure 1: Location of Tiri2, SP1 and WTC

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Environment and Climate Change Canada (ECCC)

ECCC 2 – Capacity and treatment thresholds

Comment

Section 2.3 of the SETP-WTC Design Report states that the new Saline Effluent Treatment Plant (SETP) located within the Water Treatment Complex (WTC) is designed for a maximum treatment flow rate of 20,000 m3/d. However, Section 2.7 shows maximum flow limitations of 12,000 m3/day in each of the breakpoint chlorination and TSS removal line components. It is not clear whether the SETP-WTC would have the capacity to treat flows of 20,000 m3/d.

The existing SETP was upgraded to treat 1600 m3/day in 2020. It is not clear if this SETP will be retained for system backup/redundancy.

The SETP-WTC is designed to remove ammonia down to 0.5 mg N/L unionized ammonia (Table 1), and ammonia levels in effluent will be manually analyzed periodically to assess treatment performance. The primary source of ammonia will be water from the Tiriganiaq pit, which will be piped to the Saline Pond 1 (SP1), along with contact water from Collection Pond 1 (CP1). CP1 is expected to have low ammonia levels, which may negate the need for ammonia treatment in the combined waste streams. Thresholds for triggering ammonia treatment have not been identified, nor has the maximum concentration which the plant is able to treat been noted (i.e. any upper limits to effective treatment).

Maintenance is described in Section 3.5 for cleaning the discfilter system, but it is not specified whether the rest of the system will have to be taken off-line for maintenance and how that might affect water management.

Recommendation

ECCC requests clarification on the following:
1. When ammonia treatment is required, will the maximum treatment capacity be held at 12,000 m^3/d?
2. Will the existing SETP be used in addition to the SETP-WTC?
3. At what ammonia concentration would the SETP-WTC treatment be used?
4. Is there a maximum ammonia concentration that can be treated?
5. Will there be periods when the treatment system will be down for maintenance, and if so, how will any high-ammonia wastewater be managed during maintenance periods?

Agnico Eagle Answer

1. The SETP-WTC consist of 2 treatment trains. One train can treat TSS up to 12 000 m^3/d, and the other train (call the breakpoint chlorination train) can treat TSS and ammonia nitrogen at 12 000 m^3/d. Flowrate in each of these trains will vary depending on raw water quality and treatment target. As long as the effluent at the treated water tank meets the treatment targets, the SETP-WTC can be operated up to 20 000 m^3/d while treating ammonia.

2. The SETP is not intended to be used in parallel of the SETP-WTC. However, the plant will remain available if needed.

3. The need of ammonia treatment will depend on the feed ammonia concentration (in raw water) and treatment target. It is assumed that the SETP-WTC is used to remain below the MDMER limit of 0.5 mg/L unionized ammonia (maximum monthly mean concentration) and TSS limit of 15 mg/L in average (max grab 30 mg/L). Thus, anytime that unionized ammonia in raw water exceeds 0.5 mg/L, the break point chlorination will be activated. The breakpoint chlorination may also be activated if ammonia nitrogen concentration in the raw water is suspected to lead to compliance issues, such as acute toxicity.

4. The maximum capacity of ammonia treated is expressed in terms of load per day. The reaction of breakpoint chlorination and the need for chemical is proportional to the load of ammonia to be removed per day (it is required 21.6 mg of CaOCl2 pure per mg of ammonia to be removed). Thus, the break point chlorination line can remove at a maximum of 866 kg per day of ammonia.

5. Most of the maintenance on the SETP-WTC will be performed outside the discharge season to limit need of shut down. However, there will also be downtime due to routine maintenance of the SETP-WTC during operation. Therefore, it is expected to have shut down periodically for cleaning of Actiflo and discfilter. During this period, the plant will be stopped, and raw water will remain in their relative storage ponds.