

Environmental Protection Operations Directorate  
Prairie & Northern Region  
5019 52<sup>nd</sup> Street, 4<sup>th</sup> Floor  
P.O. Box 2310  
Yellowknife, NT X1A 2P7

ECCC File: 6100 000 012/015  
NWB File: 2AM-MEL1631



January 17, 2020  
(resubmitted with corrections February 28, 2020)

via email at: [licensing@nwb-oen.ca](mailto:licensing@nwb-oen.ca)

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

Dear Richard Dwyer:

**RE: 2AM-MEL1631 – Agnico Eagle Minerals – Meliadine Project – Interim Closure and Reclamation Plan**

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned interim closure and reclamation plan.

ECCC's specialist advice based on our mandate pursuant to the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act*.

ECCC has the following comments:

**1. Closure Water Quality Objectives – Pits and Connection to Surface Waters**

Reference(s)

- Meliadine Interim Closure and Reclamation Plan 2019 Final Report, Dec. 12, 2019 Rev.00

Comment

Section 1.3.4 *Open Pits* of the interim closure and reclamation plan (ICRP, page 9) states that water quality model results have indicated that water quality in the flooded pits will meet the discharge criteria and post closure treatment will not be required. Water control structures are to be maintained until discharge criteria are met. Section 5.2.4.5 of the ICRP *Engineering Work Associated with Selected Closure Activity* (page 82) again refers to discharge from the pits meeting water licence discharge criteria. However, the expectation has been for the water quality in the pits to meet baseline concentrations or Canadian



Council of the Ministers of the Environment (CCME) and or site-specific water quality objectives. The rationale for this is that the pits do not represent water discharges and will ultimately be accessible to and colonized by aquatic life. Therefore, water quality in the pits will need to be protective in quality for fishes and invertebrate life.

Section 5.2.7.5 *Engineering Work Associated with Selected Closure Activity* (Page 104) states that:

*“Once water quality meets the discharge criteria, the water management systems will be decommissioned to allow the water to naturally flow to the environment.*

*The longterm, post-closure water quality in the containment ponds and in the flooded open pit lakes are anticipated to meet Metal and Diamond Mining Effluent Regulations (MDMER), Canadian Council of Ministers of the Environment Water Quality Guidelines (CCME-WQG) for the protection of aquatic life and/or the Site-Specific Water Quality Objectives (SSWQO's) developed for the Mine (AEM, 2019c).”*

The *Metal and Diamond Mining Effluent Regulations* (MDMER) criteria may be considered for discharges, but are not appropriate as environmental quality standards. The MDMER will be in force until Recognized Closed Mine status is reached, and until that time, all releases of effluent (as defined in the MDMER) will have to be directed through Final Discharge Points in compliance with the regulations.

Any parameters that do not have receiving environment guidelines or site-specific objectives should be identified. No such parameters have emerged at this time, but monitoring over the life-of-mine may identify such parameters.

It would be useful for the ICRP to include a description of connectivity to surface waters for the open pits and water management structures at closure. This should include noting any areas where fish passage may be possible (noting that colonisation by fish will not be by the waterbodies).

#### ECCC Recommendation(s)

ECCC recommends that:

- The ICRP specify water quality objectives for closure that represent baseline conditions or national water quality objectives such as the CCME or site-specific water quality objectives.
- A map showing closure drainage conditions, with connectivity between surface waters and water management structures identified, including potential for fish passage is included in the ICRP.

## **2. Closure Water Quality Objectives – Arsenic**

#### Reference(s)

- Meliadine Interim Closure and Reclamation Plan 2019 Final Report, Dec. 12, 2019 Rev. 00

- Golder (2013). Site specific Water Quality Objectives (SSWQO) Assessment – Meliadine Gold Project, Nunavut. Document 371. Report to Agnico-Eagle Mines Ltd. February 22, 2013. 57 p.

### Comments

ICRP Section 3.3.3.1 *Surface Water Quality Monitoring* (page 36) states that:

*“Long-term, post-closure water quality in the containment ponds (CP1, CP3, CP4, CP5, and CP6) and in the flooded open pit lakes are anticipated to meet MDMER limits and CCME-WQG for the protection of aquatic life or the Site-specific Water Quality Objectives (SSWQO) developed for the Mine for aluminum, fluoride, and iron. Arsenic concentrations in CP3 could slightly exceed the SSWQO post-closure, a criterion that is conservatively protective of the receiving aquatic environment (Golder, 2013a). Concentrations that exceed predictions are minor, much less than the mixing capacity in the receiving environment. These arsenic concentrations are within the tolerance levels that have been deemed nondeleterious by Environment Canada for the Mine (Golder, 2013a).”*

The above underlined quote in the ICRP is from a document in the original Water Licence application, which referenced an email from ECCC (Golder 2013); the referenced discussion applied to the deposit of waste rock and is not necessarily directly applicable to final water quality objectives. The original comment pertained to waste rock leachate and was in the context of mixing in the receiving environment; if CP3 is accessible to fish, concentrations above the SSWQO could be of concern.

The following quote is from the referenced Golder 2013 document:

#### *4.2.2 Implications*

*In summary, it is likely that arsenic leached from the Meliadine waste rock will have a negligible or minimal toxicity to aquatic life in the site specific receiving environment. This conclusion is based on the analyses conducted above and summarized below which incorporate a relatively high degree of conservatism, but also on the 10-fold dilution in the receiving water bodies*

*A conservative SSWQO of 25 micrograms/ litre is recommended for Meliadine Lake based on the SSD results for arsenic, which are considered reliable based on the diversity of taxa reflected in the SSD and the quality of the model fit.*

The context for using the SSWQO was specific to waste rock leachate, and relied on an analysis of the arsenic speciation and on subsequent dilution; given the different context, the SSWQO should be reviewed for use as a closure objective.

Arsenic concentrations are further discussed in Section 5.2.6.7 *Uncertainties* (page 95):

*As mentioned in the Water Management Plan (AEM, 2019c), according to the water quality model predictions, during operation, CP3 arsenic concentration may exceed MDMER on occasion if precipitation events or the freshet flows generate drainage from the TSF (Golder, 2012). The main source of arsenic in CP3 is predicted to be from*

*residual process water that is assumed to be present in the filtered tailings. Arsenic transfer from process water to CP3 water will be minimized by effective dewatering of the tailings prior to placement into the TSF, and from freezing of the tailings in the TSF. Water from CP3 will be pumped to CP1 and dissolved arsenic concentration in CP1 is predicted to meet the MDMER monthly average maximum concentration. Long-term, post-closure arsenic concentrations in CP3 could slightly exceed the SSWQO post-closure, a criterion that is conservatively protective of the receiving aquatic environment (Golder, 2013). Concentrations that exceed predictions are minor, much less than the mixing capacity in the receiving environment. These arsenic concentrations (Golder, 2013) are within the tolerance levels that have been deemed non deleterious by Environment Canada for the Mine.*

ECCC notes that Section 5.2.6.7 refers specifically to dissolved arsenic, and any comparisons should use total arsenic. Ongoing monitoring provides data that can be used to update model predictions for the pit and pond water quality. Predicted concentrations should be reviewed in the context of environmental quality rather than discharges once connection to surface waters is done.

#### ECCC Recommendation(s)

ECCC recommends that:

- The proponent review water quality objectives for pits and water management structures in the context of environmental quality, based on the eventual colonization by aquatic life.
- Predictions be updated periodically for pit and pond water quality; and
- Total arsenic is used for comparisons rather than dissolved arsenic.

### **3. Closure of the Mine Site**

#### Reference(s)

- Meliadine Interim Closure and Reclamation Plan 2019 Final Report, Dec. 12, 2019 Rev. 00

#### Comments

Section 5.2.7.8 *Post-Closure Monitoring, Maintenance, and Reporting* states that “*periodic inspections will be performed by a geotechnical engineer to visually assess stability and performance of the structures*”. However, no contingencies are outlined for physical stability in section 5.2.7.9 *Contingencies*.

*Section 5.2.8.5 Engineering Work Associated with Selected Closure Activity* (page 111) states that Most of the mobile equipment will be removed once the closure stage is complete. Equipment used for closure activities and long-term maintenance will be removed from the site once they are no longer required. A small subset of equipment will be retained on-site for a portion of the post-closure stage.

It is not clear whether there will be equipment on site that would be capable of any required rock or earthworks necessary to deal with surface erosion or instability issues.

#### ECCC Recommendation(s)

- **ECCC recommends that the proponent provide confirmation of the capacity to address erosion or instability in the ICRP.**

#### **4. Landfarm**

##### Reference(s)

- Meliadine Interim Closure and Reclamation Plan 2019 Final Report, Dec. 12, 2019 Rev. 00

##### Comments

Section 5.2.9.5 *Engineering Work Associated with Selected Closure Activity* (page 121) outlines activities associated with decommissioning the landfarm. However, Section 5.2.9.5 does not specify if the liner will be removed, and if so, where it would be disposed.

#### ECCC Recommendation(s)

- ECCC recommends that in future versions of the ICRP the proponent clarify closure of the landfarm with respect to the removal of the liner and clarify the subsequent implications for drainage in the active layer.

#### **5. Waste Rock Storage Facilities**

##### Reference(s)

- Meliadine Interim Closure and Reclamation Plan 2019 Final Report, Dec. 12, 2019 Rev. 00. Section 1.3.5 Waste Rock Storage Facilities

##### Comments

The proponent states:

*“geochemical testing indicates that the waste rock and overburden from the Project is non-potentially acid generating (NPAG) and non-metal leaching (NML). Kinetic tests completed on all waste rock type and at various scales show that drainage water quality is expected to meet MDMER monthly mean effluent limits, including results for arsenic. Therefore, a closure cover system is not proposed for the WRSFs” (AEM, 2019b).”*

And that:

*“The contact water management system for the WRSFs will remain in place until mine closure activities are completed and that monitoring results demonstrate that water*

*quality conditions from the WRSFs are acceptable for discharge to the environment with no further treatment required. Once water quality meets the discharge criteria, diversion channels/berms/dikes will be decommissioned to allow the surface runoff and seepage water from the WRSFs to naturally flow to the outside environment.”*

In Section 5.2.5.8 the proponent states that:

*“Thermistor data will be monitored where required to determine thermal conditions within the WRSFs to confirm predicted permafrost aggradation/encapsulation and to verify that the thickness of the active zone is less than the design thickness of the cover;”.*

This is a contradiction, as there is no cover, and should be corrected/clarified.

In addition, the proponent indicates that *“Once water quality meets the discharge criteria, diversion channels/berms/dikes will be decommissioned to allow the surface runoff and seepage water from the WRSFs to naturally flow to the outside environment.”* As long as Meliadine Mine is subject to the MDMER, all effluents – including contact surface runoff and seepage water – are discharged through a final discharge point, and monitoring results reported through the MERS. Seepage should not be allowed to naturally flow to the environment. The requirement to manage seepage under MDMER will continue until the mine acquires the Recognized Closed Mine (RCM) status and will then be subject to the general prohibition of the *Fisheries Act*.

#### ECCC Recommendation(s)

- **ECCC recommends that the description be revised to reflect that the WRSF does not have a cover;**
- **ECCC recommends that the ICRP clarify timing for the active management of contact water.**

## **6. Soil Chemistry**

#### Reference(s)

- Meliadine Interim Closure and Reclamation Plan 2019 Final Report, Dec. 12, 2019 Rev. 00. Section 3.3.1 Soil Chemistry.

#### Comments

Proponent stated:

*“Geochemical characterization results indicated that the overburden produced will be NPAG, and that leachate concentrations are generally lower than waste rock and is predicted to meet the Metal Mining Effluent Regulations (MMER1) effluent monthly mean limits. Waste rock and overburden have compatible geochemical characteristics such*

*that these materials can be managed together in the same disposal facilities (AEM, 2015a)."*

The proponent should be aware that after an amendment on June 1, 2018, the *Metal Mining Effluent Regulations* (MMER) became the *Metal and Diamond Mining Effluent Regulations* (MDMER). The discharge limits in the amended Regulations come into force June 1, 2021. Given that this project extends beyond 2021, the proponent should be aware that by June 1, 2021, new discharge limits would apply

#### ECCC Recommendation(s)

- ECCC recommends that the proponent be aware of the new discharge limits of the amended MDMER.

## **7. Waste Rock Storage Facilities – Description of Components**

#### Reference(s)

- Meliadine Interim Closure and Reclamation Plan 2019, final Report Sections: 5.2.5 Waste Rock Storage Facilities; 5.2.5.1 Description of the components

#### Comments

The proponent **provided the following information:**

- **Waste Rock Storage Facility (WRSF) 1: The facility is located north of Tiriganiaq Pit 1 with an approximate footprint of 41.4 ha and will be located to the north of Tiriganiaq Pit 1. One small shallow pond (Pond A17) is located within the footprint of WRSF1 and will be covered by the facility.**
- WRSF 2 is located south of Pond H17 (CP1) with an approximate footprint of 20.2 ha. Five small ponds (Ponds A58, H8, H9, H10, and H11) are located within the footprint of WRSF2. Pond A58 will be fully covered and the other four ponds will be partially covered by waste rock.
- WRSF3 is located north of Tiriganiaq Pit 2, covering H20 pond basin with an approximate footprint of 22.7 ha. The runoff water from WRSF3 will be collected within Pond H19.

#### **Section 5.2.2.1 further states**

The design location of the WRSFs took into consideration the environmental, social, economic, and technical aspects of waste rock management. Waste Rock management included:

- maintaining a minimum distance of 100 m between the toe of the WRSFs and the open pits;

- maintaining a minimum distance of 20 m from the toe of the WRSFs to haul and access roads;
- maintaining a distance between the toe of the WRSFs and adjacent lakes that will insure stability of the facilities and ensure no effects to lakes not disturbed by mine activities.

*The waste rock will be managed as one mixed pile; the management plan for waste rock considers the overall leachability of the mixed pile and aims to limit arsenic leaching during operation and post closure. Predictive water quality modelling also considered the overall leachability of waste rock and results show that the mine effluent will meet MDMER during operation, and, Canadian Council of Ministers of the Environment water quality guidelines (CCME-WQG), or site-specific water quality objectives post-closure. No arsenic treatment is anticipated to be needed (AEM, 2019b).*

ECCC appreciates the environmental aspects taken into consideration in the design of the WRSFs, however, the distance between the WRSFs and adjacent lakes were not stated

It is not clear whether the quality of leachates from each of the WRSFs is being considered/assessed separately or as a mixture of the leachates from all the WRSFs. There are three WRSFs as well as the tailings. It is unclear if the three WRSFs made up of the same rock quality and type in order to provide a defensible basis for treating them as a mixed pile and not looking at individual pile's leachate quality/leachability.

#### ECCC Recommendation(s)

ECCC recommends the proponent clarify:

- The distance between the toe of the WRSFs and adjacent lakes
- Whether the quality of leachates from each of the WRSFs is being considered/assessed separately or as a mixture of all the leachates from all the WRSFs.

Please contact Eva Walker at (867) 669-4744 or [eva.walker@canada.ca](mailto:eva.walker@canada.ca) should you require more information.

Sincerely,

*[original signed by]*

Eva Walker  
Acting Senior Environmental Assessment Coordinator

cc: John Olyslager, Head, Environmental Assessment North (NT and NU)