Environment and Climate Change Canada | Environnement et Changement climatique Canada

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Via email: licensing@nwb-oen.ca

RE: 2AM-MEA1525 – Agnico Eagle Mines Ltd. – Meadowbank Mine Project – 2015 Annual Report

Attention: Karen Kharatyan

Environment and Climate Change Canada (ECCC) has reviewed the main report document, as well as the sections identified below from the information submitted to the Nunavut Water Board regarding the above-mentioned annual report. ECCC's specialist advice is provided based on our mandate, in the context of the *Canadian Environmental Protection Act*, the pollution prevention provisions of the *Fisheries Act*, the *Migratory Birds Convention Act,* and the *Species at Risk Act*.

The following comments are provided:

Appendix C2: Water Management Plan
Meadowbank Water Quality Forecasting Update (Technical Note)

1. As in previous reports, dissolved parameters rather than total have been compared to water licence limits and to guideline values, which are both for total measurements. The report acknowledges this practice (as indicated on pdf page 112):

   "*3.2 Assumptions*
   xiv. Because of the similarities between the actual and dissolved forecasted concentrations, it is assumed that the suspended fraction should settle and not be mobile during the breaching of dikes. Therefore, the dissolved parameters are used again in the forecasting model this year, compared to the total parameters."

   Table 2-2 (pdf page 110) does not necessarily support the assumption that total and dissolved are similar.

   For copper:

- The January total concentration is 2 times dissolved;
- There appears to be an error in the April dissolved measurement as it is higher than the total measurement (36.7 vs 28.5);
- July is comparable;
- The October total concentration is three times dissolved;
- The average is comparable.

For iron total concentrations were higher than dissolved by:

- January 1.9 times;
- April 1.1 times;
- July 1.4 times;
- October 2.5 times;
- Average: 1.4 times

ECCC notes that the modeling report recommends measurement of total and dissolved metals in the pits, and that transferred reclaim water be monitored for all parameters; these recommendations are supported and should be used for future comparisons. Groundwater monitoring results also report both total and dissolved forms of metals, and the total form should be used for comparisons.

With respect to the assumption that Total Suspended Solids (TSS) will settle out, this may not be valid and should be checked with sampling. If sufficient energy is present to achieve mixing of the pit water (on the understanding that meromixis is to be prevented) then there will likely be suspension of particulate matter.

2. Water quality for the North and South ponds was based on samples taken from the surface of the ponds. Profiles of the water chemistry should be done to confirm whether these are representative of the pond water. If not, a mass balance approach or other method should be used to estimate the potential contaminant contributions from the ponds.

3. Contributions from saline mine water inflows are not explicitly considered in the model. This should be estimated for inclusion in the next model update. Currently the model inputs do include measured Total Dissolved Solids (TDS) increases observed in the mill effluent, and incorporates assumed increases to the North and South Cells. Groundwater contributions should be estimated and used as a model input.

4. Table 3-1 (pdf page 116) footnote numbers do not appear in the table. Agnico Eagle Mines Ltd. (the Proponent) should update the table to clearly show the information associated with each footnote.

5. Section 4 (Water Quality Forecast Results) presents predicted water quality for the Portage and Goose pits. The pH is predicted to range from 7.50 to 7.57. The Proponent should clarify whether consideration has been given to the potential for the generation of acidity from the exposed pit walls.

6. The Proponent should clarify the source of the Total N equivalent guideline shown as a Canadian Council of Ministers of the Environment (CCME) guideline in Table 4-2 (pdf page 125), and identify what this refers to.

7. In Table 4-2 (pdf page 125) the ammonia is shown as (NH_3) (ionized) which is contradictory (the ionized form is NH_4). The Proponent should clarify what form the predictions are for.

8. Section 4.2.6 (Comparison of Forecasted Values) describes treatment options to improve pit water quality. Treatment of the metals parameters is proposed to be done upstream of discharge to the pit, and could involve several different treatment processes. Copper could be treated through lime or caustic dosing. High pH levels will change the form of ammonia and also the volatilization rates. The Proponent should clarify whether pH changes can be modeled for the pit water, or if pH adjustment will be done for any treated water prior to release or reconnection to surface waters.

Freshet Action and Incident Response Plan

9. In Section 2.3.1.5 (East Diversion ditch outlet to NP-2 Lake), Section 2.3.1.7 (NP-2 Outlet and Vault Road Culvert), and Section 2.4 (Vault Road Culvert), reference is made to TSS management, with notification being made to the Department of Fisheries and Oceans (DFO) in the event of TSS discharge. This falls under ECCC's purview; the notification information should be amended to ECCC for TSS-related issues in waterbodies.

Appendix G7: 2015 Groundwater Monitoring Report

10. The results over time for various groundwater monitoring well sites show a high degree of variability between years, and this raises questions on the robustness of groundwater characterization. For example, comparisons of TDS results from Table 2 (pdf page 15) show that MW-03-01 ranges from 315 to 1900 ppm; MW-08-02 ranges from 39 to 843, with the 2015 values being an order of magnitude lower than all previous years. Related parameters fluctuate widely (e.g. chloride). Only one site showed consistent groundwater quality for two sampling events in 2015; MW-14-01 yielded similar TDS results, and reasonable comparability for the metals parameters between the May 2015 and August 2015 samples. Mine water inflows are presented as being representative of groundwater quality, but the sample quality is not a clear match for the groundwater well samples based on chemical characterization.

    The main reasons for monitoring groundwater are to confirm there is no subsurface migration out from the tailings containment facility into the groundwater, and to track groundwater quality in order to accurately model site water quality on an ongoing basis. Those goals are being met to a degree, and ECCC suggests that it would be worthwhile to revisit the groundwater monitoring program design to focus on improving the information for water quality model updates.

11. ECCC acknowledges AEM's response to the methodology concern raised in the 2014 report review.

Appendix D1: Mine Waste Rock and Tailings Management Plan

12. Section 2.1.4.3 (Impact of Global Warming on Site Conditions) states that "*Studies indicate that the boundaries of discontinuous and continuous permafrost are expected to*

move northward due to global warming (Woo et al., 1992) (Figure 2-2). Predictions based on a warming of 4°C to 5°C over the next 50 years (NRC, 2004) (approximately double the rate predicted above) suggests that the Meadowbank site would remain within the zone of continuous permafrost, but the active layer thickness would be expected to increase, and the total thickness of permafrost may slowly reduce in time". If this is true, does the Proponent have a proposed mitigation plan to mitigate a possible effect on the ability of permafrost to encapsulate potentially acid generating (PAG) rock, if warming in the north increases as projected? The possible increase of the thickness of the active layer could mean increased flow through the active layer and perhaps water contact with PAG material.

13. Section 6 (Mine Waste Rock) states that "*The diversion ditch system further prevents any watershed freshet from reaching the RSF mitigating any potential contamination*". It should be noted that any runoff or seepage that collects in the operations area (mine site) should be treated as effluent and not allowed to drain into the environment without proper treatment. Effluent is defined under the Metal Mining Effluent Regulations (MMER) to include runoff and seepage, and therefore it is recommended that the Proponent continue to monitor and develop an adaptive management plan in order to mitigate any issues that may arise.

Appendix I1: Management Plans

Incinerator Waste Management Plan

14. Section 5.2 (Acceptable Waste for Incineration/Waste Oil Furnaces) lists 'organic matter including food' as acceptable for incineration. It is not clear if 'organic matter' includes sewage, as sewage is no longer listed. If sewage is incinerated at the mine site, the Proponent should indicate under what waste type category sewage is captured, in both the Incinerator Waste Management Plan and the Incinerator Daily Report Log Book. The Proponent should also clarify whether sewage was incinerated during the stack tests.

Appendix E2: Incinerator Daily Log Book

15. The Incinerator Daily Report Log Book lists 'solid hydrocarbon waste' as solid burned material, however it is not clear what materials are included under this term. The Proponent should clarify what is included in 'solid hydrocarbon waste'.

Appendix E4: 2015 Incinerator Stack Testing Report

16. The Incinerator Stack Testing Report states that the 2015 incinerator stack tests were carried out on June 19, 20, and 21. The Incinerator Daily Report Log Book lists the types of wastes (percentage of food waste, dry waste, and solid hydrocarbon waste), and the total volume of waste as a percentage of the maximum capacity of the incinerator. The table below provides waste data from the Incinerator Daily Report Log Book and the stack test results for dioxins and furans (PCDD/F) for June 19, 20, and 21.

Date	Food Waste (%)	Dry waste (%)	Solid Hydrocarbon Waste (%)	Total Volume as a Percentage of the Maximum Capacity of the Incinerator (%)	PCDD/F (pg TEQ/RM3 @ 11% 02)
June 19	25	25	0	50	6.4
June 20	30	40	0	70	21.2
June 21	40	35	0	75	35.4

It appears that there is an exponential increase in PCDD/F emissions with volume of waste incinerated. From the test conducted with the incinerator 50% full to the test with incinerator 75% full, the PCDD/F emissions increased by almost 6 times. The stack tests should be conducted with the maximum waste capacity of the incineration and with a typical waste composition. Wastes should be collected prior to the tests to ensure that there is enough for full burn. It is noted from the Incinerator Daily Report Log Book that there were many days where 100% (some days with more than 100%) of the maximum waste capacity of the incinerator was burned.

Should you require further information, please do not hesitate to contact me at (867) 669-4733 or Melissa.Pinto@canada.ca.

Sincerely,

Melissa Pinto

Melissa Pinto
Environmental Assessment Coordinator

cc: Georgina Williston, Head, Environmental Assessment North (NT and NU)
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