

Appendix G4

TAP comments on EEM Cycle 3 Study Design and Angino's response



Sincerely,

for

Susanne Forbrich
Regional Director
Regional Authorization Officer

cc: Cristina Ruiu Environment and Climate Change Canada, Regina
Paula Siwik Environment and Climate Change Canada, Edmonton
Craig Broome Environment and Climate Change Canada, Yellowknife
Karen Kharatyan Nunavut Water Board, Gjoa Haven
Amanda Winegardner Indigenous and Northern Affairs Canada, Iqaluit

Attachments : Technical Advisory Panel Review of "Agnico Eagle Mines Ltd – Meadowbank Division Cycle 3 Study Design"

Technical Advisory Panel Review of “Agnico Eagle Mines Ltd – Meadowbank Division Cycle 3 Study Design”

The following comments and recommendations are based on the review of the report by a Technical Advisory Panel (TAP) consisting of representatives from Environment and Climate Change Canada (ECCC), Nunavut Water Board (NWB) and Indigenous and Northern Affairs Canada (INAC).

1. As required under the *Metal Mining Effluent Regulations*, your biological monitoring studies must be conducted in accordance with your study design. If it is impossible to follow the study design because of unusual circumstances, then you may deviate from the study design but you must inform the Regional Authorization Officer without delay of those circumstances and how the study will be conducted.
2. P. 26 and 51: It appears that the detection for Cd sampled in water has been lowered and will more closely align with license detection limit of 0.000010 mg/L in 2017. The TAP supports this approach.
3. P. 38: Wally Lake is considered an exposure area as of 2013. Are there data collected prior to 2013 that could be used for baseline purposes?
4. P. 38: Fish from Vault and Phaser Lakes were transferred to Wally Lake in 2014 and 2016, and AEM recognizes that this is confounding factor in assessing fish endpoints in Wally Lake. While the change in fish community as a result of the transfer will likely confound the current study, its influence on future studies remains to be seen. There is no further discussion in the Cycle 3 Study Design as to how to deal with this issue for the present cycle or in future cycles. Are there studies from other sites that could give an indication of how long it may take the population of Wally Lake to regain a steady ecological state? Are there population estimates of the fish community or species specific age class estimates from Wally prior to the fish transfer for comparison?
5. P. 38: Please note, the proposed design of 20 lethal lake trout is supported provided that power analyses continue to indicate that it is suitable.
6. P. 40: Cycle 1 and Cycle 2 studies both encountered higher than expected fish mortality. The Cycle 3 study design has indicated that fish sampling will not include sampling of pectoral fin rays for non-lethally sampled fish, in order to prevent after- sampling mortality due to the procedure. Fish mortality from Cycle 1 and Cycle 2 is reported as the result of gill-netting. The TAP suggests that CPUE data from previous phases be reviewed to determine whether timing and/or duration of net deployment can be adjusted to minimize by-catch.



AGNICO EAGLE

April 26th, 2017

Susanne Forbrich
A/ MMER Authorization Officer
Prairie and Northern Region
Environment Canada
9250, 49 St. NW
Edmonton, AB
T6B 1K5

Re: Environmental Effects Monitoring (EEM): Cycle 3 Meadowbank Mine Study Design

Dear Ms. Susanne Forbrich,

On April 10th, 2017, Agnico Eagle received TAP comments regarding study design entitled "Agnico Eagle Mines Ltd. – Meadowbank Division Cycle 3 Study Design" submitted on February 17th, 2017. You will find, attached with this letter, responses to these comments.

Should you require any further information or questions please contact the below via email or by telephone.

Regards,

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CC: *Paula Siwik, ECCC*
Cam Portt, C. Portt and Associates
Jamie Quesnel, Agnico Eagle Nunavut

1. **As required under the Metal Mining Effluent Regulations, your biological monitoring studies must be conducted in accordance with your study design. If it is impossible to follow the study design because of unusual circumstances, then you may deviate from the study design but you must inform the Regional Authorization Officer without delay of those circumstances and how the study will be conducted.**

Agnico Eagle's response:

Agnico Eagle take note of TAP comments and will advise without any delay the Regional Authorization Officer if the study design, because of unusual circumstances, will deviate from the original approved study design.

2. **P. 26 and 51: It appears that the detection for Cd sampled in water has been lowered and will more closely align with license detection limit of 0.000010 mg/L in 2017. The TAP supports this approach.**

Agnico Eagle's response:

Agnico Eagle acknowledges TAP comments.

3. **P. 38: Wally Lake is considered an exposure area as of 2013. Are there data collected prior to 2013 that could be used for baseline purposes?**

Agnico Eagle's response:

There are no fish data for Wally Lake prior to 2013 that can be used for baseline purposes.

4. **P. 38: Fish from Vault and Phaser Lakes were transferred to Wally Lake in 2014 and 2016, and AEM recognizes that this is confounding factor in assessing fish endpoints in Wally Lake. While the change in fish community as a result of the transfer will likely confound the current study, its influence on future studies remains to be seen. There is no further discussion in the Cycle 3 Study Design as to how to deal with this issue for the present cycle or in future cycles. Are there studies from other sites that could give an indication of how long it may take the population of Wally Lake to regain a steady ecological state? Are there population estimates of the fish community or species specific age class estimates from Wally prior to the fish transfer for comparison?**

Agnico Eagle's response:

To the best of our knowledge there are no studies from other sites at similar latitudes that could provide an indication of how long it may take the population of Wally Lake to return to a steady ecological state. There are no population estimated or species-specific age class estimates from Wally Lake prior to the fish transfers.

5. **P. 38: Please note, the proposed design of 20 lethal lake trout is supported provided that power analyses continue to indicate that it is suitable.**

Agnico Eagle's response:

Agnico Eagle acknowledges TAP comments.

6. **P. 40: Cycle 1 and Cycle 2 studies both encountered higher than expected fish mortality. The Cycle 3 study design has indicated that fish sampling will not include sampling of pectoral fin rays for non-lethally sampled fish, in order to prevent after-sampling mortality due to the procedure. Fish mortality from Cycle 1 and Cycle 2 is reported as the result of gill-netting. The TAP suggests that CPUE data from previous phases be reviewed to determine whether timing and/or duration of net deployment can be adjusted to minimize by-catch.**

Agnico Eagle's response:

Agnico Eagle proposed not to remove pectoral fin rays from fish that are not lethally sampled due to the limited utility of those data, the discomfort that the removal imposes on the fish, and the possible post-release complications (which could include mortality). Agnico Eagle will use the data from previous cycles to determine the appropriate amount of netting effort to collect the desired 20 fish per area, in order to minimize by-catch.

7. **P. 40: Please clarify whether the supporting in situ variables will be collected at each net deployment location or at one location in the lake. The TAP suggests that in situ information be recorded at each net deployment location.**

Agnico Eagle's response:

The lakes that will be sampled are not thermally stratified in the summer and, based on the CREMP data, there is no indication that there is significant spatial variation in dissolved oxygen, temperature or pH. There was spatial variation in specific conductance in Wally Lake while effluent was being discharged in 2016. Agnico Eagle proposes to measure temperature and specific conductance at each of net deployment location in Wally Lake and will therefore do the same at each net deployment location in the other lakes.

8. **P. 46: The 2006 and 2007 total abundance number for Wally appears to be different from the pattern in subsequent years. Did this correspond with a change in collection location or depth?**

Agnico Eagle's response:

Sample depths did vary across years in Wally Lake suggesting modest movement in sample locations. Samples in 2006 and 2007 were collected from 5 to 6 m of water

depth, whereas in subsequent years samples were collected from typically 7 to 9 m of water depth (see Figure 5-1 in the Study Design). The observation by ECCC is noted. Agnico will need to consider 2006 and 2007 when we carry out the analysis of changes over time. We will determine if we can adjust data to depth so that we can retain 2006 and 2007 in the analysis, or perhaps leave 2006 and 2007 out of the analysis.

9. P. 48: Are there within station precision estimates for Wally Lake? A visual comparison of abundance and richness suggests that there is more variation in the samples collected from Wally contrasted to Third Portage. Will 2 subsamples adequately characterize a station?

Agnico Eagle's response:

There are no within-station samples from Wally Lake. The observation by ECCC is noted. In order to assess whether the observation is correct, we looked at within-year variability using abundance data for Wally (WAL), Inuggugayualik (INUG) and Pipedream Lake (PDL). For log of numbers per m², the within-year residual variance was estimated by the mean-squared error (MSE) term from an analysis of variances among years. The MSE's were 0.0802 for Wally, 0.0439 for INUG and 0.0304 for PDL. An F ratio of largest over smallest variances (WAL/INUG) was $0.0802/0.0439 = 1.83$, which with 38 and 38 degrees of freedom was significant at $p = 0.03$. Within-year variances of abundance have therefore been significantly higher in Wally Lake than in both INUG and PDL, per Environment Canada's observation. Within-station variance could be reduced by additional sampling, but among station variance would not be reduced by the collection of additional within-station grabs. The differences in variability between lakes will persist. Agnico and its consultants will ensure that sampling within Wally Lake is carried out to minimize variability related to depth in the upcoming 2017 survey. Agnico and its consultants will also examine the influence of water depth on variability in EEM endpoints, and remove the effects of depth on endpoint variance, prior to testing effects-related hypotheses.

7. P. 40: Please clarify whether the supporting *in situ* variables will be collected at each net deployment location or at one location in the lake. The TAP suggests that *in situ* information be recorded at each net deployment location.
8. P. 46: The 2006 and 2007 total abundance number for Wally appear to be different from the pattern in subsequent years. Did this correspond with a change in collection location or depth?
9. P. 48: Are there within station precision estimates for Wally Lake? A visual comparison of abundance and richness suggests that there is more variation in the samples collected from Wally contrasted to Third Portage. Will 2 subsamples adequately characterize a station?