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April 29, 2010

Andrew Mitchell
Development Manager - Canadian Operations
Minerals and Metals Group
200-1159 Alloy Drive
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Dear Mr. Mitchell:

Subject: Environmental Effects Monitoring (EEM) Phase 3 Study Design review – Lupin Mine, Nunavut

This letter is to advise you that the Lupin Phase 3 EEM Study Design reviews have been received from the Technical Advisory Panel (TAP). The compiled review comments are appended. These comments should be addressed in the form of a simple addendum to the Phase 3 Study Design.

If you have any questions concerning the review of your Phase 3 EEM Study Design, please feel free to contact me at (780) 951-8750.

Yours truly,

Erik Allen
Regional EEM Coordinator

Attachment

cc.

Cheryl Baraniecki	Environment Canada, Edmonton
Anne Wilson	Environment Canada, Yellowknife
Chris Baron	Fisheries and Oceans Canada, Winnipeg
David Hohnstein	Nunavut Water Board, Edmonton
Dionne Filiatrault	Nunavut Water Board, Gjoa Haven
Ian Parsons	Indian and Northern Affairs Canada, Iqaluit
Paula Siwik	Environment Canada, Edmonton

Technical Advisory Panel Review Comments on "Lupin Gold Mine Site Characterization and Cycle 3 Environmental Effects Monitoring Investigation of Cause Study Design Report"

General comments

1. Overall the report was clearly written and well organized. The inclusion of detailed site maps was greatly appreciated.
2. The facility is recommended to proceed with Hypothesis 1 to assess differences in temperature between exposure and two reference sites, provided they focus on grayling condition as an endpoint, and specify the statistical approach that will be used to test the hypothesis.
3. The facility is recommended to remove Hypothesis 2 from the study design. The hypothesis is based on the assumption that grayling in the exposure and reference systems feed preferentially on specific invertebrate taxa (Chironomidae and Simulidae), and that their growth rates are correlated with the availability of these prey items. In addition, previous results from Phase 2 contradict the hypothesis, where grayling condition was lower in the exposure area despite high densities of chironomids.
4. The facility is recommended to add a study on the potential effect of trace metals in the exposure area on grayling condition. In Phases 1 and 2, trace metal concentrations were shown to be elevated in the exposure area relative to the reference area. In some cases, trace metal concentrations in the exposure area exceeded Canadian Council of Ministers of the Environment (CCME) guidelines for sediment and water quality (CCME 2007). Elsewhere, high trace metal concentrations in the aquatic environment have been associated with decreased condition and other physiological responses in fish (e.g., Woodward et al. 1995; Eastwood and Couture, 2002).
5. The recommended approach for the trace metal study is to conduct a literature review to assess whether or not trace metal concentrations in the water and sediment of the exposure site have been within the range of values that could cause effects in the early life stages of fish. The TAP also recommends a comparison of current trace metal concentrations in fish, water, and sediment samples from exposure and reference sites. Please include a description of field and laboratory methods, and a statistical approach to compare trace metal concentrations between exposure and reference sites.

Previous EEM Studies

6. p. 8. The report states that the effluent had no sublethal or acute effects on test biota; please note that sublethal effects on zooplankton, algae, and a plant species were reported in Phase 1.
7. p. 8. In the summary of the Phase 2 study, it is reported that mean invertebrate density was higher in the exposure area but that the difference was not statistically significant. Please note that the invertebrate density was >2 standard deviations higher in the exposure area, and that the *p*-value determined for that comparison was significant at 0.085, since α was set at 0.1.

20. p. 13. On Figure 3, several fish sampling stations are indicated for Dam1a, adjacent to the Tailings Area. Since exposure to effluent will be greater here than at downstream locations, will the data from these fish be analyzed as a subset, or pooled with the data from the other exposure sites?

21. p. 15. The report states that the fish survey will be completed during August 2010. Please indicate in more specific terms when the proposed field program (fish, sediment, water quality) will be conducted.

Water quality and sediment sampling

22. p. 18. Please describe the method that will be used to collect sediment quality samples.

23. p. 18. Please describe QA/QC procedures for water and sediment sampling and data analysis.

Minor comments and errata

p. 3. The report indicates that '3 million cubic litres' of effluent were discharged in 2009- please note that this should be cubic *metres*.

p. 10. The report states that effluent was not released between 2005 and 2009, however Table 2 indicates that effluent was not discharged from 2006 to 2008.

p. 12. Please ensure that each fish is assessed for external condition (i.e., lesions, tumours, parasites).

p. 12. If using multiple fish sampling techniques (e.g., electrofishing and minnow traps), please ensure that the methods are used in a consistent manner across all reference and exposure areas to prevent size selection.

p. 12. Please calculate the mean, median, SD, SE, min. and max. for all fish, water quality and sediment quality measurements.

References

CCME. 2007. Canadian Environmental Quality Guidelines. Update 7.1. Canadian Council of Ministers of the Environment. http://ceqg-rcqe.ccme.ca/.

Eastwood, S. and Couture, P. 2002. Seasonal variations in condition and liver metal concentrations of yellow perch (*Perca flavescens*) from a metal-contaminated environment. Aquatic Toxicology. 58: 43-56.

Woodward, D.F., Farag, A.M., Bergman, H.L., DeLonay, A.J., Little, E.E., Smith, C.E., and Barrows, F.T. 1995. Metals-contaminated benthic invertebrates in the Clark Fork River, Montana: effects on age-0 brown trout and rainbow trout. Canadian Journal of Fisheries and Aquatic Sciences. 52: 1994-2004.