Environment Canada | Environnement Canada

Prairie and Northern Region
Environmental Protection Operations Division
Twin Atria #2, Room 200
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February 20, 2007 File: 7834-3-37/B51-1

Mr. Murray Markle
Site Manager
Nanisivik Mine
CanZinco Ltd.
95 Wellington Street West
Toronto Ontario
M5J 2N7

Dear: Mr. Markle,

RE: Nanisivik Mine Environmental Effects Monitoring (EEM) Report Review

The submission entitled 'Report to Canzinco Limited on Metal Mining Environmental Effects Monitoring (EEM), Nanisivik Mine, Nunavut' was received by July 30, 2006 as per the Metal Mining Effluent Regulations (MMER) of the *Fisheries Act*. It has been reviewed by a Technical Advisory Panel (TAP) consisting of representatives from Environment Canada, Fisheries and Oceans Canada, Indian and Northern Affairs Canada, and the Nunavut Water Board. The Final Biological Monitoring Study and Report meet EEM Program requirements.

As noted in the first section of the review comments, your company is to be commended for a well written, concise report. The compiled review comments are appended. Although we recognize that this facility is now closed, we would appreciate if these comments were addressed in an addendum to the Interpretive Report, in order to have the correct information on file for this final study.

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If you have any questions concerning the evaluation of your EEM Interpretative Report, or if you wish to set up a TAP meeting to discuss the review, please contact Dorothy Lindeman at (780) 951-8750.

Sincerely,

Shauna Sigurdson
A/Regional Director
Regional Authorization Officer

Enclosure

cc:	Robert Carreau	CanZinco Ltd., Toronto
	Dorothy Lindeman	Environment Canada, Edmonton
	Barry Briscoe	Environment Canada, Winnipeg
	Craig Broome	Environment Canada, Yellowknife
	James Noble	Environment Canada, Iqaluit
	Anne Wilson	Environment Canada, Yellowknife
	Chris Baron	Fisheries and Oceans, Winnipeg
	Mike Palmer	Indian and Northern Affairs, Yellowknife
	Joe Murdock	Nunavut Water Board
	Philippe di Pizzo	Nunavut Water Board

Technical Advisory Panel (TAP) Review Comments on
'REPORT TO CANZINCO LIMITED ON METAL MINING ENVIRONMENTAL EFFECTS MONITORING (EEM), NANISIVIK MINE, NUNAVUT'

General Comments

1. Overall, this report was well written, concise and the information well organized. However, in most report sections, detail on methodology was lacking. While some methodology description was initially provided in the proposed EEM Study Design (January 2004), without a summary of the sampling and analysis approaches used for the Interpretative Report, the reader cannot know how the actual study was conducted.

2. The mine should be commended for the benthic design that included three exposure areas representing three different effluent concentrations in the creek.

Introduction

3. P. 1. Please note, in addition to being subject to the Final Biological Monitoring provisions of the MMER, the mine was also required to conduct effluent characterization, sublethal toxicity testing and water quality monitoring as described under Schedule 5 of the Metal Mining Effluent Regulations (MMER).

4. It should be stated in the report why fish tissue analysis for mercury was not required in this study.

Marine Fish Study

5. P. 9. Please note that the liver "effect endpoint" for EEM is "liver weight at body weight" and that the "supporting endpoint is "liver weight at body length". The endpoint list on P. 9 of the report has these two endpoints reversed.

6. P. 9. Please note that "gonad at body length" should also be listed as a supporting endpoint.

7. Given that fish 'E7' was determined to be an outlier based on gonad and liver measurements, was it removed from all analyses or only those involving liver and gonad measurements?

8. P. 10. Section 2.2.2. There is no description of catch per unit effort (CPUE) for the fish survey. Please provide an estimation of CPUE for the shorthorn sculpin.

9. P. 10. Section 2.2.2. There is no description of whether any lesions, tumours, parasites or other abnormalities were found during fish sampling. Please provide this information, as per Schedule 5, Section 16 (b) of the MMER.

10. P. 9 -10. The report would benefit from a general description of statistical analysis approach, including alpha and beta values in the methods section. In Section 2.2.4, there is reference to ANOVA and ANCOVA results on an endpoint by endpoint basis, and reference to a standard significance p-value of 0.5 for age data, but no overall description of statistical approach. The Metal Mining Guidance Document (MMGD) recommends that alpha and beta be set equal, and that a minimum power or 0.90 be achieved. Please indicate what beta value was used for statistical analyses and what level of power was achieved for the fish analyses conducted.

11. P. 13. What do the highlighted values in Table 2.2 represent?

12. P. 28. The report claims that that the effects found during the fish survey represent an "enhancement of performance in the fish, rather than a reduction of these measures". Please note, an increase in liver size (as indicated by the liver at weight and liver at length endpoints) is not necessarily indicative of "enhancement" or improvement of fish health, and can also be an indication of chemical toxicity (Lowell et al. 2005).

13. P. 28. The report suggests that metal loading from the natural mineral outcrop in Twin Lakes Creek and from the town sewage is larger than metal loading from mine effluent. While the Study Design report described metal concentrations due to loading from the mineral outcrop, no information has been provided on the potential loading from the town sewage. The report should present values of the potential loading of town sewage if this is suggested as a confounding factor influencing the results.

14. P. 29. Was there any reason why "gonad at length" analysis was not conducted? This endpoint is recommended as a supporting endpoint by the MMGD.

Benthic Invertebrate Community Survey

15. P. 31. The report states that benthic samples were sorted and reported based on the 0.25 mm fraction. The accepted Study Design had indicated that benthic samples would be sampled and reported at two levels, 0.25 mm and 0.5 mm, recognizing that this latter size fraction is the level recommended by the MMGD for national consistency. Please provide the benthic data for the 0.5 mm fraction.

16. P. 31. The report refers to Standard Operating Procedures being followed, but there is no description of what these procedures involved. The report also notes that QA/QC data are included in Appendix C, however the only information in the appendix is a summary of invertebrate numbers. Please provide QA/QC information relating to field sampling (e.g. preservation of samples), lab sorting (what percentage of samples were resorted to verify initial sort) etc.

17. P. 32. There is no discussion of "supporting variables" as they relate to the benthic invertebrate survey results. These results should be used to help interpret findings.

18. P. 34. There is no description of how percent "typical substrate" (particle size analysis) was determined. From Table 3.2, it appears that this was only determined at one location per area, although P. 31 of this report (as well as the Study Design Addendum) indicate that this would be determined for each station.

19. P. 39. The benthic methods section would benefit from a general description of the statistical analysis approach used, including alpha and beta values used.

20. P. 44. Generally, non-benthic organisms should not be included in the benthic invertebrate community survey. However, given that the number of these organisms was very low (n=4), is it expected that the results would differ with these organisms excluded?

21. P. 45. The report states that the effect of mine effluent on the benthic invertebrate community only extends as far as 3.5 km, due to the presence of the natural sulfide mineral outcrop located 3.5 km downstream of the Final Discharge Point (FDP). Please

note, even if the mineral outcrop further impacts the benthic community beyond km 3.5, it does not negate any effects already caused by mine effluent. It may serve to amplify effects on the benthic invertebrate community in the creek, but mine effluent may still be influencing the overall health of the creek invertebrate community.

General Discussion and Conclusions

22. Please see comment #10 that enlarged livers are not necessarily a sign of enhanced fish performance. However the TAP agrees that depending on the level of metal loading from the natural outcrop during the EEM sampling season, this outcrop could represent a confounding factor in the EEM study.

23. P. 52. The report suggests that nutrient enrichment could be occurring in Twin Lakes Creek due to town sewage discharge. However the water quality data provided in this document do not show any sign of increased nutrients (N or P) downstream of the town sewage. In fact, the only increase in nutrients (N) in the creek appears to be in the mine exposure area that receives mine effluent, upstream of any potential town sewage or outcrop contributions. Based on the water quality data presented in this report, it would seem unlikely that town sewage is responsible for the effects seen in fish.

24. Results of Sublethal Toxicity testing over the phase are not reported in the Interpretative Report. As per the MMER, the Interpretative Report should include a comparison of the results of biological monitoring to the results of sublethal toxicity testing (See Schedule 5, Section 17 and Section 25).

Minor Points and Errata

25. Please note, the Tables in Appendix B refer to Arctic Sculpin collected from the exposure area rather than Shorthorn Sculpin.

References

Environment Canada. 2002. Metal Mining Guidance Document for Aquatic Effects Monitoring (MMGD). June 2002.

Lowell, R.B., B. Ring, G. Pastershank, S. Walker, L. Trudel and K. Hedley. 2005. National Assessment of Pulp and Paper Environmental Effects Monitoring Data: Findings from Cycles 1 through 3, National Water Research Institute, Burlington, Ontario. NWRI Scientific Assessment Report Series No. 5. 40 pp.