

**From:** [Kathleen Graham](#)  
**To:** [permits@mvlwb.com](mailto:permits@mvlwb.com)  
**Subject:** FW: Draft TAP review comments, Giant Mine 2011 EEM interpretative report - November 23  
**Date:** Wednesday, November 30, 2011 2:58:17 PM  
**Attachments:** [DRAFT\\_3rd\\_EEM\\_Interpretative\\_Report\\_Giant\\_TAP\\_review\\_2011.doc](#)

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For the Giant Mine file

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**From:** Boss,Shelly [Edm] [mailto:Shelly.Boss@EC.gc.ca]  
**Sent:** November-28-11 3:32 PM  
**To:** Sawdon, Lorraine J; Siwik,Paula [Edm]  
**Cc:** McPherson, Morag; Baron, Christopher; Lowman,Lisa [Yel]; kgraham@mvlwb.com; Paul Green  
**Subject:** RE: Draft TAP review comments, Giant Mine 2011 EEM interpretative report - November 23

Thanks very much Lorraine and Chris,

The deadline has been extended to December 9th. Your input on the report and/or the draft review comments would be greatly appreciated if you can fit it in. Chris I'll try and send you an electronic copy of the report in a separate email.

A few comments have been added since the previous draft, in yellow.

Let me know if you have any questions.

Shelly

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**From:** Sawdon, Lorraine J [mailto:Lorraine.Sawdon@dfo-mpo.gc.ca]  
**Sent:** Monday, November 28, 2011 2:51 PM  
**To:** Siwik,Paula [Edm]; Boss,Shelly [Edm]  
**Cc:** McPherson, Morag; Baron, Christopher  
**Subject:** RE: Draft TAP review comments, Giant Mine 2011 EEM interpretative report - November 23

Hi Paula and Shelly,

Chris Baron with DFO is willing to provide input, provided there is sufficient time remaining before the deadline. Can you please let Chris know what the time lines are?

Thanks, and sorry for the slow response - we are working this out on our end.

Cheers  
Lorraine

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**From:** Baron, Christopher  
**Sent:** November 24, 2011 9:01 AM  
**To:** Sawdon, Lorraine J  
**Cc:** McPherson, Morag  
**Subject:** RE: Draft TAP review comments, Giant Mine 2011 EEM interpretative report - November 23

Lorraine,

I spoke with Morag this morning about this project I am willing to be involved in the review if there is sufficient time remaining before the deadline. We also discussed the bigger picture of what role DFO Science would play in similar regional issues related to the EEM Program and I shall seek clarification to that question.

Regards,

Chris

**Christopher L. Baron**

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**From:** Sawdon, Lorraine J

**Sent:** November 23, 2011 11:29 AM

**To:** Baron, Christopher

**Subject:** FW: Draft TAP review comments, Giant Mine 2011 EEM interpretative report - November 23

Hi Chris,

I hear that you still participating in some of the EEMs. Giant mine is under review, and I am hoping that you can participate. If you are unable to, do you know who is available for such reviews?

Thanks

Lorraine

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**From:** Boss,Shelly [Edm]

**Sent:** Thursday, November 10, 2011 12:23 PM

**To:** 'Lynn Boettger - MVLWB'; 'Paul Green'; Lowman,Lisa [Yel]

**Cc:** 'Robert Jenkins'

**Subject:** Draft TAP review comments, Giant Mine 2011 EEM interpretative report - November 23

Hi everyone,

Please find attached draft comments on the **Phase 3 EEM Interpretative Report submitted by INAC Giant Mine in 2011**. This report was sent to you in June 2011 and contains the results of biological monitoring studies done in 2010 for the Giant Mine. I would like to get the review to the proponent by the end of November. **Please send me any further comments on the report or feedback on the draft comments by end of day, November 23rd**, or let me know if this timeline presents a problem.

<< File: DRAFT\_3rd EEM Interpretative Report Giant\_TAP review, 2011.doc >>  
Just to let you know Chris Baron (DFO) had to step down from the TAP due to workload issues; we hope to find a DFO replacement but it may not happen in time for this review. Lisa Lowman is replacing Anne Wilson on this TAP as well (thanks Lisa!).

Paul I know you were not going to have time to review the report but please feel free to provide feedback on the draft comments.

Lisa, I got your message saying you were interested in reviewing the report. The timing is a bit tight for jumping in but by all means if think you can fit it, I would welcome feedback on the draft comments or further comments on the report itself (Anne was sent a copy of this report and she says it should be with the EEM files up there).

Lynn, I don't think I have received anything from MVLWB on this yet. Hopefully you will have time to comment but if it's not in the cards, just let me know.

Regarding the report, overall I thought it was detailed and comprehensive and so many of the comments are just clarifications on errors or inconsistencies. Effects have been confirmed for the fish surveys. This means that the next phase of monitoring should look at magnitude and extent of effects, followed by phase(s) to investigate the cause of effects. The report raises concerns about moving to investigative studies on the specific endpoints that were confirmed (sculpin age, stickleback size). We may want to discuss this a bit further, but for now the review comments reflect the above path forward.

Thank you, and please let me know if you have any questions (although I am at a conference next week so may be slow to respond!).

Shelly

### **Shelly Boss**

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## **Technical Advisory Panel (TAP) review comments on “Environmental Effects Monitoring (EEM) Program, Phase 3, Final Interpretative Report, Giant Mine – June 2011”**

### **General Comments**

1. The third Environmental Effects Monitoring (EEM) Interpretative Report for Giant Mine was well-organized and comprehensive. The proponent's efforts to incorporate TAP recommendations and include additional elements such as the young-of-year (YOY) sculpin survey are noted.
2. The results of biological monitoring studies presented in the 2008 and 2011 Interpretative Reports indicate similar types of effects on the fish population. Thus, the next biological monitoring study should include biological monitoring studies (i.e., site characterization, fish and fish tissue (as applicable), and benthos) (S.19(1)(a)(b)+(c)) and "a description of one or more additional sampling areas within the exposure area that shall be used to assess the magnitude and geographic extent of the effect." (S.19(1)(d)). Please refer to the Metal Mining Effluent Regulations (MMER), Schedule 5, Sections 19 to 22.
3. A study design must be submitted to the authorization officer at least 6 months before the biological monitoring study is conducted (MMER Schedule 5, Section 19(1)). Please refer to MMER Schedule 5, Section 22 for submission timelines for the next interpretative report.
4. Executive summary and elsewhere: The following clarifications are provided regarding the cited rationale for the facility conducting periodic monitoring for phase 3: Although the Bray-Curtis Index (BCI) was significant in the initial phase, in the second phase the statistical significance of the BCI was dependent on the inclusion or exclusion of outliers. After due consideration, it was agreed that the effect on the BCI was not confirmed in two consecutive studies. Note also that although the TAP did agree that confirmation of the fish study would be appropriate this was not based on concerns regarding confounding habitat factors.
5. Executive summary and elsewhere. The report tends to place emphasis on the possible influence of factors such as temperature and historically contaminated sediments within the exposure area. It should be noted that a number of parameters of concern are elevated in the effluent and occur at concentrations in exposure area water samples above guidelines set for the protection of aquatic life (Canadian Water Quality Guidelines (CWQG), or similar guidelines). Of particular note are nitrate, arsenic, copper, chloride and sulphate.

### **Site Characteristics**

6. P. 19. Please clarify the discharge start and end dates for 2010.
7. P. 21. The report indicates that arsenic and copper in effluent exceed CWQG. Note also that cyanide and selenium are slightly higher than guideline concentrations in some or all samples.
8. P. 22. Table 2-4 lists the CWQG for nitrate (as nitrogen) as 13 mg/L. The CWQG of 13 mg/L is for mg of  $\text{NO}_3^-/\text{L}$ ; the equivalent guideline for nitrate as nitrogen would be 2.9 mg/L. This guideline value is exceeded for all of the 2010 effluent samples listed in Table 2-4.
9. P. 29. The report notes the high levels of sulphate in effluent on page 21, however data on sulphate are absent from Table 3-2 regarding water quality in Baker Creek. Please provide these data if available.

10. P. 29. The text notes that arsenic and copper were higher than applicable guidelines in Baker Creek exposure area samples. The TAP notes that other parameters, such as cyanide, nitrate, selenium and chloride, exceeded applicable guidelines in one or more samples.

### **Fish Survey**

11. P. 52 (also P. 76). Please clarify the method used when the slopes of regression lines were not parallel during ANCOVA. Is the reported difference in  $R^2$  values a comparison between the full and reduced regression models, as described in Barrett et al. (2010)?
12. P. 56 (and page 114, benthic section). The discussions provided on water quality QA/QC, and identification of any related issues, were detailed and informative.
13. P. 73. The report states that the proportion of parasites in slimy sculpin was higher in the exposure area than in the reference area for females, and that the reverse was true for males. From table 4-12, it appears that parasites were present in higher proportion in exposure females (45%) and males (62%) than in the reference area (females 6%, males 34%). Please confirm if this is correct.
14. P. 75-76. The thorough approach taken to data screening and testing and efforts to deal with significant statistical interactions are commended. Please note that a significant interaction (i.e., non-parallel regression slopes) is considered a statistically significant effect for the fish survey. Chapter 8 of the 2011 metal mining technical guidance document (MMGD, Environment Canada, 2011) provides a third possible approach for significant statistical interactions, in cases where removal of outliers has been attempted and the parallel model cannot be used. This involves estimating effects separately for small and large fish.
15. P. 84, 89. The report indicates that female liver weight at body weight (p.84) and YOY condition (p. 89) were not analyzed due to highly unequal variance. Were non-parametric tests considered? Please discuss further.
16. P. 85, 87-88. The graphs provided for relationships of length-weight, size at age and relative gonad relationships were informative, particularly in cases where there were statistical interactions. It would be appreciated if similar graphs for relative liver data could be provided, as these appear to have been omitted from the report.
17. P. 86. As noted in the report, growth appears to be higher for younger sculpin in the exposure area and lower for older age classes. The TAP recommends analyzing size at age by t-test within age classes to confirm site differences in growth.
18. P. 86. Please clarify the magnitude of effect on male relative gonad size. Text on page 86 indicates the difference was <20%, whereas Table 4-18 reports a magnitude of 38.66%.
19. P. 96, Table 4-23. Where there is only one age class fish, such as for male and juvenile sculpin in 2006, differences in size at age can be compared as weight (or length) within the age class using t-test/ANOVA. Also, as noted in comment 14, significant interactions should be listed in the table (see also Table 4-24) as an effect.

### **Benthic Invertebrate Community Survey**

20. P. 112. Were benthic samples sorted in their entirety? If laboratory sub-sampling was performed, please provide details on the methods used and QA/QC performed.
21. P. 118. Please confirm whether nitrate should also be listed in Table 5-4 as having near-field concentrations more than two times those of the reference area.
22. P. 119. The presentation of sediment data by station is appreciated. To meet requirements under Schedule 5, section 16(a)(iii), please also provide descriptive statistics of mean, median, standard deviation, standard error, and minimum and maximum values for sediment measurements (TOC, particle size) by area.
23. P. 107. What was the realized precision (abundance and richness) of the benthic station sub-samples?
24. P. 125-126. There are a few discrepancies between the descriptions of family presence/absence on page 125 and information in table 5-10 (e.g., Hydridae also found only in the reference area, Pisidiidae present in near-field but not far-field area). Please confirm whether the information in Table 5-10 is correct, and clarify any discrepancies between page 125 and table 5-10.

### **Toxicity Testing**

25. P. 136. The summary of sublethal toxicity results for this and previous phases is appreciated. It is indicated in the report that effluent concentrations of <30% elicited sublethal toxicity to *Ceriodaphna dubia*, *Pseudokirchneriella subcapitata* and *Lemna minor* in Phases 1 and 2 but not in Phase 3. It would appear from the information presented in Tables 6-2 and 6-4 that this was the case for *P. subcapitata* growth and *L. minor* biomass, but that toxicity did occur in Phase 3 at <30% effluent concentrations for *C. dubia* reproduction and *L. minor* frond number.
26. P. 138. The numbers discussed under “Potential Effects in Baker Creek” appear to be those from phase 2, rather than phase 3.

### **Synopsis and Conclusions**

27. The TAP notes several consistencies in sculpin results between the 2006 and 2010 surveys. In particular, young fish in the exposure area appear to have higher growth (age-1 exposed fish almost 25% heavier in 2006, bigger in 2010 judging from Figure 4-6) compared to reference fish, there is a near-absence of older age classes in the exposure area and corresponding lower CPUE (evident in 2010). Older fish that are present in the exposure area may have slower growth than reference fish.
28. P. 139. The synopsis and conclusions for the invertebrate community do not make reference to the differences found in the assemblages between areas. Notwithstanding the risk posed by historical contamination, current effluent appears to have contributed to some changes in benthic assemblage composition, e.g., a higher proportion of chironomids and lower proportion of mayflies in the near-field area relative to the reference area and far-field area.

### **Further Recommendations**

29. P. 140. The report notes concerns regarding confirming effects based on age for sculpin and size for ninespine stickleback. Further information would be needed to fully evaluate

these concerns. Note that some of the ideas presented regarding examining age and size structures of the populations could be appropriate as part of an investigation of cause study.

30. Previous correspondence from the mine had indicated that preliminary studies may be undertaken upstream of the discharge on Baker Creek to assess suitability as a reference area for the fish and benthic studies. Please note that the TAP is in favor of locating a reference area that is more similar to the Baker Creek exposure area, such as the upper reaches of Baker Creek.

#### **Minor points and errors**

- P.52. Table 4-2 should also list weight at age, which is an effect endpoint.
- P. 67. The report states that species richness of fish was equal between the Exposure and Reference areas at 9 species. It would appear from Table 4-8 that a total of 8 species were caught in the Exposure Area and 7 in Reference area.
- P. 97, Table 4-24. Length and weight of young-of-the-year fish at the end of the growth period are considered endpoints used for determining effects for a non-lethal survey. Length and weight are listed as support endpoints in the table.
- P. 128. The report states that there were no families present in 2010 that were absent in 2004 and 2006. From Table 5-10, this does not appear to be the case (e.g., Perlidae, two families of Oligochaetes). It may be of more interest that total number of families per area is lowest in 2010, with a number of families absent in 2011 that were present in the earlier phases.
- P. 134. There are some inaccuracies in the first paragraph under 6.3.4. Note that sublethal toxicity data are submitted once per year, by March 31<sup>st</sup> for tests conducted the previous year, and are entered into Environment Canada's electronic reporting system, Regulatory Information Submission System (RISS). Hard copy reports are submitted to the Regional Authorization Officer.

#### **References**

Environment Canada. 2011. Metal Mining EEM Guidance Document (MMGD).