



***Independent Environmental Monitoring Agency***

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**Re: Agency Review of the 2007 Aquatic Effects Monitoring Report**

The Agency has completed its review of the 2007 AEMP report. While we commend BHPB generally for delivering a high quality report, we do have a number of comments on the report results that we believe warrant your attention. These relate to water quality results as well as mercury, molybdenum, parasite infection and hydrocarbon in fish in the lakes downstream of the mine.

**Water Quality**

Nitrates have now risen above CCME guidelines in both Leslie and Moose lakes. The Agency is pleased to learn that BHPB has taken mitigative steps to prevent nitrate-laden water from entering the downstream environment, primarily by holding water within Cell E until such time as nitrate concentrations have declined.

We note that molybdenum levels continued to rise in Moose Lake relative to previous years, but declined slightly in Leslie. Both are near or at the CCME guideline. This is still a worrisome development. While molybdenum is near the CCME guideline level, we notice that selenium has risen above it for the first time in Leslie, Moose & Nema lake water. It is noteworthy that trout livers in Moose Lake also contained higher selenium levels (mean of over 1 mg/kg more) than those sampled in 2002. This result is not adjusted for age however. This indicates to us that selenium should be evaluated in future AEMP reports.

The Agency is disappointed to learn that no winter oxygen measurements were taken in 2007 due to problems with the measuring instruments. Since Cujo and Kodiak lakes have had to be aerated in past years to overcome problems of low winter oxygen levels, winter measurements have proven critical to warning BHPB of potential anoxic conditions that may need to be mitigated before fish are harmed.

## Fish

We are interested in the finding that infection rates of the tapeworm *Ligula intestinalis* in slimy sculpin are much higher in lakes immediately downstream of mine activity (Kodiak, Leslie, Moose & Cujo) than those further downstream and in reference lakes (see Fig. 3.7-77 of AEMP report). As heavy parasite infection is often associated with exposure to stressors in fish, we think BHPB should consider continuing this area of study in future years. The frequency of monitoring of slimy sculpin could be every 2 or 3 years rather than every five, as this is a more abundant species in AEMP lakes than either lake trout or round whitefish and thus populations should withstand more frequent lethal sampling.

Molybdenum was elevated in whitefish livers in Moose Lake in 2007 compared to 2002 (See Fig. 3.7-62). Even so, the report states that “there is no evidence for an effect of mine activities” on the uptake of molybdenum in round whitefish. This conclusion does not seem to be compatible with the Moose Lake results. We think this question is deserving of greater attention.

A “total of 24 lake trout liver samples and 10 myomere samples exceeded the Health Canada mercury guideline of 0.5 mg/kg WW” (p. 3-109 of AEMP report). It has been brought to our attention by BHPB that these numbers are erroneous. It was actually 12 liver and 3 myomere samples above the guideline value. The majority of these samples were from lake trout caught in lakes downstream of the LLCF (Kodiak, Nema and Slipper). In contrast, in 2002 lake trout liver samples from only Slipper Lake exceeded the mercury guideline. Average mercury concentrations in 2007 exceeded the guideline in livers of lake trout caught at Kodiak and Nema lakes (average concentrations were 0.874 mg/kg WW and 0.531 mg/kg WW, respectively). The average mercury concentration in lake trout livers caught farther downstream, in Slipper Lake, approached the guideline but did not exceed it.

Since mercury is not elevated in the water of any of these lakes, and two of the 12 trout liver samples above the Health Canada guideline value were from control lakes, the Agency does not dispute the following RESCAN evaluation, “The elevated mercury concentrations in some potentially affected lakes may be linked to the larger, older fish that were captured during 2007 monitoring.” However, it would have strengthened that contention if it had been supported by comparison of the ages of the contaminant-studied trout in 2007 with those of 1999 and 2002, since not all aged fish were sampled for contaminants.

Hydrocarbon metabolites in the bile of both whitefish and trout of Leslie Lake are equivalent to levels found in areas elsewhere in the world exposed to significant oil spills. RESCAN finds that there was no increased incidence of parasitism in these fish species in Leslie, which would suggest no adverse physical effects from hydrocarbon exposure. However, slimy sculpin from both Leslie & Moose lakes did have elevated rates of parasitism compared to control lakes. It would be helpful to know if those infected fish also had evidence of hydrocarbon exposure.

RESCAN suspects the source of the hydrocarbons is the LLCF and suggests sampling fish within Cell E in future to verify this possibility. This is a very good idea. We also note that BHPB's ICRP Section 4 responses (tracking #168) states that underground minewater contains hydrocarbons averaging 29.1 mg/l although Eric Denholm of BHPB is looking into this situation as he believes the number may be erroneous. Even if the minewater is high in hydrocarbons, it is not clear to the Agency whether a significant portion of that loading to the LLCF would make its way into Cell E from the upper cells. Additional work may be required to resolve this matter.

#### Minimum Detectable Differences

As a result of the AEMP Re-Evaluation workshop in November 2006, the Agency understood that BHPB committed to determining effect sizes--that is, what degree of change in water quality variables is deemed to be acceptable. What we have received instead is an examination of what level of change to those variables is detectable. In our view, these are not the same thing. The intent of this requirement needs to be clarified. If it is the former, BHPB needs to show it intends to canvass stakeholders to determine the maximum level of change acceptable to them so as to establish effect sizes for the statistical analyses in the AEMP. If it is the latter, the study currently presented appears to address the issue.

We would be happy to discuss these comments with you at your convenience.

Sincerely,

-Original Signed By-

Bill Ross  
Chairperson

cc. Society Members  
Anne Wilson, Environment Canada  
Bruce Hanna, Fisheries and Oceans  
Eric Denholm, BHPB