



July 22, 2010

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Re: Review of 2009 AEMP report

Dear Violet and Mark,

The Environmental Monitoring Advisory Board (EMAB) wishes to thank the Wek'èezhii Land and Water Board (WLWB) for the opportunity to review Diavik Diamond Mines' 2009 Aquatic Effects Monitoring Program annual report and respectfully submit the following.

We have made every effort to thoroughly review the documents. We contracted North-South Consultants (N-S) to provide technical review and advice and we have also reviewed the documents internally. However given the substantial amount of material (over 700 pages plus hundreds of pages of raw data), we have not been able to provide a detailed review of all aspects of the report.

We continue to appreciate the detailed technical appendices prepared by Golder Associates for each of the main elements of the 2009 AEMP annual report, the inclusion of all the 2009 data, and the summary compilation report prepared by Diavik. We note that the 2009 annual AEMP report identified several early warning effect triggers as well as a number of moderate level effects and four high level effects.

The N-S technical review is attached for your consideration, including extensive comments on the technical appendices. EMAB wishes to underline that the sampling success in 2009 has increased certainty around the data analysis, conclusions and recommendations. EMAB endorses the N-S recommendations, summarized in the table at the end of their report. In addition we would like to highlight a few areas, some of which were also mentioned in our reviews of previous reports:

#### **Dust gauges**

Despite EMAB's objections last year, DDMI discontinued the temporary dust gauges even though the results appeared to be very different from the permanent gauges. It is not clear how DDMI concluded that the average results are similar, and it did not provide a statistical analysis.

EMAB understands that WLWB staff have recommended the issue of design of this study be resolved during the three-year AEMP design review next year. Under the circumstances this may be a reasonable approach, however the variation in results between methods raises questions about the validity of the data from the dust monitoring, an issue EMAB has been raising since 2005.

EMAB looks forward to the resolution of this issue through the three-year design review. We also suggest that the review consider a more timely process for examining and revising any

monitoring design where legitimate questions are raised about the validity of the data being collected.

### **Eutrophication**

The Comprehensive Study Report (CSR) states: *“In the absence of CCME guidelines for the protection of aquatic life for total phosphorus, Diavik established a site-specific threshold of 0.005 mg/L to maintain the ultra-oligotrophic nature of trophic (productivity) status in Lac de Gras. Up to 20% of the surface area of Lac de Gras is expected to exceed this threshold during peak operations. Phosphorus concentrations in the remainder of the lake are predicted to remain slightly below the threshold. Levels would decline to background levels after closure.”* The intent of the prediction is that no more than 20% of Lac de Gras will shift from ultra-oligotrophic through the life of the mine. Chlorophyll *a* already shows that 28% of the lake is affected, up from 24% in 2008.

The report notes that total phosphorus effects decreased in 2009 from 14% of Lac de Gras to 11%; however the area with increased phytoplankton biomass (as measured by chlorophyll *a*) was larger. At the same time phosphorus loads were the highest since 2002. The most commonly reported effect of nutrient enrichment on aquatic ecosystems is an increase in algal biomass. Typically, there is a positive correlation between total phosphorus and phytoplankton biomass in lakes and reservoirs, although the precise relationship may vary between lakes. Consideration of eutrophication response variables (e.g., chlorophyll *a*) is important, as not all lakes and reservoirs exhibit the same relationship between nutrients and phytoplankton. The simplest "model" relating nutrients (i.e., phosphorus) to phytoplankton abundance is a linear regression between total phosphorus (TP) and chlorophyll *a*. Since the precise relationship between these parameters is site-specific, it would be beneficial to conduct a regression analysis between TP and chlorophyll *a* for Lac de Gras using available information. EMAB notes that the map in DDMI's summary (Fig 7-13 on page 69) is confusing since it only reflects the extent of TP-affected areas - the same map as shown in Fig 4-7 on page 32 of the Golder Associates Eutrophication report. The extent of chlorophyll *a* affected areas is shown in Fig 4-5 on page 30 of that report. EMAB recommends that DDMI either change the map title or provide the additional information on the extent of chlorophyll *a*.

EMAB and N-S have reviewed Hutchinson Environmental Services Limited (HESL) memo of April 8, 2010 regarding phosphorus predictions and effects. We appreciate HESL's support for our recommendation last year that DDMI forecast the current nutrient enrichment trends over the life of the mine immediately, and support HESL's recommendation that DDMI develop a predictive model of spatial distribution of phosphorus concentrations in Lac de Gras that is calibrated to loads and measured concentration over the past 5 years and which is then related to loadings predicted for future years.

### **Mercury**

EMAB continues to be concerned about the mercury levels in trout in Lac de Gras. We were disappointed that DDMI did not undertake the analysis proposed last year comparing levels in fish from 2005 and 2008 to determine whether there is a detectable increase. We understand the need for data from Lac du Sauvage to assess the relationship between any change and the effects of the mine, but it is important to establish soon whether mercury levels are increasing. In this regard EMAB was pleased that DDMI and DFO initiated the study last year to investigate mercury in sediment cores in Lac de Gras.

We also note that the fish palatability studies, which took place in 2009, 2006, 2005, 2004, 2003 and 2002, collected and analyzed fish tissue from trout. DDMI's three-year integration/summary report should include an analysis of mercury results from these data. We note that six of the 10 trout caught in 2009 had mercury concentrations greater than the background levels referenced in the CSR (181.5 µg/kg) that DDMI predicted would not be exceeded.

As we stated last year, the possible link between nutrient enrichment and increases in mercury availability, coupled with the risk that nutrient enrichment is occurring faster than predicted,

point to the need to address this matter in a timely way to prepare for the possibility that an adaptive management response is needed soon.

### Summary report

In past reviews EMAB has commented that DDMI's summary report should be more transparent in relation to:

- The effects identified by Golder Associates in the various appendices
- The recommendations made by Golder Associates in the various appendices
- The adaptive responses taken by DDMI in relation to the identified effects.

The water licence and AEMP design document provide direction in these areas:

- Effects
  - The water licence (part K(10)(c) requires that each AEMP report “provide an interpretation of the results, including an evaluation of any identified environmental changes that occurred as a result of the Project”
  - the AEMP design document envisions that each AEMP report will include a discussion of each effect by DDMI (eg. pages 430-431 and 509) including an evaluation of cause and in certain cases an evaluation of the study design.
- Recommendations
  - Section K(10)(e) of the DDMI's water licence requires that the annual AEMP report include “recommendations for refining the Aquatic Effects Monitoring Program to improve its effectiveness as required.” It has been EMAB's understanding that changes to improve the AEMP could be made in any year if recommended by DDMI and approved by the WLWB, in addition to the broader three-year design review.
  - Section 4.3.8.6 and Figure 4.3-11 of the AEMP design document identify two separate responses to effects:
    - evaluation of study design, such as adding sampling stations which is done as part of the AEMP through the annual report; and
    - management responses, which are outside the AEMP, through the adaptive management plan (now management response framework)
- Adaptive responses
  - Section K(10)(d) of the water licence requires DDMI to include “an evaluation of any adaptive management response actions implemented during the year.”

As in 2008, the summary report refers to all identified effects and brings forward the effects summary tables found in the various appendices. This is very helpful. EMAB suggests that the water licence and AEMP also require that the summary speak to each effect, to state whether DDMI plans any additional action (further investigation, evaluation of study design, adaptive management etc.) or not, and a rationale for the decision. It would be useful if the responses to effects were compiled in each effects summary table.

DDMI's summary report does not address all the recommendations in the appendices, a comment we also made regarding the 2007 and 2008 reports and in our letter of January 8, 2009 to DDMI. In the appendices, Golder Associates provides a reason for each recommendation it makes. The summary report should speak to each recommendation made, to provide transparency for reviewers, and to meet the requirements of the water licence and AEMP design document. It is not required that DDMI implement all the recommendations from the appendices, but it should provide a rationale for accepting or rejecting each one. Where it state its intention to address the recommendation at a later date, say through the three-year design review, it should provide a rationale. As noted above the water licence and design document do not explicitly state that any design changes cannot be considered until the next three-year design review. Again, it would be helpful if the recommendations and response were included in the effects summary tables.

### **Three-year summary report and design review report**

In addition to our comments above, EMAB appreciates and supports the WLWB's direction to DDMI in its comments on the 2008 AEMP report regarding its expectations for the upcoming AEMP three-year summary report and AEMP design review report.

### **Adaptive Management**

As noted above and in the N-S report, there are a number of possible adaptive responses to some of the effects found by the 2007, 2008 and 2009 AEMPs. With the longer than expected period required for development of the management response framework we again encourage the WLWB and DDMI to consider possible actions in response to effects identified in the 2009 and previous AEMP reports. DDMI has already made ad hoc adaptive responses to some issues but not others, and we would prefer to see a systematic approach responding to all effects, with the understanding that for many of the effects Diavik could justify not taking any management response. These responses could also be included in the effects summary tables. We believe this would assist EMAB and communities to understand the link between effects and DDMI responses.

EMAB looks forward to reviewing the management response framework guidelines being drafted by the WLWB and the next version of DDMI's AdMP when available. We have received strong interest from communities regarding DDMI's responses to changes in Lac de Gras during community updates and at our May 2008 Adaptive Management workshop, and expect that the response framework will be valuable in addressing concerns and improving understanding of management responses.

### **Traditional Knowledge**

EMAB is disappointed that the Traditional Knowledge (TK/IQ) component of the AEMP has still not been implemented and there appears to be little progress. In December Diavik rejected a proposal for community based monitoring of aquatic and wildlife effects using TK that EMAB developed in collaboration with the Aboriginal Parties to the Environmental Agreement as well as DDMI and the Wek'èezhii Renewable Resources Board, without proposing an alternative. We encourage DDMI to continue and enhance its efforts to work with communities to develop the AEMP's TK/IQ component and we provide a number of recommendations that we believe are required for further progress:

- DDMI should contract TK/IQ expertise to assist it and the Aboriginal Parties to develop a TK research plan, to develop protocols and methods for working with communities and to develop proposals for and implementation of TK/IQ monitoring and to document existing TK information.
- Within six months DDMI should develop a program to provide funding to Aboriginal Parties for development and implementation of proposals for monitoring in the AEMP using TK, in consultation with EMAB and the Aboriginal Parties to the EA.
- DDMI should carry out a thorough literature review to document existing baseline TK information on the Lac de Gras region

We trust that these comments are useful and encourage you to give them full consideration. If you require further information, please contact John McCullum at the EMAB office.

Sincerely

Doug Crossley  
Chair

Cc EMAB members (by email)  
Parties to the Environmental Agreement  
Dr. Kathleen Racher, Regulatory Director (Mining), WLWB (by email)