



Snap Lake Environmental Monitoring Agency
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April 9, 2009

Dee McCallum
SHE Manager
Snap Lake Mine
De Beers Canada Inc
300 - 5102 50th Ave
Yellowknife, NT.
X1A 3S8

Re: Water Licence 2007 Annual Report

Dear Ms. McCallum,

The Snap Lake Environmental Monitoring Agency (SLEMA) had reviewed the following documents:

- 2007 Water Licence Annual Report (2007 WLAR)
 - Appendix I 2007 Dam Inspection Report
 - Appendix II Detailed Tabular Summaries of the 2007 Water Quality Data for the Surveillance Network Program (SNP) Stations
 - Appendix III 2007 Fish Tasting Event
 - Appendix IV 2007 Annual Report for the Aquatic Effects Monitoring Program (AEMP) (excluding the sections related to sediment quality, phytoplankton and zooplankton, and benthic invertebrate, which will be reviewed by an independent expert.)

Comments are presented below.

General Comments

Some SLEMA comments on 2006 WLAR were considered in 2007 WLAR, and improvements of reporting format and contents were observed.

The 2007 WLAP presented adequate and reasonable details on water related activities with good quality. It fulfills the Water Licence MV2001L2-0002 requirements. There are a few review comments and questions regarding this submission.

- Nutrients loadings approaching Water Licence Limits,
- Non-compliant discharge of Zinc from Temporary WTP in June and July,



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- Cancellation of annual June, October, November, and December field surveys,
- Increase in whole lake concentration of TDS and Chloride accumulation in Snap Lake, and
- Toxicity testing failures.

Comments on 2007 WLAR

- Section 22 (Part B, Item 5m): Figure 22-1 is inconsistent with the description in page 33. It stated that if any of the sewage effluent samples “show elevations beyond the parameters within the Water Licence, the domestic waste water generated from the group of MBRs and STPs is deposited into the WMP”. However, in Figure 22-1, wetland is still part of the contingency plan for incompliant sewage effluent. Figure 22-1 seems to show the situation before the SNP change (SNP 02-19 to SNP 02-16i). In addition, it seems that the sewage effluent should be combined with the effluent from Temporary Water Treatment Plant (TWTP) first, and then the combined flow is joined by the effluent from the Permanent Water Treatment Plant (PWTP), while Figure 22-1 shows different flow combination. Clarification is requested.
- Section 23 (Part B, Item 5n): The section summarizes the activities of each station of Surveillance Network Program (SNP) without the information of Water Licence compliance. A summary of compliance of SNP 02-16i, SNP 02-17, and SNP 02-18 against the Water Licence limits (maximum and monthly average) are recommended in this section of future submissions.
- Section 23 (Part B, Item 5n): It is good to see De Beers report the total loadings for total phosphorus, ammonia and nitrate. Table 23-2 provides the calculation of phosphorus loading with details. Does the calculation of ammonia and nitrate loading follow the same method? More details are required to provide for Table 23-3.
- Based on the reported loadings in the following table, they are approaching the Water Licence limits. The re-run of water quality model (Memorandum by Gold Associates, Snap Lake Mine: Nitrate and Ammonia concentration and Loading Estimates Relative to Environmental Assessment Report Predictions for Additional Explosive Use, dated February 14, 2008) shows that, for a 100% increase in the rate of explosive use, the corresponding modeled increase in both concentration and long term loading rate in Snap Lake is approximately 25%. Then the loading of Ammonia and Nitrate will exceed the Water Licence limits if that estimation comes true. What will De Beers do to mitigate the impacts?



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Cumulative Nutrients Loadings to Snap Lake, November 2006 to October 2007

Nutrient	Loading in 2007 (kg/yr)	Loading with 25% Increase resulted from 100% Increase in the Rate of Explosive Use (kg/yr)	Limit (kg/yr)
Phosphorus	213.38	213.38	256
Ammonia	183,470.8	229,338.5	187,000
Nitrate	205,086.3	256,357.875	219,000

- Section 28 (Part B, Item 5s): The predictions of future mine-water discharge were refined with additional data obtained in 2007 from the monitoring of groundwater flows. The results of the hydro-geological modeling indicated that peak inflow quantities likely to be observed during mine production will be similar to that predicted in the Environmental Assessment of the Project, and the predictions in 2006 were over-estimated. SLEMA appreciates the efforts De Beers made in mitigations of peak flows and hydro-geological investigations and encourage De Beers to continue to lessen the impact of the flows into the Snap Lake underground workings.
- There are some typos, e.g. the maximum values of Temporary Water Treatment Plant (TWTP) discharge to Snap Lake from January to December in Table 3-1, the maximum values of Permanent Water Treatment Plant (PWTP) discharge to Snap Lake from February to December in Table 3-2 (SLEMA pointed out similar typos in its comments on De Beers 2006 Water Licence Annual Report, and De Beers responded to correct in 2007 report. Unfortunately, this kind of typos reoccurred), evaporation loss in Section 9.2 (353mm in page 13 vs. 352 mm in Table 9-1), and “August” in the summary of October (last line of page 32).

Comments on Appendix I (Dam Inspection)

The report attached is not final report, only Project Memorandum. A formal inspection report is required.

Comments on Appendix II (SNP Tabular Summaries)

- There were elevated zinc concentrations (0.03-0.15 mg/L) in effluent from TWTP (SNP 02-17) from Jun 25 to July 15, which were above Water Licence discharge limit (maximum concentration of any grab sample: 0.02mg/L). Based on De Beers calculation of the flow weighted average zinc discharge of all streams to the diffuser line, the monthly discharge in July exceeded the average monthly limit (0.01 mg/L). Section 22 of 2007 WLAR mentions the investigation into the elevated zinc values, but provides no final results. Final investigation report is requested.



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- There is a non-compliance report dated November 11, 2007 (pH). It was not reported in Section 22 of 2007 WLAR.

Comments on Appendix III (Fish Tasting)

The fish tissue samples were collected in the first fish tasting event, but no analysis report is available until now. The collection (and following analysis) of fish tissue samples (western science) of the same fish tasted (traditional knowledge) will help improve the knowledge for fish health in Snap Lake. It is recommended that fish tissue samples be taken and analyzed for future fish tasting events.

Comments on Appendix IV (AEMP)

Section 2 Water Quality

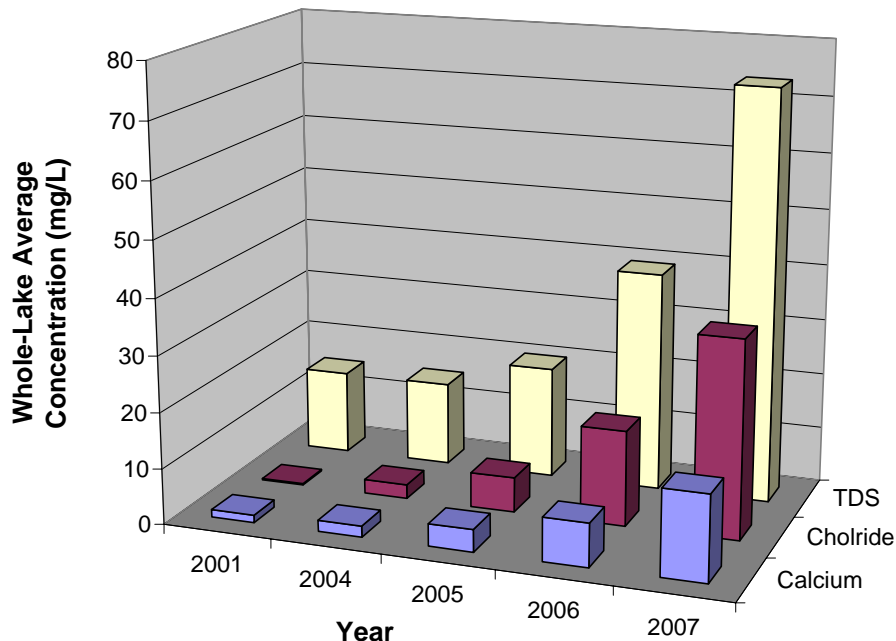
- Section 2.2.1.2, p2-10: De Beers permanently cancelled the annual June, October, November, and December field surveys in January 2007, and claimed the cancellation would not change the AEMP and did not seek approval from Mackenzie Valley Land and Water Board (MVLWB). In addition to the four months, January and May field surveys for permanent diffuser station seemed not to be conducted. With only six months of monitoring data, would the effectiveness of the AEMP be compromised? If the ice condition in June, October, November, and December is getting safe, does De Beers consider resuming field surveys in those months? Any investigation for alternatives of sampling in those months was conducted? A special study is recommended to address the concern, and to confirm the absence of the field surveys in those months will not impact the effectiveness of the AEMP.
- Section 2.2.1.3, p2-11, Table 2-1: There are three sampling stations for permanent diffuser (i.e. SNP 02-20d, SNP 02-20e, SNP 02-20f), which is consistent with the Surveillance Network Program (SNP) of Water Licence MV2001L2-0002. However, in Table 1 of De Beers SNP monthly reports since January 2005, only 2 stations are showed for SNP 02-20. Clarification is requested.
- Section 2.2.1.3, p2-11, Table 2-1: There is a typo. SNAP09 was showed in both categories of Mid-field stations and Far-field stations.
- Section 2.2.2.2, p2-20: It is stated that, "if batch discharges of treated domestic wastewater did not coincide with discharges from the temporary water plant, then flow-weighted concentration and loads of parameters with higher concentrations in treated effluent could be under-represented". Although the data under-representation might be limited, it seems possible to improve the data representation, if the method for calculation of total loading of phosphorus was used.



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- Section 2.3.2, p2-25: It is noticed that the number of blank samples with detected concentrations near those measured in the lake in 2007 is substantially higher than that in previous years, and De Beers already took actions to address the issue. The report for the investigation and follow-up solutions is requested.
- Section 2.4.2.1, p2-28: The water quality guideline used in Table 2-5 are from Canadian Council of Ministers of the Environment (CCME) (1999). CCME updates its guidelines regularly. The current version is published in September 2007. The use of updated CCME guidelines is recommended.
- Section 2.4.2.1, p2-30, Table 2-6: The whole-lake average concentrations of Calcium, Chloride, and Total Dissolved Solids (TDS) have been increasing since the inception of the Snap Lake Project, and the changes are quite significant (see the following chart). Although the values are well below the Environmental Assessment Report (EAR) benchmarks or CCME guidelines criteria, the potential of exceeding those limits over the long-term has been noticed (p2-50). Options to mitigate the trend should be prepared or in place.

Concentrations of Major Ions over Time



- Section 2.4.2.2, p2-31, Table 2-8: Maximum concentrations of 15 out of 16 parameters (discharge quality of water treatment plants) were above EAR predictions. Although those parameters are not likely to affect whole-lake



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- concentrations due to intermittent peaks rather than typical concentrations, average concentrations of 7 out of 16 parameters were above EAR predictions and likely to affect whole-lake concentrations. It is noticed that the number of parameters above EAR predictions is more than that in previous years. It is recommended that De Beers pay attention to the trend and take measures if necessary.
- Section 2.4.2.2, p2-34: The toxicity failures were identified as a concern. Efforts should be taken to prevent similar failures in future testing.
- Section 2.4.2.2, p2-35, Table 2-9: The percentage of the total volume of treated domestic wastewater discharged to the wetlands should be $12,642/(12,541+73,652) \times 100\% = 14.6\%$ rather than 17.2%.
- Section 2.4.2.2, p2-41 & 42, Table 2-13 & 2-14: The total volume of SNP 02-17 is 3,649,180 m³ in Table 2-13, and the counterpart in Table 2-14 is 3,619,477 m³. Why are they different?
- Section 2.4.3 and Section 2.4.4: The analyses for temporal trends, and spatial trends and seasonal variation are convincing. The efforts made by De Beers are highly appreciated.
- Section 2.5.5, p2-91: SLEMA supports the recommendations for data collection and data analysis, and expects better quality of data for the future years.

Section 7 Plume Characterization Special Study

- Section 7.2.1.2, p7-5, Table 7-1: The number of deep-water sampling stations in Table 7-1 (8 stations in August) is inconsistent with the description in p7-8 (9 stations in August).
- Section 7.6, p7-24: SLEMA supports the recommendation for additional measurement of current velocities, and further recommends recording the real-time mine water discharge from the permanent diffuser while measuring the current velocities in order for comparison and analysis.

Section 8

- Section 8.2, p8-3: A wetland study was referenced. Further detail about the study is requested.

AEMP Update

- The update of the Aquatic Effects Monitoring Plan is recommended, because the reference lake had been chosen, and the mine was almost fully constructed and enters into full operation.



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SLEMA would be pleased to discuss the above comments with De Beers to ensure improved annual environmental reporting.

Sincerely,

(Original signed by)

Rachel Crapeau
Vice Chairperson

cc: Indian and Northern Affairs Canada
Environment and Natural Resources, GNWT
Mackenzie Valley Land and Water Board