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July 8, 2014

File: L020

Ms. Joanne Deneron
Chairperson
Mackenzie Valley Review Board
200 Scotia Centre; 5102-50th Ave
Box 938, Yellowknife, NT X1A 2N7

[via E-mail]

Dear: Ms. Deneron

Re: De Beers Canada Inc. Closing Statements EA1314-02

De Beers Canada Inc. (De Beers) is in receipt of all submissions by parties to environmental assessment EA1314-02 related to the Snap Lake Mine water licence amendment. De Beers is pleased to provide the following closing statements for proceeding EA1314-02 as they relate to the defined scope of the assessment.

Basis for the Proposed Amendments to the Water Licence

De Beers Canada Inc. operates Snap Lake Mine pursuant to water licence MV2011L2-0004 and land use permit MV2010D0053. The water licence sets the context for the proposed amendments that are the subject of this environmental assessment EA1314-02. De Beers is applying to change the quality of water allowed to be discharged to Snap Lake based on site-specific toxicity studies and evaluation of effects on the receiving environment. The derivation of new site-specific water quality objectives (SSWQO)s and effluent quality criteria (EQC) was first discussed in 2011 as part of the Mackenzie Valley Land and Water Board (MVLWB) process for renewal of the water licence. The testing to be conducted was outlined and discussed with MVLWB technical staff, regulators, and communities, and changes were made to the proposed test scope based on input received. De Beers has met the requirements of its water licence to provide results of these studies and has used this information appropriately to request higher, yet conservative, and thus protective limits for allowable concentrations of total dissolved solids (TDS), chloride, nitrite, sulphate, and fluoride in Snap Lake.

No Significant Adverse Impacts to the Environment

De Beers' evidence clearly demonstrates that **there will not be significant adverse impacts to the environment if TDS concentrations in Snap Lake exceed the current limit of 350 mg/L**. No party has argued against this. De Beers concludes that the non-science-based recommendations of the original (2003) environmental assessment related to TDS are outdated, and are not supported by current research; therefore, De Beers' proposal to rescind the current licence limit of 350 mg/L for Snap Lake is supported.

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De Beers' evidence demonstrates that **there will not be significant adverse impacts to the environment at TDS concentrations in Snap Lake of at least 684 mg/L, and likely as high as 1,000 mg/L. The water will remain safe to drink, the fish will be safe to eat, and the ecosystem function of Snap Lake will be maintained.** While Environment Canada has argued that there may be uncertainties in data results, De Beers emphasizes that it is inappropriate to focus on the results of a single *Daphnia magna* test (daphnids represent only about 2% of the zooplankton in Snap Lake). De Beers notes that Environment Canada has only commented on one *Daphnia magna* test of the five such tests conducted, and that Environment Canada did not follow its own guidance in reanalyzing the data from this one test; that guidance requires that data are log-transformed prior to analyses. More importantly, in the context of three results with *Daphnia magna* of no effect at more than 1,435 mg/L, more than 1,477 mg/L, and more than 1,510 mg/L - which have not been disputed by Environment Canada, De Beers' interpretation of the dose-response series in the one test critiqued by Environment Canada does not appear unreasonable. The weight of evidence from the five *Daphnia magna* tests indicates negligible to low level effects at greater than 1,000 mg/L TDS. Similarly, the results of the novel copepod tests match the published literature, indicating that copepods, which comprise a major portion of the zooplankton in Snap Lake, are not adversely affected by TDS concentrations in excess of 1,000 mg/L TDS.

The Government of the Northwest Territories (GNWT)'s concern that De Beers failed to follow Canadian Council for Ministers of the Environment (CCME) guidance on the basis that a 30-day fathead minnow test (as a third fish species) was not conducted, is unfounded. As the Mackenzie Valley Review Board (Review Board)'s technical staff noted at the hearings, and the Review Board's independent consultant, Ecometrix, agreed, De Beers was not attempting to develop a national water quality guideline, but rather to conduct appropriate testing focused on fish and other organisms that actually live in Snap Lake (fathead minnows are not found in Snap Lake) in order to establish conservative, technically defensible TDS benchmarks. De Beers has done exactly what it was asked to do, following discussion and input beginning in 2011 with MVLWB Technical Staff, regulators, and communities. Ecometrix's independent peer review of De Beers' technical work was supportive. For example, Don Hart on pages 196-199 of the transcripts from Day 1 of the Hearing stated that the level of environmental protection recommended by CCME does not preclude possible minor effects on sensitive species. Further, Don Hart on page 225 of the transcripts from Day 1 of the Hearing agreed that the Boards' Water and Effluent Management Policy does not require the use of CCME procedures to develop SSWQOs.

With respect to an unmitigated scenario where concentration increases follow the upper bound model projections, **there might be significant adverse effects to the environment if TDS concentrations in Snap Lake reached 1,700 mg/L**, although this is uncertain, as noted by both De Beers' consultant, Golder, and the MVLWB's and Review Board's independent consultant, Ecometrix. However, and in any event, De Beers commits to implementing mitigation over the life of mine to meet a protective, yet reasonably achievable TDS SSWQO to be established by the MVLWB in the subsequent regulatory process.

The GNWT's concerns regarding uncertainty are addressed by the conservatism inherent in the SSWQOs as noted above and below. The GNWT's concerns in their closing comments regarding a possible "toxic condition post closure" are not shared by De Beers and do not appear to reflect

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all scientific knowledge (e.g., they do not consider pertinent well-cited publications such as: *Chapman PM, Wang F, Janssen C, Persoone G, Allen H. 1998. Ecotoxicology of metals in aquatic sediments: binding and release, bioavailability, hazard, risk and remediation. Can J Fish Aquat Sci 55: 2221-2243.*). GNWT is now referring to new technical information that is for the first time being provided in the GNWT's closing comments. This is unfair and contrary to the rules of evidence. However, there will be an opportunity to discuss this and other new evidence during the MVLWB process that will set the SSWQO.

The Proposed SSWQOs are Conservative and Technically Defensible

De Beers has tested a full spectrum of parameters representative of the aquatic environment in Snap Lake, and thus has a very good understanding of the potential response of the aquatic environment to increasing concentrations of TDS. De Beers notes, for non-technical reviewers, that the conservative “no effect” benchmark is an inhibition concentration (IC) response, not a lethal concentration (LC) response. In other words, chronic effects such as reduced growth or reproduction, which could affect populations of organisms in Snap Lake, will not occur below this concentration, but *may* occur above this concentration. This is an inherently conservative and appropriate means of establishing benchmarks as noted by the Review Board's and MVLWB's independent consultant, Ecometrix. The safety factor of 1.0 was supported by Ecometrix related to the relatively low uncertainty in the toxicity test results (page 214, June 5 Hearing transcript).

De Beers has previously indicated that eleven manuscripts related to the site-specific toxicity studies are currently in preparation for publication, and an additional two manuscripts (establishment of strontium and fluoride SSWQOs) have now been accepted for publication in a respected, international, peer-reviewed journal. De Beers has high confidence that the site-specific scientific studies are robust, informative, and greatly add to the Northern scientific knowledge base. That said, these studies are not meant to be used to establish national guidelines for toxicity testing as noted previously, but rather to fulfill the specific requirements for site-specific studies of Snap Lake.

The Water Will Continue to Be Safe to Drink

De Beers' proposal to increase the amount of TDS in Snap Lake **will not result in significant adverse impacts to drinking water or local land use**. The recommendations by several parties to establish a water quality objective of 500 mg/L for Snap Lake is arbitrary, rather than objective as suggested. It is not supported by the site-specific toxicity studies, nor by any evidence presented by these parties. Snap Lake is not likely to be used as a drinking water source by local land users during operations; however, De Beers re-iterates that its own mine employees currently use Snap Lake as a drinking water source, and will continue to do so throughout mine life. Snap Lake water provided as drinking water to mine employees is currently treated with chlorine, as is required under the *Northwest Territories' Water System Supply Regulations*. **De Beers could apply the necessary treatment at the water intake (SNP 02-15) to mitigate potential aesthetic (taste) concerns, but such mitigation is not necessary for Snap Lake as a whole. The water is, and will remain, safe to drink.**

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De Beers has shown that, once mine operations have ceased, the taste of Snap Lake water will very quickly improve such that **there will not be any long-term changes to the aesthetic quality of water in Snap Lake**. As noted at the Hearing, not all people drinking water with TDS concentrations above 500 mg/L will be able to detect a difference in taste.

Mitigation Will Be Implemented

De Beers has committed to implementing mitigation to reduce TDS loadings to Snap Lake. **De Beers is actively evaluating technologies, including focused grouting and potential treatment technologies that could be employed to meet a SSWQO that is protective of the environment.** This evaluation takes into account the technical, environmental, and economic tradeoffs to arrive at a proposed mitigation solution for the project that is appropriate and achievable for Snap Lake. The results of this evaluation will be available in Q4, 2014. De Beers has presented evidence to show that the lowest proposed 684 mg/L benchmark will not be exceeded until 2016 in the upper limit model, or possibly later

The outcomes of the evaluation of mitigation, while helpful, should not be a prerequisite to making an environmental assessment decision, since what is being reviewed - a change in water quality based on a SSWQO - establishes a “no-effects” threshold, rather than a significant effects threshold. As explained previously, the SSWQO is not a ‘line in the sand’ above which significant adverse effects will certainly occur. As such, the SSWQO, its companion EQC, and the mitigation needed to meet it will inherently mitigate significant adverse impacts.

De Beers has noted that decreasing the concentrations of TDS in effluent by treatment methods, while desirable in some respects, will result in other potential environmental impacts such as increased infrastructure, waste storage, handling, transportation, and disposal, and increased energy demands. In plain terms, taking the salt out of the water doesn’t make it go away, and it is important that treatment not cause more environmental impacts than it avoids. This consideration of trade-offs will need to take into account what concentrations of TDS continue to maintain the ecosystem function of Snap Lake; again, the fundamental purpose of developing SSWQOs.

Monitoring Will Continue and Will Be Extended

De Beers undertakes comprehensive monitoring of the aquatic ecosystem of Snap Lake, as well as water quality monitoring of lakes downstream, as part of its Aquatic Effects Monitoring Program (AEMP). This is a robust program, with a comprehensive response framework designed to identify and, via adaptive management, appropriately respond to any environmental conditions that are outside of the predictions made in the original environmental assessment. De Beers is of the opinion that the AEMP is the appropriate mechanism to test the predictions of this environmental assessment.

De Beers has committed to implementing additional monitoring at the inlet to Mackay Lake, as part of the AEMP, in order to verify predictions that changes to water quality due to Snap Lake Mine discharge of TDS will not be measurable beyond 44 km downstream of Snap Lake.

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Recommendations

De Beers was asked at the Public Hearing to consider what a non-numeric outcome of this review process could be. De Beers provided a preliminary response based on the evidence submitted to date. De Beers thanks the Review Board for the opportunity to consider this further. De Beers suggests that recommendations arising out of this environmental assessment could be as follows:

- To prevent significant adverse impacts to the environment from ongoing discharge of TDS and its constituent ions chloride, sulphate, fluoride, and nitrate from Snap Lake Mine to the receiving environment, the MVLWB will establish appropriately protective and reasonably achievable site-specific water quality objective(s) for these parameters that are based on toxicity studies completed by De Beers, and other relevant evidence provided by parties to this environmental assessment and the subsequent water licence amendment process.
- De Beers will present the results of a preliminary evaluation of best applicable technologies that are economically achievable for Snap Lake Mine for consideration by the MVLWB, regulators, and communities, in the establishment of appropriate SSWQOs and EQC for TDS.

In closing, De Beers thanks the Review Board, the MVLWB, the parties to the environmental assessment and the public for their thoughtful deliberations, and looks forward to receiving the Review Board's report.

Sincerely,
DE BEERS CANADA INC.



Erica Bonhomme
Manager, Environment
Snap Lake Mine

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