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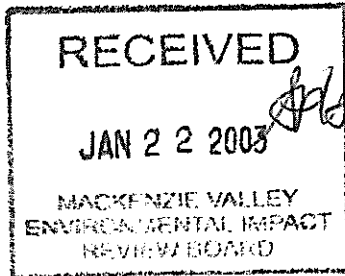
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TO - À

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Re: Unresolved issues on the EA of the
De Beers Canada Mining Inc (DCMI)
Snap Lake Diamond Project





Indian and Northern
Affairs Canada
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et du Nord Canada
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January 22, 2003

Your file - Votre référence

Our file - Notre référence

BY FACSIMILE: (867) 766-7074

Gordon Wray
Acting Chair
Mackenzie Valley Environmental Impact Review Board
PO Box 938
YELLOWKNIFE, NT
X1A 2N7

Dear Mr. Wray:

**Re: Unresolved Issues on the Environmental Assessment (EA)
of the De Beers Canada Mining Inc. (DCMI) Snap Lake Diamond Project**

Indian and Northern Affairs Canada (INAC) has identified to the Mackenzie Valley Environmental Impact Review Board (Board) specific technical issues resulting from our review of the proposed Snap Lake Diamond Project. Many of these issues were raised during the November and December 2002 technical sessions held by the Board; however, several of these issues still remain unresolved. We feel strongly that these issues should be resolved prior to the submission of our technical report on February 14, 2003, and request a ruling from the Board on this matter at its earliest convenience. As it stands, we feel there are significant uncertainties remaining in the proponent's recent impact predictions.

In addition, we have not received the Board's written response as to why it decided not to include three of our Information Requests (IR) in the IR process. We would appreciate receiving clarification from the Board as soon as possible.

The outstanding issues are as follows:

1. Development of Site-Specific Water Quality Benchmarks

DCMI has developed site-specific benchmarks for assessing the potential effects of mining activities on water quality conditions in the vicinity of Snap Lake. However, the methods that were used to derive the benchmarks are not consistent with the procedures established by the Canadian Council of Ministers of the Environment (CCME).

In our view, DCMI should derive benchmarks using the procedures that have been developed by the CCME and apply them to evaluate the effects associated with discharges of treated wastewater into Snap Lake. We recommend that a single

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benchmark be established for each chemical of potential concern (COPC) that represents the chronic toxicity threshold (CTT) for the most sensitive receptor group in the lake, typically zooplankton.

*Opinion
disagree*

2. Maps of Snap Lake with concentration isopleths

We believe that DCMI should provide maps of Snap Lake which show concentration isopleths radiating from the diffuser for key COPCs, including total suspended solids (TSS), turbidity, total ammonia, nitrate, phosphorus (i.e., total phosphorus, dissolved phosphorus, and ortho-phosphate - TP, DP, and OP), chloride, total dissolved solids (TDS), copper, cadmium, and chromium (III and IV). These modelling results should reflect the need to incorporate more conservative assumptions, as specified by participants at the recent technical sessions.

1A

3. Selection of Impact Assessment Criteria

DCMI has developed criteria for assessing the potential impacts of mining activities (i.e., as negligible, minor, moderate, or major) based on areal extent of exceedances of various effects thresholds (e.g., HC20 values). However, the impact assessment criteria that were selected by DCMI tend to minimize the potential for rating predicted effects as high because COPC concentrations in the whole lake (i.e. dilution of contaminants in 100% of lake volume) must exceed the levels that would adversely affect 20% of the aquatic species in Snap Lake before the effects would be considered to be high. Negligible, low, or moderate impacts were predicted if the severity or areal extent of the effects was lower.

The approach selected by DCMI is flawed because it ignores that fact that zooplankton tend to be the most sensitive group of aquatic organisms and that impacts on these sensitive species could potentially destabilize the aquatic community. A more conservative impact assessment criteria needs to be applied in the EA of the proposed project.

*Opinion
disagree*

Application of more conservative criteria for assessing the impacts associated with releases of individual COPCs is likely to provide the Board and other participants in the EA process with more confidence that the effects of the project are not being underestimated in the EA.

4. Design and Capacity of the Water Treatment Plant

INAC is concerned that the water treatment plant is designed to facilitate the removal of suspended solids only. Further evaluation of the information provided by DCMI suggests that certain metals, phosphorus, and major ions may occur at concentrations sufficient to adversely affect aquatic organisms in all or a portion of Snap Lake. Potentially, the levels of COPCs in mine water could be higher than predicted. As a consequence, further water treatment may be needed to ensure that releases of COPCs does not adversely affect the aquatic communities of Snap Lake. The results of further analyses will provide the

information needed to determine if the proposed level of wastewater treatment is likely to be sufficient.

Opinion

INAC is also concerned that the Water Management Pond may not have sufficient capacity to retain untreated waters during upset conditions within the treatment plant. We believe that DCMI should provide an analysis of the expected sedimentation efficiency within the Waste Management Pond.

IR

5. Concentrations of COPCs in Snap Lake

INAC's evaluation of the information contained in the EA and supplemental reports suggest that the levels of several water quality variables (e.g., TDS, TP, DP, and OP) could be higher than predicted in connate groundwater. In addition, the lack of mixing under ice-covered conditions and the negative buoyancy of the effluent may result in higher than anticipated levels of COPCs in water at the bottom of Snap Lake during the winter. As deep lake water is likely to represent an important source of inflow water to the mine, the concentrations of COPCs in mine water could be higher than anticipated by DCMI. As a result, it is possible that the concentrations of COPCs in effluent from the water treatment plant could be higher than those predicted in the EA, particularly in deeper portions of the lake. In order to make reasonable predictions about the long-term fate of discharges to Snap Lake, there must be a program of collecting baseline data concerning currents in Snap Lake. At this time, there a lack of this baseline data. Consequently, it is possible that the effects on sensitive environmental receptors that were predicted in the EA report are underestimated.

lack of baseline data

IR (A) 1/22/03

Further discussions regarding our concerns on the underestimation of the connate water chemistry are currently being planned. Any issues which remain outstanding at the conclusion of these discussions will be identified in our technical report.

6. Accuracy of the Phosphorus Model

Based on evaluations of the data contained in the North Lakes study, it is possible that the concentrations of phosphorus in mine water could be underestimated in the EA. In addition, the evaluations of the effects of phosphorus in the EA did not fully consider the potential availability of the dissolved phosphorus that will be released from the mine. Furthermore, the baseline concentrations of phosphorus in Snap Lake may be overestimated due to limitations on the availability of data on the concentrations of phosphorus during the open-water growing season for algae. Together, this information suggests that increases in the concentrations of potentially bioavailable forms of phosphorus in Snap Lake may be higher than anticipated.

During the technical sessions, the possible limitations of the assessment of the effects of phosphorus releases on the trophic status of Snap Lake were identified. It was

recommended that DCMI conduct further analyses to evaluate the potential effects on phosphorus releases on Snap Lake. More specifically, it was recommended that the results of phosphorus modelling be re-evaluated using the following additional assumptions:

*re-eval
model
↓
FAS 10
model*

- I. The concentrations of orthophosphate (OP) in mine water could be higher than anticipated in the EA, therefore, the levels of OP in mine water plus one standard deviation should be used to evaluate the potential effects of phosphorus additions on the trophic status of Snap Lake;
- II. All of the dissolved phosphorus (DP) in mine water is available to aquatic plants in the EA, therefore, the levels of DP in mine water should be used to evaluate the potential effects of phosphorus additions on the trophic status of Snap Lake; and,
- III. The concentrations of DP in mine water could be higher than anticipated in the EA, therefore, the levels of DP in mine water plus one standard deviation should be used to evaluate the potential effects of phosphorus additions on the trophic status of Snap Lake.

Since the results of phosphorus modelling may be sensitive to baseline concentrations of phosphorus in Snap Lake, it is recommended that both average concentrations and average concentrations minus one standard deviation of DP be used to establish baseline concentrations for the purpose of modelling.

7. Secondary Effects of Lake Eutrophication

DCMI evaluated the effects of nutrient releases from the mine site on the trophic status of Snap Lake. In addition, the secondary effects of eutrophication were evaluated by considering the effects of enhanced algal production and subsequent settling of algae on the lake bottom on dissolved oxygen (DO) concentrations under ice. The results of this assessment indicated that DO levels under ice could decrease by 1 to 3 mg/L and approach levels of concern for lake trout. Since the phosphorus modelling that was presented in the EA report may underestimate effects in Snap Lake, it is important for DCMI to re-evaluate the secondary effects of lake eutrophication after more conservative assumptions have been applied in the phosphorus modelling.

*re-evaluated
based on
results in #6*

8. Potential Effects of TDS on Snap Lake

Although the effects of chloride releases were assessed in the EA report, the potential effects of TDS were not fully evaluated. More specifically, the potential effects of TDS releases on the structure of aquatic communities due to changes in the osmolarity of lake water were not assessed. Currently, Snap Lake has low levels of TDS. As such, aquatic communities are likely to be dominated by those species that are tolerant of osmotic stress (i.e., dealing with substantial inflows of low ionic strength water into their tissues). Increases in the ionic strength of water in Snap Lake could favour a transition toward

species that thrive at higher levels of dissolved ions and, as a result, alter the structure of one or more aquatic communities (i.e., algae, zooplankton, etc.). DCMI should be encouraged to undertake the analyses needed to more fully assess the potential effects of TDS releases on Snap Lake.

*Additional
analyses*

9. Cumulative Effects Assessment

Although DCMI has included a section in the EA report on cumulative effects assessment, it does not provide a basis for fully evaluating the effects of the proposed Snap Lake diamond project nor the interactive effects between the project and other anthropogenic activities that could influence aquatic resources in the Lockhart River Basin.

Opinion

10. Thermal Properties of North Pile

As a result of discussions at the technical session is clear that DCMI has not considered thermal issues regarding the proposed North Pile sufficiently. Golder Associates conceded that the thermal modeling of the North Pile had been conducted for logistical reasons, to prepare a management plan for deposition of the paste and movement of spigots, rather than for investigation of the freezing behavior of the North Pile.

Our principal criticisms of the modeling conducted to date are: (1) the arbitrary assignment of the geothermal flux, determined without reference to field conditions; (2) the arbitrary assignment of n-factors, determined without reference to the saturated state of the Pile or changing snow cover conditions over winter; and (3) the assignment of thermal properties, some of which are clearly in error as published in the EA submission, while the physical basis for others remains unavailable. These concerns were expressed at the sessions and were neither refuted nor discussed by DCMI. It became clear that DCMI has not conducted any laboratory tests to determine the freezing characteristics of the kimberlite paste. There are no test data on the unfrozen water content characteristic of the paste, the frost susceptibility of the paste, or the chemical behavior of pore water in the paste upon freezing.

The output from the thermal modeling presented in the IRs indicates that considerable sections of the North Pile will be within a few tenths of a degree Celsius of 0°C. Given that the simulations of the local ground thermal regime differ from field conditions by 3°C or so, the evidence from the modeling combined with the criticisms of the model, do not allow a clear judgement regarding the thermal status of the North Pile. In particular, we cannot determine whether we should expect the North Pile to be frozen or thawed, and if frozen, how long the freezing may take.

The initial implications of this problem are: (1) the amount and timing of process water drainage from the North Pile cannot be defined without determination of the freezing conditions in the pile; and (2) the quality of the drained water cannot be evaluated without

some assessment of cryoconcentration rates to be expected in the pore water.

Without a more thorough exploration of the freezing regime, there are potential problems for abandonment and reclamation in terms of the potential for hydrofracturing due to pore-water expulsion.

The following are required in order to continue our assessment of this aspect of the project.

- I. Unfrozen water content characteristic curves for the North Pile paste mixes, determined by laboratory test.
- II. Frost heave tests on the North Pile paste mixes to determine whether the paste is frost susceptible, or whether pore water is expelled during freezing.
- III. Results from revision of the thermal modeling, to incorporate:
 - (i) a field value of the geothermal gradient;
 - (ii) a temporally sensitive assignment of n-factors;
 - (iii) thermal properties which are recalculated to include results from (I).
- IV. With the new thermal modeling, an assessment should be made of the rates of cryoconcentration in the pore water of the North Pile, and the influence these may have on the quality of water seeping from the Pile.

IR -
re-assessment
of thermal
model.

Any revision in the thermal modeling will influence the assumptions used in predicting water quality that may emanate from the North Pile through oxidation and metal leaching. For example, locating potentially acid generating metavolcanics at the base of the North Pile may have a greater than anticipated influence on water quality should the North Pile not freeze as rapidly as currently projected by DCMI. Thus, water quality predictions should be revised in accordance with revised thermal modeling. There must also be an analysis of how this seepage water might mix with lake water in the North arm of Snap Lake and what the impact on water quality in this area will be.

11. Abandonment and Reclamation

Another outstanding issue is within the Abandonment and Reclamation (A&R) component of the project. Resolution of the issue has been sought through the IR process and was further raised during the technical sessions, as well as identified during the Dec. 23, 2002 DCMI meeting. Without this information, there is a lack of confidence in various aspects of DCMI's proposed A&R methods and objectives for the Project.

This issue is considered to be an EA issue and not a regulatory issue, as it is not a function of the approval of an A&R plan, but a principle from which to base the development of such a plan from. And while the finer elements of the A&R work can be addressed through the regulatory phase, preliminary discussions at the EA stage are essential

to ensure that DCMI and regulators share common A&R goals.

We suggest that DCMI provide further detailed information, including the research and rationale for the components comprising A&R activities. While more detail in all A&R areas is needed disposal scenarios/options considered, associated costs, implications and rationale for there use or rejection are of particular concern. The type of information requirement is also well articulated in Lines 567 to 572 of the Terms of Reference.

more info.

If you have any questions concerning this letter, please contact Tamara Hamilton at (867) 669-2616.

Sincerely,



Gal David Livingstone
Director, Renewable Resources and Environment

cc: Robin Johnstone, De Beers Canada Mining Inc.