

Addendum to Dogrib Technical Report on Snap Lake Project Assessment

**Dogrib Treaty 11 Council
March 14, 2003**

INTRODUCTION

The Dogrib Treaty 11 Council is still in the process of reviewing the technical memoranda submitted to the Review Board in late February by DeBeers. At this point we have not performed any detailed reviews. However, we have the following comments concerning the outstanding issues of importance to us. The issues we will want to focus on at the Review Board's public hearing into this matter include:

1. The reliability of predicted mine water volumes
2. The reliability of predicted mine water quality and implications for Snap Lake
3. The lack of an accurate assessment of cumulative effects on caribou.

SPECIFIC COMMENTS

1. Water Volumes

The project is located underneath a large lake, and the mine workings will be extensive. Groundwater from the adjacent rocks, and ultimately lake water from above, will flow into the workings as mining progresses. The volume of this flow may present challenges for water management at the site, including water treatment before discharging it to Snap Lake. The proponent is convinced that it has accurately predicted potential maximum flows. At this stage in our review, we do not believe that their overall approach is sufficiently conservative.

Water flow predictions have been based on computer modeling, with only limited real data from drilling to calibrate the model. This means that there is little certainty about what will happen as mining proceeds underground, and flows could be much greater than those anticipated. Confidence levels for the model results have not been provided, and the range of variability (including maximum potential inflows) have not been thoroughly examined. The regional groundwater flow is not well understood, and knowledge used in the assessment has been based more on assumptions than on real data. A single fracture encountered in the rock could easily increase water inflow by orders of magnitude greater than anticipated.

The proponent notes several mitigating factors to this potential problem. Mining proceeds incrementally, so that real inflows can be measured and compared against the predictions, and that it will know ahead of time if water inflows will be too great to handle. The proponent also states that backfilling the workings with concrete paste will serve to keep open spaces to a minimum and, therefore, control inflow rates. Grouting can be used to slow down water inflow to the workings. A water containment pond will provide up to only 10 days of storage. These measures might be reasonable if there were uniform conditions throughout the rock, a condition not proven. It is unlikely that these measures can realistically handle sudden inflows as may be encountered through contact with a large fracture or other discontinuities in the rock.

In the worst case of sudden, uncontrollable volumes of water, the proponent states that it will allow the mine to flood and abandon the workings. It is not realistic to believe that the proponent will voluntarily abandon its project in such an event when it has the alternative of discharging the untreated water directly to Snap Lake. Nor is it realistic to think that government will enforce such a promise by shutting down the operation. The Review Board should not rely on this option in order to find the project environmentally acceptable.

The water volume issue has direct consequences for water treatment capacity at the site. Room to expand water treatment facilities that could be required is restricted, and contingency measures are not readily identified, beyond shutting the mine down or discharging untreated volumes to Snap Lake.

All this presents a serious problem for the Review Board, and it is one that cannot be resolved at this stage. On the basis of the available information, it will be difficult for the Board to conclude that potential impacts to Snap Lake water quality are acceptable, or are mitigable through demonstrated, conventional means.

Further work will be required by the proponent when it goes to the Mackenzie Valley Land and Water Board for its water licence. This will include additional geotechnical investigation at the site, improved calibration of the model, and a better analysis of the range of variability that might reasonably be expected for mine water inflows. Proposed contingency measures for upset conditions must be realistic, demonstrated, and viable at the site. A range of safety will need to be identified for acceptable inflow conditions for the mine.

2. Water Quality

Our technical report identified issues relating to the predicted effects of mine water discharged into Snap Lake, and the resulting potential changes in water quality and impacts to aquatic life. In particular we raised the issue of uncertainties in predicted water quality from the mine as well as the dispersion modeling to predict effluent movement, and the interactive effects associated with the mine-related changes in Snap Lake.

The proponent attempted to address the latter issue in its Feb.28 paper entitled "Potential Overall Effects of the Changes in Water and Sediment on the Aquatic Communities of Snap Lake." (We note that the additive and synergistic effects have still not been addressed – for example, the relationship of predicted changes in water quality and aquatic community to the potential changes between aquatic and terrestrial ecosystem interactions).

Some of the predicted changes in Snap Lake for certain parameters of concern are as follows:

- A greater than twenty-fold increase in concentration of total dissolved solids
- Phosphorus increases 2 to 3-fold resulting in increased phytoplankton abundance
- An increase in the TN/TP ratio (25:1 to 1000:1)
- Calcium increasing about 65-fold during winter
- Chloride increasing about 685-fold during winter
- Dissolved oxygen decreasing to close to zero in certain areas during winter
- Cadmium and chromium increasing

Each one of these changes is a stress on aquatic organisms, in some cases perhaps positive and, in others, adverse. As the proponent notes, the state of science does not allow a quantitative prediction of the net result of these individual stresses to be determined. Therefore a more

qualitative or subjective approach is required, it says, and so has adopted a "weight of evidence" approach to examine this issue. This method simply tabulates the individual effects which are given subjective ratings such as "small positive", "moderate negative", "neutral", etc., and then a best guess is made by "tallying" the subjective ratings. Professional judgment is used to guide the rating.

The process does not lead to consistently explainable or even intuitive results. To illustrate, for "benthic invertebrate productivity", it is possible for the proponent to tally as below:

2 neutrals + 2 negatives + 1 positive = 1 neutral

Similarly, for "benthic invertebrate community", the proponent tallies:

3 neutrals + 2 negatives = 1 neutral

These results are not convincing. This work does not provide any increased accuracy as to what will happen if the project proceeds. The uncertainty surrounding the predictions of individual components that will be loaded into Snap Lake, their behaviour and distribution within the lake itself and, particularly, the net interactive effects of these on the aquatic ecosystem has not been narrowed by the proponent's most recent work.

An understanding of what will happen to the Snap Lake may be achieved through monitoring resultant conditions and conducting toxicity tests as mining progresses. While monitoring and testing may tell us if adverse effects are occurring, there is nothing that can be done to mitigate or prevent the impacts. In essence, the proponent is proposing to run an experiment with Snap Lake, and test various hypotheses regarding the effects of discharging large volumes of mine effluent for many years into a small to moderately-sized pristine subarctic lake (and downstream waters).

These are serious issues for the Board to consider, because it is understanding the overall net effect of the mine-related changes in Snap Lake that will allow a responsible decision to be made about environmental acceptability of this project. We will deal further with these and related issues at the public hearing.

3. Caribou

The potential cumulative effects of another mining development within the range of the Bathurst caribou herd are a major concern of the Dogrib. There is as yet no process in place for monitoring the effects of these disturbances on caribou. The proponent submitted two reports in February that deal with the results of recent wildlife surveys, including caribou. However, there is no additional information relating to the assessment of potential additive and synergistic effects on caribou, or to the cumulative impacts issue. Our original comments still stand, and we will speak to this issue at the public hearing.

Submitted by

Tony Pearce

For Dogrib Treaty 11 Council