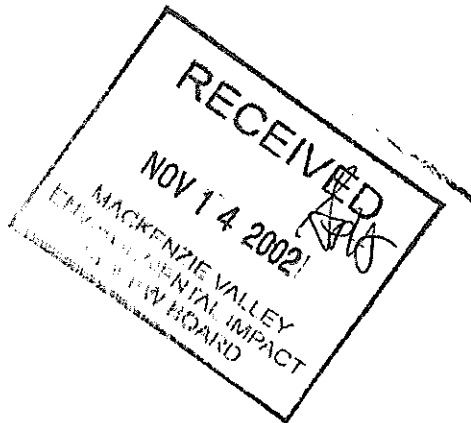


Stantec Consulting Ltd.  
10160 - 112 Street  
Edmonton AB T5K 2L6  
Tel: (780) 917-7000  
stantec.com



**Stantec**



13 November 2002  
File: 108-59528

Tel: (780) 917-7243  
Fax: (780) 917-7249  
jkupper@stantec.com

Chamberlain Hutchison  
Suite 1310  
10025 - 102A Avenue  
Edmonton, Alberta  
T5J 2Z2

**Attention: Janet L. Hutchison, LL.B.**

Dear Ms. Hutchison:

**Reference: DeBeers Snap Lake Diamond Project Environmental Assessment**

As per your request, we have compiled a list of outstanding Technical Issues that we feel should be addressed in the technical sessions. We have used the same format adopted by the Board's consultant in its "Rationale of Technical Issues" document. The attached Technical Issues were prepared by Dr. Petr Komers, P.Biol. (Wildlife), Mr. Bob Shelast, P.Biol. (Fisheries), and Dr. João Küpper, P.Eng. (Hydrogeology).

Stantec has reviewed the Rationale of Technical Issues prepared by the Board's consultant for the specific entries relating to wildlife, fisheries and hydrogeology. In general, we concur with the Board's consultant list of technical issues and associated rationale. There are, however, other issues or rationale not specifically addressed by the Board's consultant that we feel are relevant to the technical sessions. These technical issues are attached.

We trust this will meet your current requirements. Should you have any questions, or need additional information, please contact the undersigned at your earliest convenience.

Sincerely,

**STANTEC CONSULTING LTD.**

J.A. Küpper, Ph.D., P.Eng.  
Senior Hydrogeologist

Attachment: List of Technical Issues

jak m:\projects\10859528\hutchison\_02nov13\_technicalissues.doc

Buildings  
Environment  
Industrial  
Transportation  
Urban Land

Reference: DeBeers Snap Lake Diamond Project Environmental Assessment

### Wildlife – Impact Ratings

**IR Response Number(s)** 4.11.17, 4.11.22

**What is the issue?** A central issue in the DeBeers EAR is the ability to assess impacts using impact definitions that are based on poor measurability of benchmarks such as natural variation and population demography. The responses provided to IRs so far do not provide any clearer understanding than before. DeBeers points to "social values" and population parameters, terms even less defined and less clear than those in the original EAR.

Referring to tables 10.1-3 or 10.4-12, the definition of impact ratings is questioned.

**Why is it an issue?** Natural variation and population parameters are currently unknown, and may, in fact, not be measurable. As detailed in these IRs, an impact assessment can simply not be performed based on a benchmark which is not measurable.

**How will resolution of this issue add value to the EA?** Clear and measurable impact ratings are basic to the foundation of impact assessments. Without measurable parameters built into definitions, impacts cannot be predicted and monitoring programs cannot test the accuracy of the initial prediction.

**Who should provide the response?**

- DeBeers needs to define benchmarks that are measurable, reflecting currently available knowledge.
- Government Agencies should facilitate access to information emerging from past and current research conducted by the government.
- Local communities should be given the opportunity to contribute local traditional knowledge.

### Wildlife – Cumulative Effects

**IR Response Number(s)** 4.11.25

**What is the issue?** The concept of cumulative effects assessment on wildlife is still not clarified. Although DeBeers notes correctly that cumulative effects must overlap in their zone of influence (ZOI), DeBeers appears to evade the question of where exactly the ZOI might be. The ZOI is not just the RSA; rather, it is wherever a population that is affected might roam. Thus, if 0.01% of the caribou population, no matter where they roam, is affected, then any additional 0.01% (or any value as appropriate) by other mines and developments might add to the effects on that same population if the other mines are within the range of the population.

**Why is it an issue?** The boundary of the RSA has nothing to do with the evaluation of the cumulative effects in the region used by the population. A ZOI must be defined in order to address cumulative effects on populations

**How will resolution of this issue add value to the EA?** Understanding the level of cumulative effects is fundamental to development of regional mitigation strategies and monitoring programs.

**Reference: DeBeers Snap Lake Diamond Project Environmental Assessment**

- Who should provide the response?** DeBeers, demonstrating
- that a process has been followed by which the currently available information on regional populations has been gathered,
  - where the information gaps lie, and
  - how the gaps affect the confidence in predictions.

Industrial proponents as well as managers of governmental development projects need to collaborate with DeBeers in providing information about their development projects.

**Wildlife – Monitoring Program**

**IR Response Number(s)** 4.11.18, 4.11.26

**What is the issue?** DeBeers continues to be committed to monitoring programs and adaptive management as per ISO 14001. However, no monitoring program exists at this time and stakeholders are not assured that effects, if any, can be accurately measured to assess mitigation effectiveness. As to monitoring requirements, the Terms of Reference are unequivocal: "DeBeers shall describe the approach, objectives, and proposed methodologies that will be used in any proposed monitoring program(s)" (ToR, Section 2.11, line 576).

**Why is it an issue?** With respect to Section 10.1.3 of the EAR, the ability of DeBeers to collect data that provide answers to key questions is of concern to stakeholders.

If DeBeers cannot collect data pertinent to the key questions of the EAR, how will stakeholders be assured that DeBeers can collect future data that will be pertinent to the questions on mitigation success as part of monitoring plans?

This question goes beyond the one related to the development of EMS as part of ISO 14001 certification (see also IR 3.5.15 or 3.9.1), because the certification will address procedural requirements, but not evaluate required data quality. In other words, similar to the Terms of Reference for the EAR, the EMS will provide a format for asking questions but may fail in evaluating the quality of answers.

**How will resolution of this issue add value to the EA?** Without monitoring programs, it is impossible to evaluate how, if at all, mitigation measures will be successful. Developing monitoring programs and adaptive management plans is the only way to counter the uncertainty in impact predictions. This is particularly important in systems where predictive accuracy is poor.

- Who should provide the response?**
- DeBeers for local monitoring programs.
  - Government agencies need to provide guidelines on regional monitoring in order to integrate measurements of effects by the proponents in the region.
  - DeBeers needs to collaborate with other proponents, governments and stakeholders in developing regional monitoring programs.

Reference: DeBeers Snap Lake Diamond Project Environmental Assessment

### Wildlife – Traditional Knowledge

<b>IR Response Number(s)</b>	4.11.26, 3.10.21, 3.10.22, 3.10.23, 3.10.26, 3.10.27, 4.11.17, 4.11.22, 4.11.23, 4.11.25
<b>What is the issue?</b>	Unless DeBeers significantly improves the information gaps, as exemplified in the above noted IRs, it is essential to know how monitoring programs will be developed to show scientific validity and rigour, locally and regionally, and how traditional knowledge and local communities will be involved in monitoring design.
<b>Why is it an issue?</b>	Although some traditional knowledge has been collected and integrated into the EAR, local knowledge, if collected in a consensus building approach, would likely reduce numerous information gaps. Traditional knowledge can provide valuable guidance in developing mitigation and monitoring programs.
<b>How will resolution of this issue add value to the EA?</b>	In light of the logistical difficulties of gathering detailed baseline information, traditional knowledge is a valuable tool for reducing information gaps and improving on accuracy of predictions. Monitoring plans, in particular, will benefit from the integration of traditional knowledge. Traditional knowledge was required in the Terms of Reference to be given equal weight to western science (ToR, Section 2.2.2, Line 51 to 55), which in the present EAR does not appear to be the case.
<b>Who should provide the response?</b>	<ul style="list-style-type: none"><li>▪ DeBeers needs to identify a plan to gather traditional knowledge, and preferably one that facilitates communities collaborating with the proponent and among themselves to provide a consensus on traditional knowledge.</li><li>▪ Government agencies should facilitate the contact between the proponent and the communities.</li></ul>

### Wildlife - Adaptive Management Plan

<b>IR Response Number(s)</b>	4.11.18
<b>What is the issue?</b>	There is reason for concern that results of monitoring programs will not translate into immediate mitigative action. The concern is based on the complete absence of concrete monitoring plans and insufficient evidence to demonstrate that DeBeers can develop adaptive management plans (other than a commitment that ISO 14001 will be followed).
<b>Why is it an issue?</b>	Without adaptive management, the results of monitoring will remain unused, given that adaptive management refers to how the operation of a project adapts to the conditions indicated by the monitoring program.
<b>How will resolution of this issue add value to the EA?</b>	An adaptive management plan or, at minimum, a demonstration that DeBeers has operated under adaptive management plans elsewhere, would assure stakeholders that DeBeers can act effectively upon the results from monitoring programs.
<b>Who should provide the response?</b>	DeBeers

Reference: DeBeers Snap Lake Diamond Project Environmental Assessment

### **Wildlife - Linking Data Collection and Impact Analysis**

<b>IR Response Number(s)</b>	4.11.23
<b>What is the issue?</b>	The idea of measuring movements in order to assess whether movements will be affected (i.e. Key Question W2) seems to be rejected by DeBeers in the response to IR 4.11.23; a paradoxical approach. Key Question W2 remains unanswered.
<b>Why is it an issue?</b>	Without adequate knowledge of wildlife movements, a key component of the Terms of Reference is unfulfilled.
<b>How will resolution of this issue add value to the EA?</b>	Movement corridors and preferred habitat of more than just caribou need to be mapped in order to a) evaluate potential impacts, b) design mitigation measures, and c) develop monitoring programs.
<b>Who should provide the response?</b>	DeBeers, detailed TK surveys may be substantially more informative about wildlife movements than current field surveys. (This is an issue specific to wildlife movements and to the ability to provide answers to Key Question W2, but it also demonstrates the need to incorporate TK in general, see issue on TK above).

### **Wildlife - Logic of linkage analysis**

<b>IR Response Number(s)</b>	
<b>What is the issue?</b>	Efforts to design mitigation measures are evident throughout the EAR, but their placement is not "easily" understood or clear as required in the ToR. For example, mitigation measures are often referred to in unexpected places like the linkage analysis on p. 10-187 regarding the water management pond, where the effects of the water management pond are dismissed because the pond would be fenced. The fencing, in this case, is a mitigation measure that addresses the clear linkage.
<b>Why is it an issue?</b>	The rationale used by DeBeers results in dismissing a potential impact and thereby avoids the analysis of the potential for that impact. The rationale is that much more questionable in light of the finding that such project elements (water management pond in this case) have been shown in other mines to be linked to direct mortality.
<b>How will resolution of this issue add value to the EA?</b>	The effectiveness of fencing as a mitigation measure to avoid direct wildlife mortality needs to be demonstrated, not assumed.
<b>Who should provide the response?</b>	DeBeers

### **Surface Water Quality – Phosphorus Inputs**

<b>IR Response Number(s)</b>	4.1.8
<b>What is the issue?</b>	There are several IRs that deal with the output of treated wastewater into Snap Lake. Currently, there is an output pipe located at the head of a wetland located southeast of the Service Complex. Based on field observations during the summer of 2002, a significant amount of "algae" was observed concen-

**Reference: DeBeers Snap Lake Diamond Project Environmental Assessment**

trated around the outfall and in the wetland for about 20 feet around the outfall (Michael Thoms, pers. comm.). Has any sampling been done in this area to determine if this is related to effluent discharge (i.e., temperature or nutrient effects)? If it is related to effluent discharge, can this effect be used to define potential effects of the effluent discharge into Snap Lake?

It appears that phosphorus inputs from the current operation have resulted in a localized increase in algae (chlorophyll *a*). As stated in the EA, under full production, phosphorus loading to Snap Lake will increase, resulting in a 40% increase in chlorophyll *a* in Snap Lake. This may result in significant changes to the Snap Lake ecosystem. The influx of phosphorus into the lake will lower the nitrogen to phosphorus ratio (N:P), potentially resulting in the bloom of cyanophytes which may be toxic. The EA does not discuss this issue and, in fact, sees uptake of phosphorus by algae in the lake as a means to maintain phosphorus levels in the lake at background levels.

A second issue arising from an increase in algal populations is the potential effects this may have on the zooplankton community which graze on this algae and subsequent effects on fish that rely on this zooplankton as a food supply. A shift in dominance of certain zooplankton species put other zooplankton species at a competitive disadvantage.

<b><i>Why is it an issue?</i></b>	A shift in the nutrient balance may ultimately have impacts on the aquatic resources (zooplankton, benthic invertebrates, and fish) of Snap Lake.
<b><i>How will resolution of this issue add value to the EA?</i></b>	Clarification of nutrient input effects would allow a proper assessment of impacts to the Snap Lake aquatic ecosystem.
<b><i>Who should provide the response?</i></b>	DeBeers

**Surface Water Quality – Flocculent Release**

***IR Response Number(s)*** 4.1.2

***What is the issue?*** At issue is the potential for residual flocculent to enter Snap Lake. The response from DeBeers stated that aquatic toxicity testing of the flocculent proposed for use (Percol 351) is non-toxic in the range of concentrations that will be used in the process plant. However, it does not address concentrations that may occur during upset conditions or accidental releases, when such concentrations would likely be toxic.

***Why is it an issue?*** Potential impacts to aquatic life from mine water treatment and discharge into Snap Lake have not been fully addressed.

***How will resolution of this issue add value to the EA?*** Closer examination of potential impacts of flocculent release and development of spill response measures.

***Who should provide the response?*** DeBeers

Reference: DeBeers Snap Lake Diamond Project Environmental Assessment

### **Aquatic Resources – Monitoring Program**

**IR Response Number(s)**

- What is the issue?** Aquatic resources monitoring has been presented only in general terms. A detailed monitoring program would be finalized only during the regulatory process.
- Why is it an issue?** Monitoring is essential in order to determine whether impact predictions are accurate and as a safeguard to the aquatic ecosystem of the project area. Full disclosure of a monitoring program for the Snap Lake project is needed to determine whether adequate steps have been taken to maintain ecosystem integrity.
- How will resolution of this issue add value to the EA?** In the absence of sufficient baseline information, there is a need to know how monitoring programs will be developed to show scientific validity and rigour, locally and regionally, and how TK and local communities will be involved in monitoring design. The monitoring program should address fish resources (population changes, fish health), fish habitat, and non-fish organisms. The results of the monitoring programs should be incorporated into an adaptive management plan.
- Who should provide the response?** DeBeers, GNWT, DFO.

### **Aquatic Resources - Lake Sediments**

**IR Response Number(s)**

- What is the issue?** IR 1.6.2, 4.19  
Further clarification of the impacts of mine operation on lake sediments is needed.
- Why is it an issue?** The EA dismissed several parameters and focused on a few selected parameters. However, several parameters, including heavy metals such as selenium, should be further analyzed and discussed. Heavy metal contamination can result in sublethal effects on aquatic organisms which will ultimately affect the functioning of the ecosystem. Metals such as selenium are known to cause deformities in fish. Further information is needed on the potential for elevated concentrations of metals from the processing of the kimberlite. Several issues regarding porewater toxicity do not appear to be adequately answered.
- How will resolution of this issue add value to the EA?** Further assessment of the effects of groundwater inputs on lake sediments and water quality is needed to properly address potential impacts on the aquatic resources of Snap Lake and North/Northeast lakes.
- Who should provide the response?** DeBeers

**Stantec**

### **Lake Level Fluctuations**

**IR Response Number(s)**

- What is the issue?** 3.10.17  
Lake level fluctuations may impact fish and fish habitat.
- Why is it an issue?** The EA states that water level fluctuations will be within natural variation.

**Reference: DeBeers Snap Lake Diamond Project Environmental Assessment**

There are two pertinent issues related to this statement. Has adequate baseline information been collected to accurately determine flow fluctuations in lake levels? Secondly, what is the **frequency, timing and duration** of these fluctuations compared to natural levels and what is the effect on fish habitat?

Under natural conditions, low lake levels may result in lowered spawning success and recruitment to the populations. The lake can freeze to the bed at spawning sites, resulting in the mortality of eggs from fall spawning fish such as lake trout, and the loss of a year class. Although this may occur under natural conditions, the frequency of such events is limited, allowing for the population to recover from the occasional loss of a year class. However, if lake levels are lowered on a more frequent basis, the population over time may not be resilient. Little is known of the population dynamics of these northern lakes and the baseline data does not cover a long enough period of time to provide any insight into the dynamics.

**How will resolution of this issue add value to the EA?** A more thorough examination of lake level fluctuations and the potential effects on fish and fish habitat will provide a greater level of confidence in the impact predictions.

**Who should provide the response?** DeBeers

**Groundwater – Regional Groundwater Flow Regime**

**IR Response Number(s)** 1.45

**What is the issue?** There is uncertainty in the determination of the regional groundwater flow regime. The EA relies on a hydrogeological model that is conceptual in nature and was only partially validated with field data. Deep groundwater flow directions have been postulated based solely on the lake elevations. No groundwater level data were available and no consideration was given to the potential control that fracture zones and faults may have on the groundwater flow regime.

It has been implicitly assumed that the fracture system in bedrock is dense enough to allow a macroscopic approximation of the flow as a porous media equivalent. However, a number of faults, including Snap and Crackle faults, may provide a preferential pathway for the groundwater and significantly affect the inferred groundwater flow regime.

**Why is it an issue?** Only the North and Northeast Lakes have been identified as potentially affected by post-closure seepage of groundwater through the mine workings. It is possible that other lakes, such as Cansell to the west or Capot Blanc to the east may also be affected if faults and fracture zones exert considerable control on the groundwater flow.

**How will resolution of this issue add value to the EA?** Validating the regional groundwater flow regime, with proper consideration of the faults and fracture zones, would allow a proper assessment of post-closure impacts on the adjacent lakes.

**Who should provide the response?** DeBeers

Reference: DeBeers Snap Lake Diamond Project Environmental Assessment

## Groundwater – Inflows to the Mine Workings

**IR Response Number(s)**

**What is the issue?**

There are uncertainties in the prediction of the quantity and quality of groundwater entering the mine workings.

An uncertainty analyses was conducted because there was very limited data to calibrate the groundwater flow model. However, high hydraulic conductivity values observed in several drill holes were excluded from the uncertainty analyses. A high hydraulic conductivity of the bedrock could lead to higher-than-predicted inflows to the mine workings. In addition, the hydraulic conductivity of the lake bottom sediments, a critical parameter, was estimated. The bottom sediments control the amount of leakage from Snap Lake and a lower hydraulic conductivity of these sediments would lead to a higher percentage of native groundwater entering the mine workings.

The groundwater quality data were obtained from a small area of the proposed mine footprint, and variations in the groundwater chemistry should be expected as the mine develops. If granite is the host bedrock over a large portion of the mine footprint, more mineralized groundwater would be expected to enter the mine workings as mining progressed.

**Why is it an issue?**

The quantity and quality of groundwater entering the mine workings will directly affect the water quality of Snap Lake. As minimal water treatment has been proposed, an increase in total dissolved solids and other parameter concentrations would occur in Snap Lake. Because groundwater represents up to 90% of the water discharge to Snap Lake, it is important to have a good understanding of its effects on the lake.

**How will resolution of this issue add value to the EA?**

A better understanding of groundwater quantity and quality is required to verify model predictions of the effects on the water quality of Snap Lake.

**Who should provide the response?**

DeBeers

## Groundwater – Monitoring Program

**IR Response Number(s)**

1.50, 3.8.7

**What is the issue?**

Groundwater monitoring has been presented only in general terms. A detailed monitoring program would be finalized only during the regulatory process.

**Why is it an issue?**

There is very limited data on groundwater levels to support the postulated groundwater flow direction. A properly developed groundwater monitoring program should be an integral part of the mine operations and it should include means of obtaining data to validate the model predictions and potential impacts, as well as contingency plans that would be implemented should deviations be observed during monitoring.

There is uncertainty as to how DeBeers would implement a monitoring program. The concern is that the groundwater monitoring program may be very limited, based on the response to IR 3.8.7. Since there is a lack of data to properly define the groundwater flow regime, monitoring locations may be poorly selected, providing misleading information.

**Reference: DeBeers Snap Lake Diamond Project Environmental Assessment**

***How will resolution of this issue add value to the EA?*** A detailed groundwater program will provide confidence that DeBeers will collect adequate data to verify predictions and, if required, implement alternative measures to minimize impacts should deviations from initial predictions be observed.

***Who should provide the response?*** DeBeers

# Watershed Writing

J. Michael Thoms  
5472 Laburnum Ave.  
Powell River, BC  
V8A 4M8  
Phone: (604) 414-0017

13 November 2002

To: The MVEIRB

I am a social science researcher with experience conducting research about aboriginal communities. In the past, I have conducted research on aboriginal social, health, economic, and cultural issues through funding from various First Nations, Health Canada, Corrections Canada, and DIAND. I have also made contributions to the academic literature. I have a BA from the University of Toronto, a MA in Native Studies from Trent University, and am near the completion of a PhD at the University of British Columbia.

The North Slave Metis Alliance (NSMA) requested I review the DeBeers' EAR and related Information Responses (IRs) to identify the social, cultural, and economic impacts the NSMA is predicted to experience and assess the likelihood or certainty that DeBeers' proposed mitigation measures will offset these effects. In my opinion, the DeBeers' EAR and IR process contain substantive problems and I am unable to provide the NSMA with the information it requires to fully assess the impact this development will have on its community. My comments contain general references to the duty to consult. However, I expect those issues will be more fully canvassed by NSMA's legal counsel.

I appreciate that the MVEIRB and De Beers requested very specific and focused questions. I have made an effort to do so, but must stress that many of the issues I identify are not questions of interpretation of specific datasets, but represent concerns with De Beers' fundamental methodology, and in some cases, the complete absence of data. These methodological issues are appropriate issues to be reviewed at the technical sessions. If DeBeers wishes to provide the NSMA with the social science literature it has relied on, I am willing to review that material and be prepared to comment on it at the technical sessions.

As requested, I present each issue in the format suggested by Gartner and Lee Limited (GLL). I also wish to add that I concur with the socio-economic issues identified by GLL in sections 3, 4, and 6 of its 1 November 2002 report and will participate in these technical discussions.

At the MVEIRB pre-technical hearing on 8 November 2002, I raised additional issues not reviewed here concerning NSMA heritage resources and TK. De Beers committed to specific resolution measures at the meeting, so I will not repeat them here. However, until those commitments are fulfilled, these issues remain a concern and may require discussion at the technical sessions.

J. Michael Thoms

## **1. The existing social, cultural, and economic environment of the NSMA**

### **What is the technical issue?**

De Beers did not describe the existing social, cultural, and economic environment of the NSMA in its EAR. To help address this gap, the NSMA provided De Beers with data on its demography, employment levels, education, skills, and community infrastructure conditions. De Beers has not analyzed this data to build a baseline of the existing NSMA environment.

### **Why it is an issue?**

The description of a community's "existing" social, cultural, and economic environment is the first step in any socio-economic impact assessment (SEIA). This is the base of knowledge about a community from which predictions about impacts are based, mitigation is proposed, and monitoring protocols are established. Without baselines, a community's abilities to absorb change cannot be understood, mitigation measures cannot be tailored specific to that community, and changes in the community's socio-cultural and economic well being cannot be traced.

### **How the resolution of the issue adds value to the EA?**

The construction and analysis of NSMA baseline data contributes knowledge regarding the existing environment of the NSMA, a current gap in the EAR. This baseline data forms the foundation for impact prediction, monitoring, and mitigation.

### **Who can best respond to the issue?**

De Beers, in co-operation with the NSMA.

## **2. Predicting social, cultural, and economic impacts**

### **What is the technical issue?**

De Beers claims that “impacts to each community cannot be predicted” and thus treats all aboriginal communities, separated by geography, culture, economic, and social conditions, as a homogenous group with the same potential capacity to absorb change (EAR section 5.3.3.1). I do not accept this proposition. In figure 1, I have assembled the conventional indicators of community wellness and cultural well being for the affected aboriginal communities from data in the EAR, the GNWT report “Communities and Diamonds”, and NSMA data. It can readily be seen that education, unemployment, aboriginal language retention levels, and other key indicators, vary sharply. From this basic observation, it should be clear that each community’s capacity to absorb change differs.

It is noted in the data in figure 1 and the data report submitted to De Beers that the NSMA is at a particular disadvantage to absorb change because, unlike other communities, it does not possess a physical community boundary and core DIAND funding. The EA process must assess the different capacities of the NSMA to absorb change and make impact predictions based on this community’s specific conditions.

### **Why this is an issue?**

The fundamental purpose of SEIA is to assess and predict impacts based on the best available data so that communities can prepare for, and develop strategies to cope with change. The current information in the EA does not attempt to do this for the NSMA. De Beers’ methodology to treat all communities as the same for the purposes of impact predictions is invalid. De Beers has access to the community-specific data necessary to make impact predictions at the level of the community and should conduct this analysis.

### **How resolution of this issue adds value to the EA?**

There is no certainty that the ability of the NSMA to adapt to change has been assessed and no certainty that the general impact predictions are valid in respect to the unique capacities of the NSMA. Confidence in the impact predictions may be possible if the community-specific data available for NSMA is properly analyzed.

### **Who can best respond to this issue?**

De Beers, in co-operation with the NSMA.

### **3. Impact mitigation**

#### **What is the issue?**

In its EAR, De Beers commits to implementing specific mitigation measures, where necessary, with each community. De Beers further states that some mitigation measures will require government partnerships. However, the failure to predict the specific impacts on the NSMA prevents any informed development of the mitigation measures necessary for the NSMA to adapt to changes and make the most positive opportunities from development. In short, the general mitigation proposals in the EA are vague and not based on valid impact predictions. In addition, it is not known to what degree government is committed to the partnerships proposed by De Beers.

#### **Why is this an issue?**

The NSMA has a different capacity to absorb and adapt to changes than other aboriginal communities. Mitigation measure must be implemented at the level of the community. Only once the NSMA baseline data is analyzed and community specific impact predictions are made, can specific and focused mitigation measures be developed. Government commitment to mitigation partnerships is unknown.

#### **Why does the resolution of this issue at value to the EA?**

Mitigation is a fundamental component of SEIA. There must be certainty that the proposed mitigation measures are sensitive to the unique vulnerabilities and capacity of the NSMA to absorb change. Improper mitigation compromises a community's cultural survival.

#### **Who can best respond to the issue?**

De Beers and the Federal and territorial government, in co-operation with the NSMA.

#### **4. Monitoring social, cultural, and economic change**

##### **What is the issue?**

De Beers' EA does not adequately address questions about the monitoring of social, cultural, and economic change. This monitoring must be grounded in community baseline data. Questions as to who will control and manage community baseline data have not been addressed: will De Beers, the GNWT, or each community control the data? What indicators will be monitored? How will confidentiality be protected? What funding will De Beers provide for ongoing community-based monitoring of indicators selected by the communities? Given that Census Canada and GNWT labour force survey do not discern the Metis society, how will this information gap be remedied?

##### **Why is this is an issue?**

A monitoring system that will detect changes in the NSMA members' cultural, social, and economic status that can inform adaptive management strategies needs to be developed.

##### **How does resolution of this issue add value to the EA?**

Monitoring is a fundamental aspect of EA and must be resolved before project approval.

##### **Who can best respond to the issue?**

De Beers, in co-operation with the NSMA .

## **5. The adequacy of public consultation**

### **What is the issue?**

In addition to concerns about whether government and De Beers are meeting their obligations pursuant to the duty to consult, I am concerned about the adequacy of public consultation and whether De Beers followed its expressed methodology. I am concerned that De Beers' identification of public consultation input is selective to only certain issues and not representative of all input.

In IR 2.5.3, the GNWT asked De Beers to provide citations for, among other terms, "triangulation". De Beers provided the following definition of triangulation: "process for ensuring reliable qualitative analysis; categories and themes that emerge from the qualitative data are compared against other case studies, professionals' judgment, and brought back to the original first-hand source (e.g. interview participants) to verify the validity of the findings." Further, throughout its EAR section 5, De Beers states that it verified aboriginal issues and concerns with the first-hand source, a key tenet of its triangulation methodology. Yet, De Beers did not document all information received during its consultations with the NSMA and has not acted on some issues identified in appendix IV.1-1 (its list of public concerns). Further, in IR 2.5.5, De Beers indicates that it, "did not verify all records of meetings". In lieu, De Beers states that it provided a "record of consultation" in the Snap Lake Diamond Project Scoping Document submitted to the MVEIRB and that this scoping document was widely distributed and that no contradictions were raised. I do not consider this verification method to meet the standards of "triangulation" or good social science research. It is not clear that all public concerns have been documented and verified with the producers of the concerns – a standard EA practice and a goal De Beers set out for itself.

### **Why is this an issue?**

Public consultation and the documentation of public concerns is a fundamental tenet to EA practice. There must be certainty that this process was rigorously followed, is verifiable, and led to considerations of alternatives to project design.

### **How resolution of the issue adds value to the EA**

Until the adequacy of the public consultation process is reviewed, and there is certainty that all public concerns are documented and verified, the reviewers of the project proposal can have no certainty that all public issues are accurately before them.

### **Who can best respond?**

DeBeers.

## **6. Project Design**

### **What is the issue**

The purpose of public consultation is not only to hear and document concerns but also to use this information to adapt project design. De Beers and both levels of government are also required, pursuant to the duty to consult, to make good faith efforts to accommodate the concerns raised by Aboriginal communities. Section 2.2.1:viii of the TOR, require DeBeers to show how consultation “affected the design of the project”. In *Can't Live Without Work*, the NSMA listed a series of concerns about the potential effects of mining on the NSMA and made a series of recommendation about how these potential effects can be mitigated through adaptations in the design of a project. In IR 3.11.1 (f) I asked for details on how “requested or suggested project changes” listed in *Can't Live Without Work* were addressed. DeBeers responded that, “the terms of reference do not require DeBeers to specify impacts related to each primary community separately.” My concern is De Beers had within its hands information on how to adapt their project to address Metis concerns, but instead of doing so, it chose not to add this value to the EA. Further, neither the federal nor the territorial government have taken steps to accommodate these concerns.

### **Why is this an issue?**

This is an issue because an analysis of this information can lead to improved project design and is required in the ToR. Further, the obligations of government and De Beers pursuant to their duty to consult go beyond the ToR.

### **How resolution of the issue will add value to the EA?**

A complete consideration of NSMA recommendations about project design, based on the memberships' long experiences with mining, employment, and other activities in the North, brings invaluable insight into project design. Further, if government and De Beers do not meet their obligations pursuant to the duty to consult, the entire EA process is jeopardized.

### **Who can best respond to the issue?**

De Beers, the Government of Canada and the Government of the Northwest Territories.

## **7. Resource Use, Spatial Boundaries, Assessment of the Maximum Zone of Influences, and Cumulative Effects.**

### **What is the issue?**

The spatial boundaries for predicting the impacts on various NSMA valued ecosystem components (VECs) are invalid. Impacts on traditional land use (fisheries) practices of the NSMA have not been assessed. The map in figure 2 documents the traditional fishing places proximal to Yellowknife of a small sample of Métis fishers. De Beers did not identify these critical food and cultural fisheries in its component on “existing resource use”.

As the non-Native population has increased in Yellowknife, Métis traditional knowledge holders have observed significant cumulative impacts on these fisheries from recreational non-Native fishing. Further, in IR 2.1.3, De Beers implies that these lakes will experience increased recreational pressures from off-work De Beers employees, but no impact analysis is offered. Impacts on these fisheries need to be included in De Beers’ assessment of the maximum zone of influence of its development. The existing RSA (illustrated) is not adequate for an assessment of these impacts. These impacts are within a definition of the zone of maximum environmental impacts induced by the development as the employees are associated with the development and population increase is one outgrowth of the development.

### **Why this is an issue**

The NSMA depends on these fisheries for food and cultural traditions. Members of the NSMA have an intimate knowledge of these lakes and NSMA TK holders indicate that these lakes cannot sustain increased angling pressures. “The loss of these fisheries is irreversible and will be a significant impact on the culture and economy of the NSMA and limit the choices of future generations of Métis. Assessing and mitigating impacts on these traditional fisheries is fundamental to the cultural and economic well being of the NSMA. The MVEIRB has a duty to consider the TK input of the NSMA. Spatial boundaries must be designed to assess impacts on a specific VEC under analysis and in some cases, cannot be localized to a single RSA.

### **How the Resolution of the issue adds value to the EA**

De Beers implies that these fisheries will be affected by their development. Until this effect is analyzed and mitigation and monitoring measures implemented, there is no certainty that a traditional component of the NSMA’s existing resource use and cultural and economic well-being will not be adversely impacted.

### **Who can best respond to the issue?**

De Beers.

## **8. Sustainable economic development**

### **What is the issue?**

The objective of EA practice in Canada is to develop projects that are economically sustainable. One definition is that the project should not compromise the ability of the descendants of communities to make choices in the future. De Beers has not solicited input from the NSMA on its vision of and goals for sustainable economic development in the North Slave Region.

There should be a technical session to be devoted to hearing from government, industry, communities, and other stakeholders about their vision of and goals for sustainable economic development.

### **Why is it an issue?**

Sustainable economic development is an explicit purpose of EA practice, but no discussion about what each stakeholder envisions has occurred.

### **How the Resolution adds value to the EA**

A technical session on the sustainable economic vision of each stakeholder will help build consensus about the direction of development in the region. The sharing of visions will allow for coordinated planning and clearer statements of objectives.

### **Who can best respond to the issue**

The MVEIRB should host a session for stakeholder discussion.

## **9. Confirmation of Production Rate and mine life**

### **What is the issue?**

De Beers indicates in its EA that production rates (TPD) may increase if additional resources are located. DIAND and myself issued a number of IRs requesting confirmation of production rates. De Beers's responses do not adequately address these IRs. As GLL notes in section 4.1 of their 1 November 2002 report to the MVEIRB, "changes to the production rate have impacts on the mine life, socio-economics of the project and the proposed site facilities."

### **Why is it an issue?**

The NSMA requires a solid commitment to TPD and mine life in order to develop long-term strategies for members' education, training, etc. Many of these members are currently very young and their economic and education choices must be built on a solid understanding of mine life, otherwise their life choices are compromised. "Boom and bust" scenarios have historically compromised the economic stability of the North. The NSMA has expressed concern that other diamond mines in the region have changed their predicted TPD, creating considerable uncertainties and deviations from impact predictions and mitigation strategies. The NSMA has expressed the position that potential mine life be maximized in order to sustain the most potential for economic development, diversification, and skill and employment development, and other opportunities for the NSMA membership and the NWT in general.

### **How the resolution**

I concur with GLL's statement that, "confirmation of the production rate will provide more certainty and less conjecture to the components of the project being considered in the EA."

### **Who can best address this issue?**

De Beers.

**Figure 1.**

Community	Education rates													
	Core DIAND funding	Physical community	Unemployment rate	< grade nine	High school certificate	University degree attained								
NSMA	no	no	22%	23%	63%	14%	Average Income	\$36,568	TBD	15%	88% <sup>oo</sup>	Participation in traditional activities	17%	Dwellings needing major repairs
Lutselk'e	yes	yes	28.4%	29.5%	36.5%	4.9%	\$21,053	10	10	o	73.8%*	30.9%	58.6%	31.5%
Rae-Edzo	yes	yes	46.5%	31.4%	43%	3.1%	\$22,445	26	26	o	24.7%*	48%	47.2%	48%
Gameti	yes	yes	42.7%	51.9%	23.3%	1.1%	\$21,888	11	11	o	42.9%*	31.5%	17.5%	7.3%
Wha Ti	yes	yes	32.9%	34.5%	37.7	7.7	\$20,876	5	5	o	66%*	48%	47.2%	48%
Wekweti	yes	yes	35.6%	34.2%	30.6	10.8	N/A	7	7	o	71.2%*	47.2%	47.2%	48%
Detah	yes	yes	24.7	33.6%	38.8	N/A	N/A	N/A	N/A	o	49.3%*	17.5%	17.5%	7.3%
Yellowknife	N/A	N/A	7.9	3.6%	33.3%	19.7%	\$42,455	1,146	1,146	21.9	40.4%*	7.3%	7.3%	7.3%

<sup>o</sup> The number of community members who speak a native language is available in De Beers' EA (section 5.2) and the GNWT labour force survey, but the nature of the data does not allow for percentages. It may be estimated from the GNWT labour force survey that 40.7 to 94.5% of persons in

these communities speak an aboriginal language.

<sup>oo</sup> NSMA traditional activities include hunting, fishing, trapping, and arts and crafts.

\*\* Data on the traditional activities of these communities is for hunting and fishing only and may be higher when trapping and arts and crafts are included.

# Watershed Writing

J. Michael Thoms  
5472 Laburnum Ave.  
Powell River, BC  
V8A 4M8  
Phone: (604) 414-0017

13 November 2002

To: The MVEIRB

I am a social science researcher with experience conducting research about aboriginal communities. In the past, I have conducted research on aboriginal social, health, economic, and cultural issues through funding from various First Nations, Health Canada, Corrections Canada, and DIAND. I have also made contributions to the academic literature. I have a BA from the University of Toronto, a MA in Native Studies from Trent University, and am near the completion of a PhD at the University of British Columbia.

The North Slave Metis Alliance (NSMA) requested I review the DeBeers' EAR and related Information Responses (IRs) to identify the social, cultural, and economic impacts the NSMA is predicted to experience and assess the likelihood or certainty that DeBeers' proposed mitigation measures will offset these effects. In my opinion, the DeBeers' EAR and IR process contain substantive problems and I am unable to provide the NSMA with the information it requires to fully assess the impact this development will have on its community. My comments contain general references to the duty to consult. However, I expect those issues will be more fully canvassed by NSMA's legal counsel.

I appreciate that the MVEIRB and De Beers requested very specific and focused questions. I have made an effort to do so, but must stress that many of the issues I identify are not questions of interpretation of specific datasets, but represent concerns with De Beers' fundamental methodology, and in some cases, the complete absence of data. These methodological issues are appropriate issues to be reviewed at the technical sessions. If DeBeers wishes to provide the NSMA with the social science literature it has relied on, I am willing to review that material and be prepared to comment on it at the technical sessions.

As requested, I present each issue in the format suggested by Gartner and Lee Limited (GLL). I also wish to add that I concur with the socio-economic issues identified by GLL in sections 3, 4, and 6 of its 1 November 2002 report and will participate in these technical discussions.

At the MVEIRB pre-technical hearing on 8 November 2002, I raised additional issues not reviewed here concerning NSMA heritage resources and TK. De Beers committed to specific resolution measures at the meeting, so I will not repeat them here. However, until those commitments are fulfilled, these issues remain a concern and may require discussion at the technical sessions.

J. Michael Thoms

## **1. The existing social, cultural, and economic environment of the NSMA**

### **What is the technical issue?**

De Beers did not describe the existing social, cultural, and economic environment of the NSMA in its EAR. To help address this gap, the NSMA provided De Beers with data on its demography, employment levels, education, skills, and community infrastructure conditions. De Beers has not analyzed this data to build a baseline of the existing NSMA environment.

### **Why it is an issue?**

The description of a community's "existing" social, cultural, and economic environment is the first step in any socio-economic impact assessment (SEIA). This is the base of knowledge about a community from which predictions about impacts are based, mitigation is proposed, and monitoring protocols are established. Without baselines, a community's abilities to absorb change cannot be understood, mitigation measures cannot be tailored specific to that community, and changes in the community's socio-cultural and economic well being cannot be traced.

### **How the resolution of the issue adds value to the EA?**

The construction and analysis of NSMA baseline data contributes knowledge regarding the existing environment of the NSMA, a current gap in the EAR. This baseline data forms the foundation for impact prediction, monitoring, and mitigation.

### **Who can best respond to the issue?**

De Beers, in co-operation with the NSMA.

## **2. Predicting social, cultural, and economic impacts**

### **What is the technical issue?**

De Beers claims that “impacts to each community cannot be predicted” and thus treats all aboriginal communities, separated by geography, culture, economic, and social conditions, as a homogenous group with the same potential capacity to absorb change (EAR section 5.3.3.1). I do not accept this proposition. In figure 1, I have assembled the conventional indicators of community wellness and cultural well being for the affected aboriginal communities from data in the EAR, the GNWT report “Communities and Diamonds”, and NSMA data. It can readily be seen that education, unemployment, aboriginal language retention levels, and other key indicators, vary sharply. From this basic observation, it should be clear that each community’s capacity to absorb change differs.

It is noted in the data in figure 1 and the data report submitted to De Beers that the NSMA is at a particular disadvantage to absorb change because, unlike other communities, it does not possess a physical community boundary and core DIAND funding. The EA process must assess the different capacities of the NSMA to absorb change and make impact predictions based on this community’s specific conditions.

### **Why this is an issue?**

The fundamental purpose of SEIA is to assess and predict impacts based on the best available data so that communities can prepare for, and develop strategies to cope with change. The current information in the EA does not attempt to do this for the NSMA. De Beers’ methodology to treat all communities as the same for the purposes of impact predictions is invalid. De Beers has access to the community-specific data necessary to make impact predictions at the level of the community and should conduct this analysis.

### **How resolution of this issue adds value to the EA?**

There is no certainty that the ability of the NSMA to adapt to change has been assessed and no certainty that the general impact predictions are valid in respect to the unique capacities of the NSMA. Confidence in the impact predictions may be possible if the community-specific data available for NSMA is properly analyzed.

### **Who can best respond to this issue?**

De Beers, in co-operation with the NSMA.

### **3. Impact mitigation**

#### **What is the issue?**

In its EAR, De Beers commits to implementing specific mitigation measures, where necessary, with each community. De Beers further states that some mitigation measures will require government partnerships. However, the failure to predict the specific impacts on the NSMA prevents any informed development of the mitigation measures necessary for the NSMA to adapt to changes and make the most positive opportunities from development. In short, the general mitigation proposals in the EA are vague and not based on valid impact predictions. In addition, it is not known to what degree government is committed to the partnerships proposed by De Beers.

#### **Why is this an issue?**

The NSMA has a different capacity to absorb and adapt to changes than other aboriginal communities. Mitigation measure must be implemented at the level of the community. Only once the NSMA baseline data is analyzed and community specific impact predictions are made, can specific and focused mitigation measures be developed. Government commitment to mitigation partnerships is unknown.

#### **Why does the resolution of this issue at value to the EA?**

Mitigation is a fundamental component of SEIA. There must be certainty that the proposed mitigation measures are sensitive to the unique vulnerabilities and capacity of the NSMA to absorb change. Improper mitigation compromises a community's cultural survival.

#### **Who can best respond to the issue?**

De Beers, the Government of Canada and the Government of the Northwest Territories, in co-operation with the NSMA.

#### **4. Monitoring social, cultural, and economic change**

##### **What is the issue?**

De Beers' EA does not adequately address questions about the monitoring of social, cultural, and economic change. This monitoring must be grounded in community baseline data. Questions as to who will control and manage community baseline data have not been addressed: will De Beers, the GNWT, or each community control the data? What indicators will be monitored? How will confidentiality be protected? What funding will De Beers provide for ongoing community-based monitoring of indicators selected by the communities? Given that Census Canada and GNWT labour force survey do not discern the Metis society, how will this information gap be remedied?

##### **Why is this is an issue?**

A monitoring system that will detect changes in the NSMA members' cultural, social, and economic status that can inform adaptive management strategies needs to be developed.

##### **How does resolution of this issue add value to the EA?**

Monitoring is a fundamental aspect of EA and must be resolved before project approval.

##### **Who can best respond to the issue?**

De Beers, in co-operation with the NSMA .

## **5. The adequacy of public consultation**

### **What is the issue?**

In addition to concerns about whether government and De Beers are meeting their obligations pursuant to the duty to consult, I am concerned about the adequacy of public consultation and whether De Beers followed its expressed methodology. I am concerned that De Beers' identification of public consultation input is selective to only certain issues and not representative of all input.

In IR 2.5.3, the GNWT asked De Beers to provide citations for, among other terms, "triangulation". De Beers provided the following definition of triangulation: "process for ensuring reliable qualitative analysis; categories and themes that emerge from the qualitative data are compared against other case studies, professionals' judgment, and brought back to the original first-hand source (e.g. interview participants) to verify the validity of the findings." Further, throughout its EAR section 5, De Beers states that it verified aboriginal issues and concerns with the first-hand source, a key tenet of its triangulation methodology. Yet, De Beers did not document all information received during its consultations with the NSMA and has not acted on some issues identified in appendix IV.1-1 (its list of public concerns). Further, in IR 2.5.5, De Beers indicates that it, "did not verify all records of meetings". In lieu, De Beers states that it provided a "record of consultation" in the Snap Lake Diamond Project Scoping Document submitted to the MVEIRB and that this scoping document was widely distributed and that no contradictions were raised. I do not consider this verification method to meet the standards of "triangulation" or good social science research. It is not clear that all public concerns have been documented and verified with the producers of the concerns – a standard EA practice and a goal De Beers set out for itself.

### **Why is this an issue?**

Public consultation and the documentation of public concerns is a fundamental tenet to EA practice. There must be certainty that this process was rigorously followed, is verifiable, and led to considerations of alternatives to project design.

### **How resolution of the issue adds value to the EA**

Until the adequacy of the public consultation process is reviewed, and there is certainty that all public concerns are documented and verified, the reviewers of the project proposal can have no certainty that all public issues are accurately before them.

### **Who can best respond?**

DeBeers.

## **6. Project Design**

### **What is the issue**

The purpose of public consultation is not only to hear and document concerns but also to use this information to adapt project design. De Beers and both levels of government are also required, pursuant to the duty to consult, to make good faith efforts to accommodate the concerns raised by Aboriginal communities. Section 2.2.1:viii of the TOR, require DeBeers to show how consultation “affected the design of the project”. In *Can't Live Without Work*, the NSMA listed a series of concerns about the potential effects of mining on the NSMA and made a series of recommendation about how these potential effects can be mitigated through adaptations in the design of a project. In IR 3.11.1 (f) I asked for details on how “requested or suggested project changes” listed in *Can't Live Without Work* were addressed. DeBeers responded that, “the terms of reference do not require DeBeers to specify impacts related to each primary community separately.” My concern is De Beers had within its hands information on how to adapt their project to address Metis concerns, but instead of doing so, it chose not to add this value to the EA. Further, neither the federal nor the territorial government have taken steps to accommodate these concerns.

### **Why is this an issue?**

This is an issue because an analysis of this information can lead to improved project design and is required in the ToR. Further, the obligations of government and De Beers pursuant to their duty to consult go beyond the ToR.

### **How resolution of the issue will add value to the EA?**

A complete consideration of NSMA recommendations about project design, based on the memberships' long experiences with mining, employment, and other activities in the North, brings invaluable insight into project design. Further, if government and De Beers do not meet their obligations pursuant to the duty to consult, the entire EA process is jeopardized.

### **Who can best respond to the issue?**

De Beers, the Government of Canada and the Government of the Northwest Territories.

## **7. Resource Use, Spatial Boundaries, Assessment of the Maximum Zone of Influences, and Cumulative Effects.**

### **What is the issue?**

The spatial boundaries for predicting the impacts on various NSMA valued ecosystem components (VECs) are invalid. Impacts on traditional land use (fisheries) practices of the NSMA have not been assessed. The map in figure 2 documents the traditional fishing places proximal to Yellowknife of a small sample of Métis fishers. De Beers did not identify these critical food and cultural fisheries in its component on “existing resource use”.

As the non-Native population has increased in Yellowknife, Métis traditional knowledge holders have observed significant cumulative impacts on these fisheries from recreational non-Native fishing. Further, in IR 2.1.3, De Beers implies that these lakes will experience increased recreational pressures from off-work De Beers employees, but no impact analysis is offered. Impacts on these fisheries need to be included in De Beers’ assessment of the maximum zone of influence of its development. The existing RSA (illustrated) is not adequate for an assessment of these impacts. These impacts are within a definition of the zone of maximum environmental impacts induced by the development as the employees are associated with the development and population increase is one outgrowth of the development.

### **Why this is an issue**

The NSMA depends on these fisheries for food and cultural traditions. Members of the NSMA have an intimate knowledge of these lakes and NSMA TK holders indicate that these lakes cannot sustain increased angling pressures. The loss of these fisheries is irreversible and will be a significant impact on the culture and economy of the NSMA and limit the choices of future generations of Métis. Assessing and mitigating impacts on these traditional fisheries is fundamental to the cultural and economic well being of the NSMA. The MVEIRB has a duty to consider the TK input of the NSMA. Spatial boundaries must be designed to assess impacts on a specific VEC under analysis and in some cases, cannot be localized to a single RSA.

### **How the Resolution of the issue adds value to the EA**

De Beers implies that these fisheries will be affected by their development. Until this effect is analyzed and mitigation and monitoring measures implemented, there is no certainty that a traditional component of the NSMA’s existing resource use and cultural and economic well-being will not be adversely impacted.

### **Who can best respond to the issue?**

De Beers.

## **8. Sustainable economic development**

### **What is the issue?**

The objective of EA practice in Canada is to develop projects that are economically sustainable. One definition is that the project should not compromise the ability of the descendants of communities to make choices in the future. De Beers has not solicited input from the NSMA on its vision of and goals for sustainable economic development in the North Slave Region.

There should be a technical session to be devoted to hearing from government, industry, communities, and other stakeholders about their vision of and goals for sustainable economic development.

### **Why is it an issue?**

Sustainable economic development is an explicit purpose of EA practice, but no discussion about what each stakeholder envisions has occurred.

### **How the Resolution adds value to the EA**

A technical session on the sustainable economic vision of each stakeholder will help build consensus about the direction of development in the region. The sharing of visions will allow for coordinated planning and clearer statements of objectives.

### **Who can best respond to the issue**

The MVEIRB should host a session for stakeholder discussion.

## **9. Confirmation of Production Rate and mine life**

### **What is the issue?**

De Beers indicates in its EA that production rates (TPD) may increase if additional resources are located. DIAND and myself issued a number of IRs requesting confirmation of production rates. De Beers's responses do not adequately address these IRs. As GLL notes in section 4.1 of their 1 November 2002 report to the MVEIRB, "changes to the production rate have impacts on the mine life, socio-economics of the project and the proposed site facilities."

### **Why is it an issue?**

The NSMA requires a solid commitment to TPD and mine life in order to develop long-term strategies for members' education, training, etc. Many of these members are currently very young and their economic and education choices must be built on a solid understanding of mine life, otherwise their life choices are compromised. "Boom and bust" scenarios have historically compromised the economic stability of the North. The NSMA has expressed concern that other diamond mines in the region have changed their predicted TPD, creating considerable uncertainties and deviations from impact predictions and mitigation strategies. The NSMA has expressed the position that potential mine life be maximized in order to sustain the most potential for economic development, diversification, and skill and employment development, and other opportunities for the NSMA membership and the NWT in general.

### **How the resolution**

I concur with GLL's statement that, "confirmation of the production rate will provide more certainty and less conjecture to the components of the project being considered in the EA."

### **Who can best address this issue?**

De Beers.



**Documented Traditional North Slave Metis Fisheries**

-  Communities
-  Yellowknife
-  Fishing Grounds
-  De Beers Exploration Site
-  De Beers RSA
-  Rivers
-  Lakes

Created on Nov 12, 2002  
 Prepared for the NSM/A by Kris Johnson.

**Louie Azzolini**

---

**From:** Ramsey, John [jramsey@NRCan.gc.ca]  
**Sent:** Thursday, November 14, 2002 2:22 PM  
**To:** Louie Azzolini; Robin Johnstone (E-mail)  
**Cc:** Burgess, Margo; Hogan, Charlene; Clausen, Scott  
**Subject:** SNAP LAKE - NRCAN TECHNICAL ISSUES.WPD



SNAP LAKE -  
CAN TECHNICAL I.

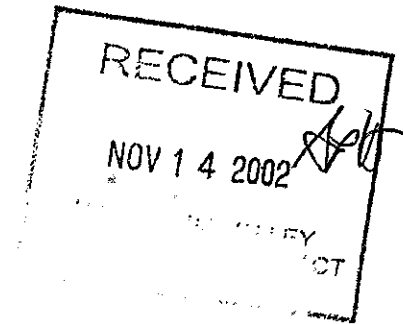
Louie and Robin,

Please find attached a list of the issues that Natural Resources Canada wishes to have discussed at the Technical Sessions.

Thank you.

John Ramsey  
Senior EA Officer  
Office of Environmental Affairs  
tel: (613) 947-1591  
fax: (613) 995-5719  
amsey@nrca.gc.ca

<<SNAP LAKE - NRCAN TECHNICAL ISSUES.WPD>>



#### **4. Mine Inflow: Uncertainty and Sensitivity**

*What is the issue?* Uncertainty estimates for parameters used in groundwater influx model have unrealistically low standard deviations (e.g. hydraulic conductivity).

*Why is this an issue?* May lead to underestimates of groundwater inflow.

#### **5. Mine inflow: Leakance factors**

*What is the issue?* Selection of parameter values for leakance formulas are too ad-hoc. More physically-based and defensible formulas are required for leakance.

*Why is this an issue?* The leakance is the most important parameter affecting modeling of groundwater influx to the mine.

### **North Lakes Water and Sediment Chemistry/Quality**

*What is the issue?* Proponent has discounted i) potential for lake thermal stratification, ii) fluctuations in dissolved oxygen content in water column, and as a result iii) fluctuations in oxygen penetration depth into sediments. Data available do not support i), seasonal measurements are lacking to support 2), and potential consequences of ii) have not been considered for metal mobility. Potential effects of shifting redox boundary cannot be ignored. Need for DeBeers to comment on:

- (1) the potential for thermal lake stratification and the consequences for water quality;
- (2) the possibility that DO profiles in the water column may shift seasonally with oxygen penetration into the sediments in summer and hypolimnetic anoxia under ice cover in winter; and
- (3) considerations of potential metal mobility through early diagenesis and possible factors affecting both the sequestration of metals into the solid phase and their release into the aqueous phase (both in pore water and the overlying water column).

*Why is this an issue?* Water quality

### **Water quality - acid precipitation effect on run-off from terrain in entire watershed**

*What is the issue?* Proponent has limited the assessment of acidic precipitation to

should be considered in the analysis over the length of the project and beyond. Increased seepage resulting from permafrost thaw in turn can enhance thermal disturbance (feedback effect) leading to further thaw and seepage.

*Why is this an issue?* Potential for increased size of zones of seepage and additional seepage to mine.

***b) Impact of roads, airstrip, mill and ancillary facilities on ground thermal regime***

*What is the issue?* Magnitude of changes to ground thermal regime associated with the construction/operation of the above facilities/infrastructure, including consideration of climate change, has not been indicated.

*Why is this an issue?* May affect, active layer thickness, permafrost thaw, and hence affect level of terrain disturbance as well as drainage changes.

***c) Impact of Water Management Pond***

*What is the issue?* No consideration/estimate of the impact of expansion of the pond on the ground thermal regime and the size of the talik beneath. Also climate change impacts on talik size and dam performance not considered.

*Why is this an issue?* Affects talik size; warmer conditions could lead to larger taliks which in turn could lead to increased seepage from the WMP.

**3. Aggregate use - evidence for massive ground ice / impacts**

*What is the issue?* EA documentation provides evidence for massive ground ice in eskers to be used for aggregate, however this does not seem to have been considered in impacts of the aggregate extraction. Is there other evidence, for example, geophysical surveys or borehole data that would support a conclusion that massive ice is not a concern? Note: a further report that has been referenced is now requested to help complete the review on this issue: report needed is Golder (2000) referred to in Golder et al. 2001 Surface Engineering Optimization Study Geotechnical Factual Report.

*Why is this an issue?* Affects determination of terrain disturbance related to ground thaw, also may affect estimates of aggregate.

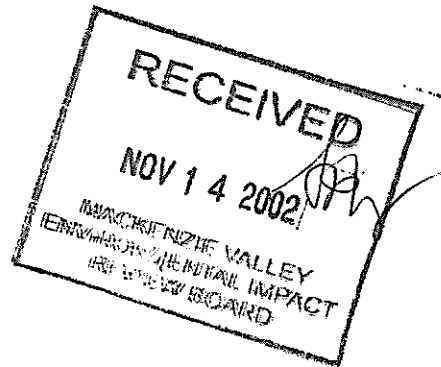
**4. Climate impacts on Contwoyto winter road(s) and other winter access**

BDY1.TXT

Louie: Attached is RWED's wildlife technical issues paper. It should be noted that this list of issues does not include other participants' issues such as the Dogrib Treaty 11, North Slave Metis Alliance and others. It is intended to provide a format for the wildlife session that will allow other participants the opportunity to raise issues that we have not identified. Other wildlife issues that have been identified need to be included. As well, I am recommending that issues such as reclamation and revegetation be included although RWED will not necessarily be addressing these issues in the technical sessions.

If you have any questions about the attached, please give me a call.

Steve (873-7775)



## Wildlife and Wildlife Habitat Technical Issues

Wildlife and Fisheries Division would like to recommend that the Wildlife and Wildlife Habitat Session be held in one of the communities outside of Yellowknife. In addition to the issue topics that will be on the agenda, there needs to be adequate time set aside for community people to raise general wildlife issues that have not been identified prior to the workshop session.

To facilitate the efficient and effective use of individual wildlife experts, Wildlife and Fisheries would like to have this technical session organized by species and groups as follows.

- 1) Caribou
- 2) Grizzly Bears
- 3) Wolverine
- 4) Wolves
- 5) Birds (i.e. waterfowl, upland birds and raptors)
- 6) Vegetation/Habitat
- 7) Reclamation and Revegetation

*This would/ have should  
have been completed by  
the birds.*

Within each of the species/topics listed above, the following issues are given for discussion in the technical session by participants.

- a) Adequacy of baseline information
- b) Use of existing studies and literature
- c) Valued Ecosystem Components and other species
- d) Study design and assessment methodology
- e) Cumulative effects
- f) Mitigation, management and monitoring

Issues a) through f) are discussed below.

### a) Adequacy of Baseline Information

#### *What is the Issue?*

The results of wildlife surveys represent three years of baseline information. It is questionable whether there is sufficient baseline information upon which to base impact predictions given the design of the studies.

Problems with the spatial and temporal boundaries of the wildlife studies need to be addressed.

#### *Why is it an Issue?*

Lack of complete baseline data means that assumptions about impacts may not be defensible over the long term.

Problems with spatial and temporal boundaries of the studies will affect study results and conclusions.

Lack of baseline information on wildlife species increases the uncertainty in assessing impact predictions.

*How will resolution of this issue add to the EA?*

Adequate baseline data is essential to assess wildlife impacts. Uncertainty in assessing impact predictions must be addressed with limited baseline data. Monitoring programs need to be designed to address gaps in baseline data and address the uncertainty associated with impact predictions.

#### b) Use of Existing Studies and Literature

*What is the Issue?*

The Environmental Assessment does not use make use of all existing studies (e.g. BHP and Diavik monitoring studies) and available literature in the assessment of project impacts.

*Why is this an Issue?*

An incomplete use of existing current studies and literature suggests that the results, conclusions and impact predictions are questionable. Confidence in impact predictions is also questionable.

*How will resolution of this issue add value to the EA?*

This information is necessary in order to conduct a complete assessment of the impacts on wildlife.

#### c) Valued Ecosystem Components and other species

*What is the Issue?*

The proponent uses Valued Ecosystem Components in its approach to environmental assessment. This approach does not include some wildlife species, such as prey species.

*Why is this an Issue?*

The inclusion of prey species in the environmental assessment would provide a more ecological approach to the environmental assessment.

*How will resolution of this issue add value to the EA?*

An ecological approach to the EA, including prey species and their linkages, would lead to a more thorough assessment of impact predictions, and the need for mitigation and monitoring programs.

#### d) Study design and assessment methodology

*What is the Issue?*

Issues have been identified for some of the wildlife studies conducted during the baseline investigations. These include number of years of data, survey timing and technique, spatial and temporal boundaries, assessment methodology, etc.

*Why is it an Issue?*

Issues pertaining to study design and assessment methodology will affect the outcome of the studies and the impact analysis.

*How will the resolution of this issue add value to the EA?*

Resolution of this issue will lead to more confidence in the impact predictions.

#### e) Cumulative effects

*What is the Issue?*

The methodology used in the assessment of cumulative effects pertaining to wildlife is not clear. The use of models and other innovative approaches to cumulative effects assessment appears to be lacking.

*Why is it an Issue?*

It is not clear whether an adequate assessment of the cumulative effects on wildlife has been conducted.

*How will resolution of this issue add value to the EA?*

Cumulative effects assessment is required for this EA. Cumulative effects need to be assessed using current methodologies that result in adequate levels of confidence in impact predictions.

f) Mitigation, management and monitoring

*What is the Issue?*

Waste management practices, on-site wildlife management plans and monitoring programs lack sufficient detail to ensure that project impacts will be minimized.

*Why is this an issue?*

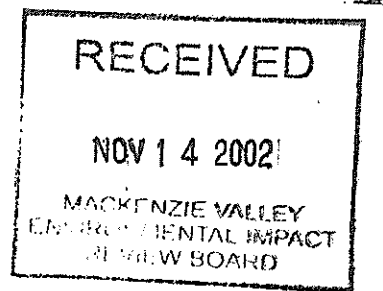
Without details on these issues, the risk of human-wildlife interactions increases. The proponent needs to be proactive to minimize wildlife attractants, minimize the potential for human-wildlife encounters, and reduce the risk of injuries or death to wildlife. Monitoring programs are needed to assess project impacts and determine the effectiveness of mitigation.

*How will resolution of this issue add value to the EA?*

Information on policies, plans and procedures pertaining to these issues are needed to ensure that wildlife impacts will be minimized. Sufficient detail is required to ensure there is both the intent and commitment to address these issues in other documents (e.g. Environmental Management System).

November 14, 2002

Mr. Louie Azzolini  
Environmental Assessment Officer  
Mackenzie Valley Environmental Impact Review Board  
Box 938, 5102-50th Avenue  
Yellowknife, NT  
X1A 2N7



**Re: Rationale for Technical Issues for the Technical Sessions, De Beers Snap Lake Diamond Project**

Dear Mr. Azzolini:

Please find attached a list and description of additional issues by Indian and Northern Affairs Canada (INAC), that warrant further discussion in the upcoming Technical Sessions.

These issues are intended to provide further clarification in support of the outstanding issues and rationale submitted at the Pre- Hearing Conference and to allow De Beers to prepare for the technical sessions.

We trust that this submission meets the MVEIRB's requirements. Should you require further assistance please do not hesitate to contact me at 669-2616 or Fraser Fairman at 669-2587

Sincerely,

Tamara Hamilton  
Environmental Scientist  
Environment and Conservation

# **Water Resources DeBeers Review Team**

## **List of Topics and Issues for the**

### **MVEIRB EA Technical Sessions**

#### **Water Quality and Quantity**

Evaluation of the potential impacts of the Snap Lake Diamond Project requires a detailed understanding of baseline environmental conditions in the vicinity of the proposed mine site, of the effects of mine construction and operations on the physical and chemical characteristics of aquatic ecosystems, and of the biological responses to changes in environmental conditions. \*Indian and Northern Affairs Canada has reviewed the information presented in the Environmental Assessment (EA) report and identified a number of key issues related to water quality and quantity, including:

- Although DeBeers Canada Mining Incorporated (DCMI) have generated a substantial quantity of baseline data, insufficient information is available to fully characterize pre-development water quality, sediment quality, and biological conditions. (This information shortfall renders uncertain the predicted effects of mining activities on environmental conditions in the vicinity of Snap Lake);
- Although DCMI have developed site-specific benchmarks for assessing the potential effects of mining activities on water quality conditions in the vicinity of Snap Lake, the methods that were used to derive the benchmarks were not consistent with the procedures that have been established by the Canadian Council of Ministers of the Environment (CCME). Application of different procedures or different assumptions could have results in lower benchmarks than were used in the EA. Accordingly, the conclusions reached regarding the potential impacts of mining activities could have been different. Therefore, the influence of applying alternate procedures and assumptions should be evaluated;
- DCMI has developed criteria for assessing the potential impacts of mining activities (i.e., as negligible, minor, moderate, or major) based on arial extent of exceedances of various effects thresholds (e.g., HC20 values). Application of different criteria for assessing impacts would likely have substantially altered the results of the EA. Therefore, the influence of applying alternate assessment criteria should be evaluated;
- The results of the INAC evaluation of the information contained in the EA and supplemental reports suggests that the levels of several water quality variables (e.g., total dissolved solids, and phosphorus) could be higher than predicted in the effluent discharged from the mine site. In addition, the effluent is unlikely to fully mix with the water in Snap Lake until break-up and perhaps much later (if at all). Therefore, the concentrations of these substances in Snap Lake are likely to be higher than predicted in portions of the lake (i.e., deeper areas) and, consequently, are likely to result in greater than predicted effects on ecological receptors. Therefore, the impacts of higher than anticipated levels of certain water quality variables need to be evaluated;

- Recently collected data from the North Lakes study suggests that the levels of phosphorus in groundwater are higher than were predicted in the EA. Since no measures were proposed in the EA to reduce releases of phosphorus to Snap Lake, it is likely that the loadings and concentrations of phosphorus in Snap Lake are likely to be substantially higher than predicted. Therefore, the impacts of higher than anticipated levels of phosphorus on the trophic status of Snap Lake and dissolved oxygen levels under ice need to be evaluated;
- The EA was conducted, in part, using the Canadian water quality guidelines. While this is appropriate for many of the water quality variables considered, the WQGs for ammonia do not consider the toxicity of the ionized ammonia fraction. Consequently, the WQGs are likely to underestimate the effects of ammonia at low temperatures and pHs. Therefore, the impacts of ammonia releases on ecological receptors should be re-evaluated using more conservative benchmarks;
- Recently collected data from the North Lakes study suggests that the levels of total dissolved solids (TDS) are likely to be higher than were predicted in the EA report. In addition, the evaluation of the effects of TDS releases from the mine on the structure of aquatic communities were not evaluated. Therefore, the impacts of TDS releases on ecological receptors should be re-evaluated.

The De Beers EA Report assumes that connate groundwater quality is represented by the average values determined from the aquatic effects program. This connate groundwater quality is mixed with Snap Lake inflows, and to a much lesser degree other water and chemical sources in the mine, on a time-varying basis, to determine the average quality of mine water discharge to Snap Lake. This mine water discharge is added to Snap Lake via the diffuser and is assumed to mix completely within the fixed Effective Lake Volume to yield average Snap Lake water quality. There is a cycling effect whereby, the mine water discharge that mixes with Snap Lake water becomes recharge water to the underground workings, which in turn mixes with connate groundwater to become new mine water discharge. For the simple case of fixed Lake water and connate water fractions, and no other temporal varying water or chemical sources, this water cycling should result in increased concentrations of ions in Snap Lake water over time.

There are two issues or concerns that could lead to much higher concentrations within Snap Lake than has been calculated and described in the EAR.

- 1) higher concentrations and dissolved chemical loading from connate groundwater to mine water discharge; and
- 2) incomplete mixing within the Effective Lake Volume of Snap Lake.

### **Higher Connate Water Concentrations and Chemical Loading**

Review of the AEP groundwater quality in summary Table Q-1 shows that there is a pronounced profile

of increasing salinity with depth in the granite bedrock to depths of 168 metres. Chloride concentrations (surrogate for TDS and other major ions) in the deepest granite samples (125 to 165 metres depth range) average 500 to 600 mg/L, although a couple of samples had lower concentrations at 121 and 248 mg/L. In assessing representativeness of AEP granite groundwater samples for selection of connate water quality in the GoldSim calculations it is appropriate to use the higher concentrations. Lower concentration samples are often not representative due to drill water and shallow groundwater/Lake water inflow dilutions. Since the deepest groundwater samples are only from a depth that is less than half the expected mine depth and salinity increases with depth, it not unreasonable to assume that the granite groundwater concentrations at 200 to 400 m depth will be much higher than the 330 mg/L used in the GoldSim calculations. Chloride concentrations in the bottom half of the mine could well approximate much more than the 600 mg/L measured at 165 m depth and that average connate groundwater concentrations over the entire mine depth would likely be at or above 600 mg/L chloride.

Data from the recent North Lakes investigations also provides corroborating evidence as to probable connate groundwater chemistry. The groundwater samples from wells MW02-05 (depth 110 to 130 m) and MW02-03 (depth 190 to 215 m) show average chloride values of about 380 mg/L and 610 mg/L, respectively. These chloride concentrations are consistent with the inference above that chloride concentrations in connate groundwater will be much greater than the 330 mg/L assumed in the GoldSim modeling.

Considering up-welling effects, the average connate groundwater concentration could easily increase to more than 960 mg/L (i.e., by applying De Beers conclusion from the FEFLOW modeling, that average concentrations would increase by 60%). Predicted connate groundwater inflows and loading to the mine were not determined with the FEFLOW modeling, but presumably were quantified with MINEDW. Since MINEDW has an overly restrictive impermeable basal boundary condition at 125 m below the mine, there is potential that inflow rates, and hence chemical loading to the mine from connate groundwater may be underestimated.

Data from the Diavik project also indicates that higher connate groundwater concentrations should be used in GoldSim modeling. Based on De Beers Figure 2.4.14-1, (a log TDS vs depth plot), a chloride concentration of about 900 to 1000 mg/L would be expected at about 400 m depth. However, connate groundwater at Snap Lake appears to have higher concentrations than that at Diavik.

Consequently, mine water chloride concentrations could be about 3 times higher than predicted in the EA Report. The impact of such increases in major (and minor ion, e.g. phosphorous) concentrations in mine water are, of course, determined with GoldSim. The existing GoldSim runs in the EAR only assume a connate groundwater chloride concentration of 330 mg/L. It would be helpful to run GoldSim assuming more representative concentrations for connate groundwater to assess impact to Snap Lake. I would suggest 600 and 900 mg/L chloride and correspondingly increased values for key major and minor ions (e.g., phosphorous).

### **Incomplete Mixing Within the Effective Lake Volume of Snap Lake**

The existing GoldSim model makes assumptions about complete mixing within the Effective Lake Volume of Snap Lake. Given the fact that mine water with higher TDS and higher density will be discharged to Snap Lake, there is potential for density separation and settling of mine water to the depressions within Snap Lake. Although such settling and limited mixing may be reduced by wind action on the Lake during the summer open water period, the degree to which this will occur is unknown because there is a lack of information on effects of currents on Lake mixing. During winter the degree of mixing is expected to be significantly reduced.

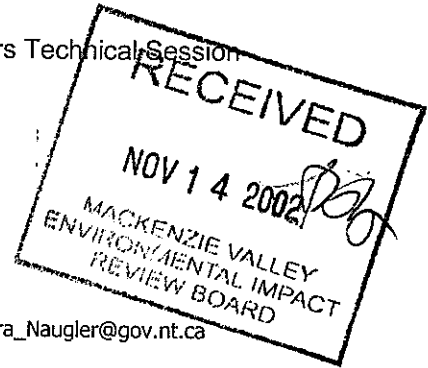
If significant density separation and incomplete mixing occurs, either seasonally or over a longer time period, there is potential that Lake water that recharges the mine will have increased concentrations, which would result in increased mine discharge water concentrations, and hence increased potential for loading to Snap Lake and increased potential for further density separation and settling.

To assess the consequences of this incomplete mixing it would be instructive to run GoldSim with a reduced mixing volume that would be representative of Snap Lake bathymetry and would consider the potential for density-driven settlement of mine water from the diffuser.

## Susan Hunt

---

**From:** Louie Azzolini  
**Sent:** Thursday, November 14, 2002 9:32 AM  
**To:** Susan Hunt  
**Subject:** FW: GNWT - Socio-Economic Submission for De Beers Technical Session



-----Original Message-----

**From:** Gavin\_More@gov.nt.ca [mailto:Gavin\_More@gov.nt.ca]  
**Sent:** Wednesday, November 13, 2002 6:20 PM  
**To:** Louie Azzolini  
**Cc:** Clay\_Buchanan@gov.nt.ca; Doris\_Eggers@gov.nt.ca; Sherry\_Lovely@gov.nt.ca; Tara\_Naugler@gov.nt.ca  
**Subject:** GNWT - Socio-Economic Submission for De Beers Technical Session



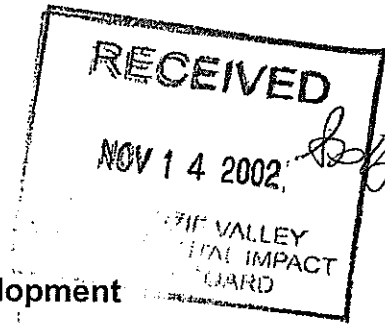
BDY.TXT (475 B) DeBeers  
Eco for Techni

## Rationale for Technical Issues

### Section 2.0 Environmental Protection Initiatives

#### Department of Resources, Wildlife And Economic Development

We concur with the issues raised during the pre-technical session conference regarding the need to discuss a number of environmental protection related issues as part of the Rationale of Technical Issues - De Beers Snap Lake Diamond Project. We also suggest moving **1.3.4 Waste Management** into this Technical Session for ease of discussion and organization of experts/session participants. Specific wildlife hazard issues can be discussed under the specific wildlife species topics.



no  
rationale.  
no specific  
issue.

Under the following sections we would like to add to the topics for discussion at the Environmental Protection Initiatives Technical Session.

### 2.1 - Air Quality and Emissions

#### IR Response Number:

#### What is the Issue?

Air quality modeling relies on a clear understanding of the emission sources and estimates. Furthermore, to determine the validity of the models predictions, reviewers require an understanding of the use of the emission information in the dispersion modeling (e.g. were seasonal variations accounted for). In addition, some contaminants of concern (e.g. SO<sub>3</sub>, CO, VOCs) and potential impacts on the receiving environment including visibility were not assessed. As details on downstream emission control equipment for point sources were not included, it is unclear if mitigation of emissions can be anticipated as part of the plant design. The assessment method and environmental consequence rating as applied by De Beers downplays exceedences of NWT and federal air quality standards, placing more emphasis on those of the US Environmental Protection Agency.

Current documentation lacks a discussion of the methods of mitigation that DeBeers may implement to manage noise and air emissions from the fresh air and exhaust raises. Furthermore, no continuous air and noise emission monitoring equipment were identified in the assessment for area's that exceed standards nor is there an indication of the locations, equipment and monitoring programs planned for the air and noise emissions.

Fugitive dust from several sources related to the mine will likely decrease air quality at certain time. De Beers does not discuss what methods will be developed to minimize/mitigate impacts from the airstrip, haul roads, North pile and mine openings.

### **Why is it an Issue?**

Air quality assessment relies extensively on modeling. To fairly assess and identify concerns, sources of emissions must be identified and used in the models. Furthermore, all parameters likely to occur should be assessed. It is also possible to abate pollution through engineering design of a facility. These opportunities will assist De Beers in mitigating concerns. It is also required for developers to monitor their emissions and air quality over time, both to document that their emissions are within acceptable standards as determined by regulators but also to determine problems that may arise.

### **How will the resolution of this issue add value to the EA?**

Resolving this issue will provide an assurance that the EA predictions around air emissions, noise emissions and fugitive dust are defensible and ensure that plans are in place for long term monitoring.

## **?.2 Adequacy of Mitigation – Contaminant Waste Management**

### **IR Response Number:**

#### **What is the Issue?**

De Beers has not developed a Waste Management Plan indicating what contaminants will be stored on site in perpetuity in the North pile, Waste Management Pond and the networks that connect these sites.

De Beers has indicated that the landfill sites have been reclassified from "mobile" to "temporary" landfill sites; a practice that does not meet GNWT standards. In the NWT, landfill sites must be developed with management plans for the life of the mine with monitoring for surface and ground water seepage.

De Beers proposal/response to landfarm hydrocarbon-contaminated soils from spills is a concern based on experience from similar practices in the north. Landfarming techniques presently used by other developers (8 years of operational experience) have not achieved remediation guidelines or acceptance to date. Encapsulating hydrocarbon-contaminated soils is not considered an acceptable remediation practice.

#### **Why is it an Issue?**

Contaminant waste management is a critical concern in the north. New projects should build on the experience gained by other developers. This should be applied in developing plans and practices that will achieve successful management of contaminants.

#### **How will the resolution of this issue add value to the EA?**

Resolving this issue will allow for better design and mitigation of contaminants and reduce the risk of long term problems.

## **?.2 Adequacy of Mitigation –Solid (Garbage) Waste Management**

**IR Response Number: 2.5.30, 2.2.12**

### **What is the Issue?**

The waste management practices (Section 10.4.2.4.4 of the EAR) lack details pertaining to protocol, policy and procedures. There are no details on implementation, training, waste collection, storage, disposal, incineration, contingency planning, etc.

To effectively manage waste from the initial establishment of camps and other facilities, a detailed plan and design of waste handling facilities is critical. This will reduce problems with environmental pollution and mitigate potential wildlife problems.

### **Why is it an Issue?**

Using a formalized and site-wide approach to waste management will help reduce problems with environmental pollution and mitigate potential wildlife problems. Such a plan puts De Beers in a pro-active position and fulfills requirements under waste management standards.

### **How will the resolution of this issue add value to the EA?**

By providing information on the policies and procedures associated with waste management, an assessment of the adequacy, efficiency and efficacy of the waste management program.

**DRAFT**

## **Rationale for Technical Issues**

### **Section 3.0 Social, Economic and Cultural Components**

**Department of Resources, Wildlife And Economic Development  
Department of Education, Culture and Employment  
Department of Health and Social Services**

We concur with the issues raised in this section of the Rationale of Technical Issues - De Beers Snap Lake Diamond Project. We also suggest that **6.1.2 Socio-Economic Categories of Analysis** and **6.3 Employment Predictions** be discussed as part of the Socio-Economics Technical Session for ease of discussion and organization of experts/session participants. This suggestion was supported by other interested parties during the Pre-Technical Session Conference.

**Under the following sections we would like to add to the topics for discussion at the Socio-Economic Technical Session.**

#### **3.1.2 Cultural Impacts**

**IR Response Number:**

##### **What is the Issue?**

De Beers has not directly mentioned the use of traditional languages when communicating with communities. Workers and families of workers from these communities may require regular communication in their traditional language.

##### **Why is it an Issue?**

The dominant language in most of the primary communities is Dogrib. De Beers' community efforts may not be successful without the recognition and use of traditional community languages in the planning and operational phases.

The effect of the absence of parents may be the loss of transmittal of traditional knowledge to younger generations. Over the longer term, this may affect the ability of future generations to maintain their cultural identity.

##### **How will the resolution of this issue add value to the EA?**

Verbal communication is an important part of the Aboriginal culture and tradition. With De Beers providing resources and people to help facilitate communication and learning within communities in traditional languages, the Aboriginal people and the mine will create a better working partnership.

The examination of the potential impacts of absent parenting may lead to the implementation of remedial methods of transmitting traditional knowledge.

DRAFT

### **3.1.2 Adequacy of Mitigation - Committed Training Programs**

**IR Response Number:** IR Response 1.39, Sections 3.9.1.3 & 5.3.4.2.4

#### **What is the Issue?**

The programs proposed by De Beers are not clearly defined. Many aspects of the training positions and programs are unclear, such as training leading to jobs. De Beers does not provide detail on other training programs that might be used to assist in developing a northern-based training program.

#### **Why is it an Issue?**

Without knowing the exact details on the initial programs which De Beers has committed to, reviewers are unable to predict if these programs will be successful in providing training and employment targeted at recruiting and retaining northerners for the mine.

#### **How will the resolution of this issue add value to the EA?**

This issue is important in determining if De Beers commitments towards the training and hiring northerners have been fully developed with the needs and adaptability of the northern population in mind.

### **3.1.2a Adequacy of Mitigation - Committed Positions**

**IR Response Number:**

#### **What is the Issue?**

When asked if De Beers were prepared to train future employees who are not local, De Beers responded that all employees would be hired locally. However, De Beers has identified that 50% of hires would be local and 50% would not. De Beers has not defined the criteria to determine if a potential employee is a local person. For example, are persons born in the north but living in southern Canada eligible as locals if they are interested in "repatriating" to the north? Secondly, does local mean a short term of residence in the north prior to being hired as compared to a person born locally and residing locally.

The available "labour pool" of northerners is likely overestimated given the variety of projects occurring in the NWT and assumptions on the willingness of northerners to work full-time. The analysis provided in Section 5.1.5.5 Causes and Effects of Socio-economic Impacts, pp. 5-26 assumes that all potential employees want to work full-time.

#### **Why is it an Issue?**

## **DRAFT**

Use of updated information will assist both De Beers and residents in determining where the potential labour force resides and where training efforts should be targeted.

Improvement the economy of the NWT through gainful employment is a concern to residents. It is unclear what "local hires" mean to employment opportunities of existing or former residents.

### **How will the resolution of this issue add value to the EA?**

The clearer definition of employment and development of hiring policy will assist northerners access gainful employment. The use of current labour statistics will assist De Beers in monitoring its progress in northern hiring in comparison to labour availability.

### **3.1.2.2 Adequacy of Mitigation - Partnership, Commitments and Accountability**

**IR Response Number:** 2.5.41 (a)

#### **What is the Issue?**

Comments related to established partnerships throughout Section 5 of the EA have alluded to partnerships and commitments that have been made. However it is unclear where the accountability lies with respect to these partnerships.

Additionally, Table 14.2-2 Summary of proposed mitigation measures and proposed monitoring plans for the Snap Lake Diamond Project, "Health and Wellness" component make reference to many partnerships with governments.

For example, De Beers has committed to the following:

- Provide substance abuse prevention and awareness programs on-site and in primary communities, in partnership with communities and governments
- Disseminate materials and information to employees and in communities related to substance abuse awareness and prevention, in partnership with communities and governments
- Provide family counseling services in the primary communities for employees and their spouses, in partnership with community social service agencies and governments
- Help to obtain culturally appropriate resources for local schools, in partnership with community and government educational agencies

De Beers has stated an interest in promoting and maintaining a healthy workforce. As part of this plan a communicable disease program has been proposed to be implemented at the Snap Lake site. Regional medical service groups will be utilized on an outreach basis as a support to the program.

#### **Why is it an Issue?**

## **DRAFT**

Each of these committed partnerships needs to be examined and articulated independently to ensure resources are identified and available to meet these commitments. It is not clear what "regional medical service groups" means in terms of specific agencies or locations. Government agencies require, for example, a description and detailing of what resources (i.e. financial resources, staff etc) to be provided by De Beers. Clarity in the expectations of communities and government regarding how these commitments will be met is important to the delivery of programs for the physical and mental well being of residents and workers.

The articulation of the plans and a definition of the scope for an Employee Family Assistance Plan (including the expected detailed roles and responsibilities of government, contractors and De Beers) and expected contributions of each party is required for multiparty planning.

### **How will the resolution of this issue add value to the EA?**

The detailing of roles and responsibilities of government, contractors and De Beers and expected contributions of each party will establish clear expectations and set realistic goals and objectives for all parties involved. Although the DH&SS recognizes that De Beers has committed to "provide family counselling services in the primary communities for employees and their spouses, in partnership with community social service agencies and governments" excludes catchment communities. From a Health & Social Services perspective, the omission of communities that draw the labour force excludes the most impacted communities. Increased impacts at the community level are expected primarily in the catchment communities. The Department therefore recommends that De Beers hire mental health workers and nurses to provide ongoing family support on the mine site as well as in primary catchment communities.

### **3.1.4 Community Consultation (Mine Management Advisory Committee)**

#### **IR Response Number:**

#### **What is the Issue?**

De Beers currently has representatives on the Mine Management Advisory Committee (MMAC) comprised of members of the primary communities and the North Slave Metis Alliance. The MMAC does not include members that will fully represent the people of the NWT. The Government of the Northwest Territories represents the entire population of the NWT and should have two GNWT representatives on the MMAC. In addition, Yellowknife is not included as having a community representative even though it is a likely source of goods and services and workers.

#### **Why is it an Issue?**

## **DRAFT**

This project will affect more than the populations represented by the above communities and the North Slave Metis Alliance. Furthermore, the exclusion of other parties limits the synergy that can be expected to occur if De Beers partners with other interested in accomplishing sustainable development in the north.

### **How will the resolution of this issue add value to the EA?**

The resolution of this issue will ensure that the MMAC has a fair and representative membership of the population affected by the project.

The involvement of other parties may assist De Beers in accomplishing its sustainable development objectives in the north.

## **3.2 Economy**

### **3.2.1 Prediction and Commitment to Northern Benefits**

**IR Response Number: 2.5.7 (g)**

#### **What is the Issue?**

De Beers expects its contractors and sub contractors to be good corporate citizens and comply with law and policy in carrying out their activities, and to voluntarily contribute to people and community's quality of life. De Beers indicates it will monitor the performance of its contractors and subcontractors, but will not require specific commitments with regard to community relations, community consultation and community involvement representation. This means that there is not a meaningful policy for De Beers ensure accountability of contractors and sub contractors.

Business development support for northern businesses is needed to overcome inherent difficulties faced by these companies. Some of the Northern mining service companies have faced financial constraints during these initial stages of development. Further training or mentorship opportunities will aid these companies. In addition, a corporate sponsored fund for SME development directly related to the operations of the mine, both during construction and after, would ensure that the interests of the mine in terms of services and products would be directly available in the local market. In the event that the operation had a financial interest in the service companies, one could expect that they would take measures to ensure the long-term viability of the concerns.

The NWT business community has seen rapid growth over the past decade. However, even large NWT businesses are fairly small in comparison to large southern competitors. In order for NWT businesses to compete consideration has to be given to "contract sizing" and sub-contracting. Where possible, contracts for a project should be broken into smaller contracts to accommodate smaller northern firms.

## **DRAFT**

Information and knowledge is key to business development. One key role for the developer is to open its doors to small community businesses. A very important part of this process will be the provision of information on what the developer wishes to purchase and how to tender through seminars on starting a business and how to sell to De Beers. Records need to be kept of NWT and non-NWT sourced purchases.

The International Research Development Centre recently published a report entitled, "*Large Mines and the Community*". Chapter seven of the report – Uranium Mining in Northern Saskatchewan – outlines the impact of successfully establishing northern goods purchasing requirements during environmental review hearings.

*"Historically, supply of goods and services to mines in northern Saskatchewan was undertaken by national and international companies who came into the region with their own, usually non-resident, employees, undertook the contract and left. This left little benefit for the region or its communities which instead saw many benefits from mining activities transferred away from the North to other regions.*

*In the 1990's, Saskatchewan's mining companies increased the number of northern suppliers, using (often aboriginal-owned) local companies, joint ventures, and preferential procurement policies."*

"Northern purchasing requirements" placed the onus on the large uranium mining companies to increase their purchasing of northern goods. These companies held public meetings across northern Saskatchewan to explain which kinds of goods would be required in the development of mines. Companies published documents to explain how individuals, companies and communities could do business with them. A similar commitment, with firm percentage targets, is needed for the NWT.

A percentage of production must be committed for local use that is consistent with the current arrangements with BHP and Diavik. The availability of rough diamond for local production is an issue that cannot be advanced without a commitment on behalf of De Beers to this program.

### **Why is it an Issue?**

Northern businesses require extra effort in order to participate in the benefits that larger projects like the De Beers mine. De Beers can, through a variety of commitments, assist to make these benefits a reality. De Beers, as the major company, must use its contract arrangements to ensure that its contractors, both northern and non-northern, also assist with northern development. Without such commitments and effort, only limited benefits will flow to the NWT.

### **How will the resolution of this issue add value to the EA?**

Discussion and commitment by De Beers to actively pursue and promote opportunities for development of northern business will assist in the delivery of benefits to northern residents.

**DRAFT**

### **3.2.5. Contractors Commitments**

**IR Response Number:** 2.5.7 (g), 2.5.44 (f), 2.5.59 (g), EA Section 5.3.4.4.2, Table 14.2-1

#### **What is the Issue?**

Contractors and sub-contractors of De Beers do not appear to have to follow the commitments of De Beers with regards to hiring practices, community relations, Family Assistance Program and best practices. The industry norm in the NWT now requires the main proponent to compel its contractors to undertake the same commitments as they have committed to in the EA and SEA, through their contracts with contractors and sub-contractors. While there may be problems going too far down the contracting ladder, major contractors should abide by northern purchasing and hiring commitments. Negotiating a SEA will definitely assist in understanding what commitments De Beers will actually undertake.

#### **Why is it an Issue?**

De Beers may decide to primarily use contractors during construction and operations phases. Without contractor commitments on the above issues there would be reduced substance to De Beers overall commitments for the various phases of the project life.

#### **How will the resolution of this issue add value to the EA?**

With the resolution of this issue, the commitments made by De Beers will be followed through by their contractors and sub-contractors to ensure that northerners benefit from the development of the mine.

### **3.2.6. Value added opportunities and Options**

**IR Response Number:** 2.5.56, 2.5.56 (d) (i) TOR lines 198-199

#### **What is the issue?**

De Beers has stated that their global marketing of rough diamonds will benefit the NWT by benefiting the industry as a whole. In accordance with their core business and marketing arrangements, their preference is to market diamond production from Canadian sources through the DTC process (i.e. mix Canadian diamonds with other production and not allow the marketing by Canadian origin). They stated that no other marketing options were considered.

De Beers has indicated that the reason they will not pursue Canadian specific branding is that the current market has limitations that can be met by production from other mines. They indicate that this will be re-assessed in the event of expanding market opportunities. De Beers has indicated that if further supply of rough is required for viable manufacturing businesses approved by the GNWT,

## **DRAFT**

De Beers "could" facilitate the supply of suitable DTC assortment of rough either directly from the DTC, through its own clients or through a trading subsidiary of the DTC.

Contrary to this statement, De Beers indicate that they have investigated the option of branding of Snap Lake diamonds and opportunities for marketing Snap Lake diamonds as part of a broader Canadian Brand. They further state that Canadian diamonds are receiving a premium.

### **Why is this an Issue?**

De Beers has made numerous statements throughout the EA of how they will work with stakeholders in the NWT to mitigate negative impacts and uncertainties and to maximize benefits to the north. They have, however, laid out few concrete action plans for how they could do so. Although support of the NWT value added industry could represent a concrete example of their willingness to work with stakeholders, De Beers has provided information that is unsupported and arguments that clearly work against the development of the industry.

De Beers has accepted that there is a benefit to marketing diamonds as Canadian. They indicate the reason they are not pursuing it at this time is that current market conditions are limited. De Beers has not provided any information on their investigation of this marketing option. They have also provided no information to back the statement that the current market conditions are limited.

De Beers' statement that their global marketing will benefit the NWT means little if diamonds marketed through the DTC cannot be marketed as Canadian. Further, De Beers has failed to provide any information to explain or quantify the statement that their current marketing actually benefits the NWT. No analysis is provided as to how these benefits compare to the benefit that would be derived from jobs and opportunities created in the value added industry. What benefit would be provided to the NWT if De Beers carry out their global marketing and do not support the industry by supplying rough or, in the event they did supply, they did not allow for the industry to market these diamonds as Canadian?

### **How will resolution of the issue add value to the EA?**

Although De Beers has stated they "could" supply rough to support the value added industry, a clearer commitment to support the value added industry would provide greater assurance that the NWT will benefit from mine development and that negative impacts and uncertainties would be mitigated. Further clarification of De Beers statements and arguments surrounding the means of supply and the marketing of diamonds as Canadian are required to determination to what extent De Beers could support the value added industry.

**DRAFT**

### **3.2.1. Spatial Areas**

**IR Response Number:** IR Response 1.20 (a), 2.5.6

#### **What is the Issue?**

The spatial areas identified by De Beers may not be reflective of the entire area affected by the mine development with regards to Socio-Economic issues.

The "Benefits Catchment" area should be clearly defined and expanded, where feasible. RWED and the NWT Bureau of Statistics are completing a labour force survey this winter. This will provide new information regarding community capacity to accommodate employment targets.

#### **Why is it an Issue?**

Communities not noted as being 'primary' communities by De Beers, but which might be affected by the development of the mine, will be excluded from the mitigation efforts proposed by De Beers.

#### **How will the resolution of this issue add value to the EA?**

The resolution of this issue will help to ensure that all NWT communities affected by the mine development will be included in mitigation efforts.

### **3.4.2. Adequacy of Mitigation Measures - Direct Flights**

**IR Response Number:**

#### **What is the Issue?**

Not all of the communities listed as catchment communities as defined in the EA are included as communities that will be part of mitigation efforts including the use of direct flights from these communities.

De Beers has not addressed how the work / rest rotation of northern workers will affect the children of these workers over the long term. Pages 5 through 136 and throughout the EA do not adequately address the long-term effects of half-time parenting and effects to families at the end of the 20 year project with respect to a generation of children raised by single parents. For example, preliminary information from developments with similar rotations indicates increased absenteeism or expulsion from school.

#### **Why is it an Issue?**

De Beers has identified the catchment communities as a separate spatial area for the potential labour force they may provide to the mine. De Beers may not

## **DRAFT**

have made air flight arrangements to ensure this labour force has transportation to the mine site.

Knowing that worker rotation for extended periods can lead to educational or other social concerns will assist De Beers in examining mitigation measures to negate the problems that can develop for children of workers. Long term effects of half-time parenting also includes increased crime rates and family abuse due to greater stresses on single parents and the breakdown of family units. Additionally, documented research has revealed that half-time parents do not teach their children basic parenting skills. Consequently, family dysfunctions repeat over generations.

### **How will the resolution of this issue add value to the EA?**

The resolution of this issue is important to ensure that communities have the transportation and social supports needed to add to the labour force at the mine site. The impacts that have resulted from previous mine rotation shifts have led to an increase in family support services in impacted communities. Commitment by De Beers to provide additional family support services will aid in mitigating long-term effects and deterioration of single parent families.

## **3.3 Government**

### **3.3.1 Adequacy of Regional and Community Infrastructure**

As incomes increase in communities within the mine hiring area, there will be increased interest in home ownership. NWT HC programs provide assistance towards home construction or purchase, but issues remain with selling homes or transferring leases. Currently, no private housing market exists in many smaller communities – cooperative housing provides an opportunity for residents to acquire housing and build equity, while minimizing risk. Cooperative housing could address some of these issues by providing a non-profit solution whereby members can recover their capital after leaving a community.

De Beers could assist by sponsoring cooperative housing in communities as a way of expanding home ownership and providing viable housing solutions to newly employed residents. With the provision of minimal seed or equity assistance, which could be held as shares till repayment, a cooperative staff/public housing project could be examined in one of the non-market communities.

The current vacancy rate in Yellowknife, a major point of hire for mines, is under 2%. The availability of housing in Yellowknife is a major impediment to further population and business growth. The cooperative housing model may be able to play a role in development of professional and staff housing for De Beers for Yellowknife. The company, through the injection of minimal equity, could ensure CMHC financing for the project. This would, in turn, ensure long term housing for key employees.

## **DRAFT**

De Beers proposes to use high efficiency reciprocating engines powered by diesel fuel and projects total diesel fuel consumption of 32 million litres of which 28 million will go through the generators. Diesel fuel will be trucked in on the winter road and stored for the whole year and will provide all energy requirements on site. Cost of the electrical component of their operation is between \$15- 20 million, based on an Edmonton rack price of \$.40/litre.

De Beers did not provide any analysis of a hydroelectric option for the minesite but only indicated that discussions had occurred with Dogrib Power and NTPC on the issue. De Beers went to some lengths to consider wind power, solar energy and hydrogen fuel cells. These were rejected as being non competitive with diesel fuel. The lack of analysis of this issue is interesting as De Beers recognized that there were issues surrounding its use of diesel solely as the energy supply. *"The cost of diesel fuel, which is estimated to be 87% of the operations and maintenance cost of the facility, justified studies to assess alternative means of supplemental power generation."*

### **Why is it an Issue?**

The lack of housing in Yellowknife and smaller communities creates social pressures and difficulties for persons moving to these locations.

Hydroelectric power is a long-term sustainable energy supply for the NWT. Previously established mining operations (Pine Point or Yellowknife), have supported investment in hydroelectric projects, which have left a legacy of publicly owned, significantly paid down energy infrastructure. The Dogrib Treaty 11 Council has taken an active interest in the advancement of hydroelectric projects in their identified claim area. A MOU has been signed between the GNWT and the Dogrib to facilitate the development of hydroelectric projects when they are the most favorable economic option.

### **How will the resolution of this issue add value to the EA?**

Commitment by De Beers to assist with co-operative housing in Yellowknife and smaller communities would alleviate the social pressures and difficulties experienced by persons moving to these locations.

Adequate consideration of alternate energy is a requirement of the EA. An analysis of hydroelectric potential is required to fulfill this gap.

## **3.4 Community**

### **3.4.1 Adequacy of Mitigation Measures – Continued Consultation / Liaison**

#### **IR Response Number:**

#### **What is the Issue?**



Environment Canada  
Environnement Canada

Environmental Protection Branch  
Suite 301, 5204 50<sup>th</sup> Avenue  
Yellowknife, NT  
X1A 1E2

November 13, 2002

Mr. L. Azzolini  
Environmental Assessment Officer  
Mackenzie Valley Environmental Impact Review Board  
Suite 200, 5102 – 50<sup>th</sup> Avenue  
Yellowknife NT Canada X1A 2N7

**RE: Environment Canada's List of Issues for Snap Lake Technical Sessions**

Dear Mr. Azzolini,

I have attached a list of issues that Environment Canada feels warrant discussion at the Snap Lake Technical sessions scheduled for November 25, 2002.

Please contact me if you have any questions or concerns about this submission.

Sincerely,

Mark Dahl  
Contaminants Biologist  
Environmental Protection Branch  
(867) 669-4734 Fax (867)873-8185  
mark.dahl@ec.gc.ca

cc: Robin Johnstone, De Beers Canada Mining Inc., Yellowknife, N.W.T.



## ENVIRONMENT CANADA ISSUES - SNAP LAKE TECHNICAL SESSIONS, NOV - DEC 2002

### WATER QUALITY

#### Issue:

##### Water Treatment Plant Operation and Capacity

Environment Canada concurs with the GLL report titled "Rationale of Technical Issues - De Beers Snap Lake Diamond Project" (GLL report) which notes that it is unclear if the De Beers treatment plant has sufficient treatment capacity to deal with higher than expected water flows, or to provide operational redundancy against malfunctions.

#### *Why is this an issue?*

The capacity and reliability of the treatment plant underpin the whole water management plan for the project. Given that there is very little water storage available for high flow periods and that the mine will require continuous de-watering during operation it is critical that the plant function effectively and reliably. While it is stated that the capacity of the treatment plant will be increased as project demand increases this does not address contingencies in the event of plant failures or periods of unexpectedly high water flow.

#### *How will resolution of this issue add value to the EA?*

Verification that the treatment plant has sufficient capacity to effectively treat water at times of high flow will ensure that the impact predictions made in the EA report are correct.

#### Issue:

EC concurs with the GLL report that the Storage Capacity of the Mine Water Containment Pond (MWCP) is an issue which requires further discussion. De Beers must demonstrate that the pond has sufficient capacity to protect Snap Lake from releases of water that could potentially degrade lake water quality.

#### *Why is this an issue?*

The storage capacity of the MWCP is small relative to the inflows it receives. De Beers has indicated that there is sufficient storage available in the pond to buffer the treatment plant during high flow periods. However, the pond does not have the capacity to hold the inflows if there is a long term malfunction or maintenance issue or if natural runoff is extremely high. For instance, in July of this year the Snap Lake site received 300 % of expected precipitation. If this event occurred during the operation of the mine it is unlikely that the pond would have had sufficient storage capacity.

#### *How will resolution of this issue add value to the EA?*

The capacity of the mine water containment pond is critical to the site water management plan. An accurate assessment of the capacity will provide assurance that Snap Lake will be impacted as predicted in the EA.



***Issue:***

EC is in agreement with the GLL report that the treatment process as presented in the EA may be insufficient to treat water to an acceptable level for release. As stated in the report the treatment plant is predominantly a filtration plant which may not provide effective treatment for parameters such as ammonia, metals and phosphorus. De Beers has combined the proposed plant with a mixing zone in Snap Lake to attain acceptable concentrations of parameters of concern.

De Beers has assumed that a mixing zone is an acceptable method of reducing parameters of concern in the effluent stream to acceptable levels. Environment Canada recommends that water treatment should be employed to reduce the concentrations of reducing parameters of concern before the effluent is released to the receiving environment. It should be noted that the receiving environment begins at the end of the pipe. Specifically EC would like assurances that the treatment plant used will employ best available technology to treat parameters of concern before considering the use of a mixing zone to dilute the effluent.

***Why is this an issue:***

It is the responsibility of De Beers to minimize the impacts associated with their development, and clearly, treatment of wastewater is necessary to mitigate impacts to Snap Lake. Early in the environmental assessment process EC indicated to De Beers that the use of a mixing zone to dilute the discharge effluent should only be considered after incorporating best available treatment technology for parameters of concern. EC further emphasized that the size of the mixing zone should be kept to a minimum in order to minimize impacts to Snap Lake. However, in the EA report De Beers does not appear to have considered these suggestions. In fact, De Beers suggests using a basic water treatment plant which employs filtration to treat the water for TSS. De Beers further suggests that a mixing zone 230 metres in diameter which comprises 1% of the lake would be required for most of the parameters of concern to be below chronic effect levels for zooplankton. The capacity of the suggested water treatment facility to effectively treat many of the other parameters of concern is uncertain and requires further discussion. Refined or additional treatment processes may be able to reduce or eliminate the need for a mixing zone.

***How will resolution of this issue add value to the EA?***

A commitment from De Beers to utilize best available treatment will minimize potential impacts of the project and reduce uncertainty in impact assessment.

***Issue:***

EC concurs with the GLL report which indicates that the output of the phosphorus model is counter-intuitive and requires clarification.

***Why is this an issue?***



De Beers indicates that the project will increase phosphorus loading to Snap Lake but predict an overall decrease in total phosphorus in the lake. The model relies on rapid cycling of phosphorus in the biota, and sequestering to the sediments. If the model is inaccurate and phosphorus levels in the lake rise, the impacts of increased phosphorus loading on the lake may be detrimental. These impacts include increased productivity (and associated ecosystem changes) and increased demand on dissolved oxygen concentrations under the ice.

***How will resolution of this issue add value to the EA?***

Clarify the basis for phosphorus model outputs and impacts related to phosphorus in order to ensure that predicted impacts on Snap Lake are realistic.

**Air Quality**

***Issue:***

EC concurs with the GNWT that a technical session should be held on Air issues, specifically to clarify the emission information and sources used for modeling the impacts of air emissions on the environment.

***Why is this an issue?***

Air emissions are an issue that warrant discussion at the technical sessions because several parameters were not discussed in the EA, including SO<sub>3</sub>, CO, VOC and acid mist; some clarification of model inputs is also required.

***How will resolution of this issue add value to the EA?***

Reduce uncertainty in assessing the impacts of air emissions on the environment.

information request?



Fisheries  
and Oceans

Pêches  
et Océans

Fish Habitat Management  
Suite 101, 5204-50<sup>th</sup> Avenue  
Yellowknife, Northwest  
Territories  
X1A 1E2

Your file *Votre référence*

Our file *Notre référence*

SC00196

November 13, 2002

Mackenzie Valley Environmental Impact Review Board  
Box 938, 5102-50<sup>th</sup> Avenue  
Yellowknife, NT  
X1A 2N7

Attention: Louie Azzolini, Environmental Assessment Officer

Dear Mr. Azzolini:

Please find attached a list and description of the issues that the Department of Fisheries and Oceans considers necessary to be resolved at the upcoming technical sessions.

We trust that this submission meets the Review Board's requirements. Should you have any questions please call me at (867) 669-4912.

Yours truly,

Marc Lange  
Area Habitat Biologist  
Fish Habitat Management  
Department of Fisheries and Oceans- Western Arctic Area

DB

Copy. Julie Dahl – Area Chief, DFO  
Robin Johnstone – De Beers

## FISH AND FISH HABITAT ISSUES AND THE SNAP LAKE DIAMOND PROJECT

DFO has the following main Issues of Concern:

1. FISH HABITAT ASSESSMENT and NNL ACCOUNTING
2. CHRONIC EFFECTS OF WATER TREATMENT PLANT DISCHARGES ON AQUATIC ORGANISMS AND FISH and POTENTIAL BIOACCUMULATION OF METALS.
3. POTENTIAL GROUNDWATER CONTAMINATION DUE TO CONTACT WITH THE PASTE BACKFILL FORMULATION.
4. CHANGES IN NUTRIENT SUPPLY AND IMPACT ON BIOMASS, PRODUCTIVE CAPACITY AND SPECIES DIVERSITY.

### FISH HABITAT ASSESSMENT and NNL ACCOUNTING

#### **Fish Habitat Assessment and NNL Accounting**

***IR Response Number*** 1.64, 1.66, 2.1.1, 3.10.12, 3.10.14, 3.10.16, 4.1.13, 4.11.12, 4.11.14, 4.11.16. A supplementary request from DFO (Round 3B) was not allowed to proceed.

#### ***What is the Issue?***

Fish habitat is defined in the MVEIRB Work Plan as “*Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes*”. The presence or absence of fish aid in confirming the presence of fish habitat however, the lack of “defined streams” does not necessarily exclude the presence of fish habitat. Undefined streams and channels may support fish habitat for periods of the year. Small water bodies and even undefined streams can provide nutrient and /or food

## **DRAFT**

De Beers has committed to providing substance abuse prevention and awareness programs on-site and in primary communities, in partnership with communities and governments. De Beers has remained silent on the issue of gambling. The DH&SS recommends that De Beers hire mental health workers and nurses to provide ongoing family support on the mine site as well as in primary and catchment communities. The articulation of commitments to partnerships is needed to assess the level of resources available to fulfill each agreement.

### **How will the resolution of this issue add value to the EA?**

Detailing the roles and responsibilities of government, contractors and De Beers and expected contributions of each party will establish clear expectations and set realistic goals and objectives for all the DH&SS.

The DH&SS recommends that observations and commitments with respect to addiction programs take this into consideration. The responsibility of monitoring should include gambling.

supply to adjacent or downstream habitat or contribute to water quality for fish.

The assessment may not have determined seasonal or transient use of various inland lake and stream habitats. The determination of presence or absence of fish habitat appears to have been based on water depth or the presence of fish at the time of sampling. Water bodies less than two meters deep were not evaluated, while deeper water bodies were assessed. Many of the inland lakes and streams identified within or next to the mine footprint were not classified as fish habitat since it was determined by De Beers consultant (Golder) that the lakes were too shallow to overwinter fish.

Further assessment or other criteria than depth is required to demonstrate that water bodies or drainages under the direct and indirect footprint of the development are not fish habitat.

***Why is it an Issue?***

In order for objectives set out in the workplan to be met and to provide sufficient information to allow DFO to proceed to the regulatory phase, a complete determination of the presence or absence of fish habitat must be undertaken. This information is also necessary for NNL accounting. Some of the lakes within the project footprint have not been accounted for.

***How will resolution of this issue add value to the EA***

The provision of this information during the EA stage is necessary to ensure that all project-related impacts have been identified and quantified and mitigated to the extent possible. DFO must also be confident that the EA is complete with respect to the identification of specific fish and fish habitat issues.

***Who should provide the response?***

De Beers should reassess fish habitat with broader criteria in consultation with DFO and present this at a technical session.

CHRONIC EFFECTS OF WATER TREATMENT PLANT DISCHARGES ON  
AQUATIC ORGANISMS AND FISH AND POTENTIAL METAL  
BIOACCUMULATION

**IR Response Number** 1.62, 1.67, 2.1.6, 2.1.8, 2.1.9, 3.4.1, 3.4.8, 3.10.10.

**What is the Issue?** The Water Treatment Plant will discharge effluent that will exceed water quality guidelines at the point of discharge into Snap Lake. Ammonia, chloride, cadmium, copper, mercury, molybdenum, nickel, lead, and selenium are cited in the EA. Total Dissolved Solids (TDS) are also expected to increase significantly in Snap Lake. A diffuser and zone of dilution are proposed to reduce toxicity. However, chronic effects on aquatic biota will still occur.

De Beers should be prepared to evaluate alternative treatment technologies at the technical sessions. Other alternatives to dilution need to be presented to mitigate the impacts from metals, nutrients and TDS.

**Why is it an Issue?** The effluent from the water treatment plant will appear to have impacts on the aquatic community in an area extending 230 m from the discharge location. The water treatment plant is not designed to treat for metals. This effluent is diluted within Snap Lake but hexavalent chromium levels in the water column may remain harmful to aquatic life. The impact is predicted to affect 1% of Snap Lake based on volume. Chromium will also settle and accumulate in the sediments of Snap Lake. There may be some exceptions to the generalization that hexavalent chromium ( $\text{Cr}^{+6}$ ) is more hazardous than trivalent chromium ( $\text{Cr}^{+3}$ ). Examples in the literature state that fish are sometimes more sensitive to  $\text{Cr}^{+3}$  than to  $\text{Cr}^{+6}$  and in soft water,  $\text{Cr}^{+3}$  is more toxic to fish than  $\text{Cr}^{+6}$ . However, the data are mixed, but there appear to be cases where Chromium  $^{+6}$  is as hazardous or more hazardous to fish and certainly to aquatic life other than fish.

A diffuser is proposed at the water outlet to aid in dispersion and to provide initial mixing of the effluent with water from Snap Lake. This will result in an initial mixing zone with high concentrations of toxic contaminants and increased density due to high TDS. The effluent however is stated to settle out in deeper water under ice since there is no lake process mixing and because it is denser due to high TDS concentrations. The effectiveness of the diffuser is therefore questionable.

This could result in a layer of water with negative effects on the aquatic community. The invertebrate population will be particularly susceptible since exposure times will persist for approximately 8 months of the year.

Since there are high levels of salinity as indicated by high TDS concentrations lake trout would also likely be affected. Of all the salmonids, lake trout exhibit the most sensitivity to ion concentrations in the water.

*How will resolution of this issue add value to the EA?*

A more detailed assessment of the water treatment processes and alternative treatment technologies is required to ensure that impact predictions are valid. This will ensure that impacts to the aquatic community are mitigated.

*Who should provide the response?*

De Beers

### **Bio accumulation Potential of Metals**

*IR Response Number*

1.52, 3.8.8.

*What is the Issue?*

Selenium and Cadmium are metals that have the potential to bioaccumulate. Selenium levels were high but dismissed due to analytical interference. Cadmium is predicted to be discharged at levels above water quality guidelines.

***Why is it an Issue?***

Some of the Cadmium is also expected to settle and will accumulate in the sediments. Cadmium may be assimilated into the organisms living in the substrate and increase in higher trophic levels as others consume the organisms. There may be effects in the food chain and the consumption of fish may pose a risk to human health.

DFO also obtained different values for the concentration of tissue substances addressed by the measurement and use of bioconcentration factors (BCF's).

***How will resolution of this issue add value to the EA?***

The assessment will alleviate or substantiate the risks to the aquatic community and human health.

***Who should provide the response?***

De Beers should be prepared to discuss the bioaccumulation of selenium and cadmium at the technical sessions.

**POTENTIAL GROUNDWATER CONTAMINATION DUE TO CONTACT WITH THE PASTE BACKFILL**

***IR Response Number***

1.15, 1.18, 1.47, 1.57, 1.62, 2.1.5, 2.1.7, 2.4.16, 2.6.18, 3.4.12, 3.4.13, 3.9.5, 4.1.3.

***What is the Issue?***

A number of IR Responses (2.4.16, 3.4.12, 3.9.5,) indicated that additional testing and work has been underway to better define the chemistry of the paste backfill, possible attenuation provided by the rock mass, and ultimate influence of groundwater in the vicinity of Snap Lake on surrounding water bodies. The results from these studies have not been disclosed or discussed.

A technical session to incorporate the findings of the additional studies and to discuss the effects of the paste backfill will ensure a better assessment of current and long-term impacts to surface water quality and aquatic life and regional groundwater impacts.

A contingency plan should also be developed should mine water and groundwater become more toxic than projected.

***Why is this an Issue?***

Considerable uncertainty exists with the chemistry and ultimate influence of the paste backfill on groundwater quality and the resultant mine-water treated by the water treatment plant. As mine development proceeds over 26 years there will be a greater area of paste backfill located underground. The groundwater that percolates into the mine will come into contact with the backfill and has the potential to take on toxic properties. The proposed water treatment plant will not treat metals. Therefore, the discharged effluent could become increasingly toxic due to increased metal levels. No contingency plan has been developed in the event that the groundwater would become more toxic than presently projected.

The paste backfill and undeveloped kimberlite exhibit increased permeability in relation to the host rock. Groundwater flows into the mine could also be greater than projected.

***How will resolution of this issue add value to the EA?***

The commitment by De Beers to undertake additional testing as referenced in the IR's indicates that there is some uncertainty in current predictions of the effects of the paste backfill. A technical session to discuss the effects of the paste backfill and the presentation of detailed contingency plans will reduce the uncertainty.

***Who should provide the response?***

De Beers

**CHANGES IN NUTRIENT SUPPLY AND IMPACT ON BIOMASS, PRODUCTIVE CAPACITY AND SPECIES DIVERSITY**

***IR Response Number***

1.56, 3.3.6, 3.4.6, 3.4.7, 3.4.10, 4.1.8.

***What is the Issue?***

The mine effluent will have greater amounts of bioavailable phosphorus (IR 4.1.8) than current

inputs into Snap Lake. This will increase the nutrient supply to the lake and cause changes in biomass and species diversity in the aquatic community. Linkages and interactions among trophic levels in response to nutrients have been poorly defined.

A detailed assessment of the trophic level responses to nutrient addition should be presented. This should include biomass, species diversity and community responses at each level.

*Why is it an Issue?*

The aquatic community in the lake will likely change in response to increased levels of bioavailable phosphorus.

The response to IR 4.1.8 indicated that phytoplankton biomass would change and levels of phosphorus would increase and accumulate in the sediments, due to phytoplankton die-off and settling. There could also be effects to zooplankton communities and biomass. The trophic level response of the zooplankton was not discussed, nor were possible effects to the invertebrate or fish community.

There could also be greater oxygen demand such that dissolved oxygen levels will decrease at depth. Projections in the EA have indicated that certain areas will be inhabitable to fish due to low oxygen, therefore additional effects could be detrimental.

*How will resolution of this issue add value to the EA?*

It will improve the assessment of effects to the aquatic community in Snap Lake.

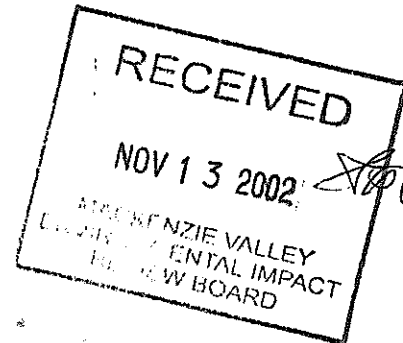
*Who should provide the Response?*

De Beers

November 12, 2002.

Louie Azzolini  
Environmental Assessment Officer  
Mackenzie Valley Environmental Impact Review Board  
Yellowknife, N.W.T.

Robin Johnstone  
Senior Environmental Manager  
De Beers Canada Mining Inc.  
Yellowknife, N.W.T.



Dear Sirs,

Further to our discussions and your request at the Pre-Hearing Conference of November 8, I have attached a page detailing outstanding concerns that need to be addressed during Technical Sessions scheduled for the end of this month.

One concerns sediment quality baseline for Snap Lake, while the other questions the adequacy of impact assessments on birds.

Thank you for your attention to these matters.

Tim Byers  
Impact Review Consultant  
for  
Yellowknives Dene First Nation Land & Environment Committee

Cc: Rachel Crapeau, Chair  
Yellowknives Dene First Nation Land & Environment Committee, Dettah

## OUTSTANDING CONCERNS of YELLOWKNIVES DENE SNAP LAKE DIAMOND PROJECT

(A)

### What is the Issue?

De Beers states that heavy metals in the sediments of Snap Lake and the reference lake were at similar levels (p. 9-180). However, Table 9.4-7 shows that cadmium in Snap Lake sediments were double the levels in the reference lake; only in Snap Lake were cadmium levels above CCME interim sediment quality guidelines.

In De Beers' response to DIAND's IR #3.4.11(a), they state that sediment heavy metal concentrations in both of these lakes are within the range of concentrations elsewhere in the Lockhart watershed. While it is true that 12% of 25 sites (1993/94) and 22% of 23 sites (1999) had sediment cadmium concentrations at or above the interim guideline level of 0.6 µg/g, Snap Lake levels were well above the median of those sites.

**Could the 4 Snap Lake "baseline" sample sites have been affected by runoff or dust from the bulk sampling activities and/or the access roads?**

### Why is this an Issue?

If the baseline bottom sediment sample locations in Snap Lake (SH1 & SH2) were affected by exploratory drilling and/or bulk sampling activities, this would leave in doubt the validity of the baseline data from Snap Lake as an indicator of "pristine" pre-development conditions against which to measure the impacts in Snap Lake during development.

De Beers needs to address the validity of this baseline data.

(B)

### What is the Issue?

The EA states, "Although noise from facilities, and vehicle and aircraft traffic may change the movement and behaviour of birds, the magnitude of impact is anticipated to be low." (P.10-182) The magnitude of impact would be dependant on when the impact took place. If disturbances from noise and/or vehicle traffic occurred during nesting, then brooding females may be flushed off their nests frequently. This would result in potentially reduced hatching success or reduced survival of chicks.

### Why is this an Issue?

Reduced hatching success or chick survival caused by noise or other disturbances would translate into a more significant impact for a population than would disturbance occurring at any other time of the year. The impact on a population of upland game birds (ptarmigan) or raptors (hawks, falcons, owls) would be significant if subjected to this disturbance over a number of successive breeding seasons.

In combination with the MVEIRB's consultants calling into question the adequacy of the raptor baseline surveys (Rationale #1.3.2), addressing the above issue in a Technical Session is warranted.

**E N T R I X**

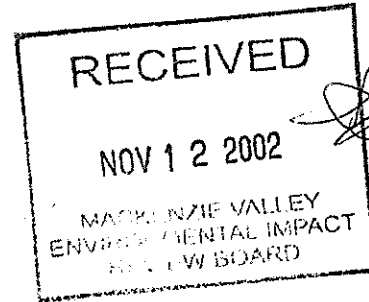
MEMO

**ENTRIX, Inc.**  
5520 14B Avenue  
Tsawwassen, B.C., V4M 2G6  
(604) 943-4598

---

**To:** Louie Azzolini, MVEIRB  
**Cc:** Ted Blondin, Dogrib Treaty 11 Council  
Tony Pearse  
**From:** Steve Wilbur  
**Date:** November 12, 2002  
**Re:** Pre-hearing meeting for Technical Sessions  
Proposed Snap Lake Diamond Project

---



We have read the Draft Rationale of Technical Issues prepared by MVEIRB, and express similar concerns regarding the issues described in the Sections 1.1.1 (Water Treatment Plant – Operation and Capacity), 1.1.2 (Water Management Pond), 1.1.4 (Groundwater Inflows to Mine and Pumping System), 1.1.5 (Increase in Total Dissolved Solids in Snap Lake), 1.1.7 (Accuracy of Phosphorus Model), 1.2.1 (Impact on Lake Sediments), 1.2.2 (Lake Level Fluctuations), 2.1 (North Pile – Residual Fe/ARD), 2.2 (North Pile – Slope Stability) and 6.1.1 (Cumulative Impacts Methodology) and would like to have these topics also considered for the upcoming technical sessions.

We still have significant questions pertaining to a number of De Beer's responses to IRs from all three rounds. But due to time constraints, we have not had the opportunity to develop technical rationale in regards to a number of IR topics. The following list represents only a portion of topics (in addition to those described below) that we would like addressed in the technical sessions.

- 1.6.2 regarding characterization of treated discharge to Snap Lake
- 2.2.10 crust development on PK
- 2.6.18c characteristics of PK and long-term chemical stability
- 3.3.2 low pH seepage from waste rock and kimberlite rejects
- 3.4.7b effects of hardness on toxicity
- 3.4.8 TSS-related impacts and water treatment assumptions
- 3.8.8 uncertainty associated with assumptions in reference (Jarvinen and Ankley)
- 3.9.2 ARD and kimberlite
- 3.10.8 regarding Groundwater Quality characterization and subsequent modeling
- 3.10.10 regarding Water Quality and the Impacts Analysis Methods
- 3.10.25 Cumulative Impacts Assessment and linkages

In many cases we were either satisfied with the many of De Beer's responses or did not fully evaluate them as they were not necessarily topics of significant concern to the Dogrib.

We have developed preliminary topics and rationale for the following issues and have attempted to keep to the MVEIRB format:

## **1.0 ENVIRONMENTAL IMPACTS**

### **1.1 Water Quality/Water Quantity**

#### **1.1.1 Groundwater Flow – Extent of Taliks**

***IR Response Number:*** 3.10.6a, b; and see Section 1.1.3 of the Rationale of Technical Issues Document

***What is the Issue?***

There are only two thermistor strings that have penetrated the entire thickness of permafrost, and only one that shows a permafrost thickness of 225 m. This amount of data can hardly be construed to yield a low uncertainty in defining permafrost thickness. Further there is no field data from the LSA that supports the assumption that taliks below lakes are approximately one-third the lake's shortest width. The presumption that permafrost distribution and dimensions at Diavik are similar to those in the LSA is not accurate. Permafrost is warmer and less extensive at Snap Lake as the region is farther south than Diavik and closer to the line of discontinuous permafrost.

***Why is it an Issue?***

There is insufficient field data from the LSA to support the primary assumptions, and it is possible that permafrost thickness is variable, and talik sizes are larger with respect to a given water body, and not necessarily hydraulically isolated. Thus groundwater flow conditions may be more complex than indicated.

***How will resolution of this issue add value to the EA?***

Reduce the uncertainty in assessing impacts related to the migration of groundwater in the LSA with potentially deleterious characteristics.

***Who should provide the response?*** De Beers

#### **1.1.2 Hydrostratigraphy and Groundwater Flow**

***IR Response Number:*** 3.10.7a, b, c

***What is the Issue?***

The responses to the above-reference IR (3.10.7a) did not fully answer the requests. The referenced cross sections do not describe the spatial distribution and variation of

hydrostratigraphic units in the LSA, nor are hydrostratigraphic units defined or described. Further, the response to 3.10.7b did not explain what is known regarding the nature and extent of interconnected fractures, so it is not obvious that the model assumptions are valid (i.e., equivalent porous media) and that preferential fracture flow can be ruled out. Also, it is not clear how the hydraulic conductivity tensor was used to represent fracture anisotropy. Finally, the effect of the modeling uncertainty on the interpretations and assessment of hydrogeologic conditions, groundwater flow calculations and impacts analyses was not discussed.

***Why is it an Issue?***

There is currently enough uncertainty regarding the characterization of hydrogeology in the LSA, and in the associated groundwater modeling to raise questions about the validity of the impacts analysis.

***How will resolution of this issue add value to the EA?***

A more robust characterization of hydrogeology (supported by more field information may be necessary), will reduce the uncertainty in modeling, yield supporting rationale to conduct appropriate sensitivity analyses, and provide a sounder basis to develop a more credible impact assessment.

***Who should provide the response?*** De Beers

## **1.2 Aquatic Habitat**

### **1.2.1 Baseline**

***IR Response Number:*** 2.1.1, 3.10.12; and see Sec 1.2.3 of Issue Rationale Document

***What is the Issue?***

The response provides reason for selecting areas for sampling and states that there was no statistical basis, and it was based on professional judgement. Several criteria are provided (as requested) in a general sense.

***Why is it an Issue?***

The reason the information requested (and bases for incomplete response), is to determine if the locations sampled are representative of the habitats that could be impacted and how this data represents actual physical and biological components in terms of probability of impact and importance in the system that is being changed. (The North Lake explanation was satisfactory.)

***How will resolution of this issue add value to the EA?***

Reduce uncertainty in impacts assessment.

*Who should provide the response?* De Beers

### **1.2.2 Baseline**

*IR Response Number:* 3.10.13

*What is the Issue?*

The response describes how the assessment examined limiting habitats and the most sensitive species productivity and survival. The question that remains is how the selection of sample locations, sample sites, and data collection that feed into the analysis accounts for what is limiting and sensitive in the system.

*Why is it an Issue?*

We understand that there is uncertainty in a system and it is impractical to eliminate all uncertainty through sampling. We, however, do not understand the design and criteria that was used to determine how data collection is representative of limiting factors and sensitive species as used in the analysis.

*How will resolution of this issue add value to the EA?*

Reduce uncertainty in impacts assessment

*Who should provide the response?* De Beers

### **1.2.3 Baseline**

*IR Response Number:* 3.10.14

*What is the Issue?*

Information on life history and habitat use of fishes in the project area is not provided. Table 9.5.15 (Summary of 1999 Lake Habitat and Fish Capture Investigations) provides general information on potential use by a certain sized fish (i.e. suitable small bodied fish habitat) and availability of overwintering habitat in the lakes sampled. This is perhaps a limiting factors assessment for that waterbody but it appears that from a project area perspective, these small waterbodies would not serve as an important (limiting) overwintering habitat and would perhaps serve other functions.

*Why is it an Issue?*

There are other water bodies directly impacted by the Project footprint in the table.

***How will resolution of this issue add value to the EA?***

The EA needs to assess all potentially affected water bodies.

***Who should provide the response?*** De Beers

**1.2.4 Key Question F-2**

**IR Response Number:** 3.10.16

***What is the Issue?***

The response to the Information Request appeared to miss the relation to impact assessment. A footnote to the TOR in Table 9.1-1, Section 2.6.5 states that impacts should be assessed on all water bodies likely to be impacted by the proponent's activities, not just lakes and not just water bodies with fisheries resources.

***Why is it an Issue?***

The impacts assessment appears to be incomplete.

***How will resolution of this issue add value to the EA?***

The EA needs to assess all potentially affected water bodies.

***Who should provide the response?*** De Beers

**1.2.6 Fish and Fish Habitat (Cumulative Impacts)**

***IR Response Number:*** 3.10.25

***What is the Issue?***

The linkage approach to project cumulative effects is linear and restrictive rather than global and additive. Cumulative effects on a regional level are not restricted by watersheds but can be connected by other processes (wind, anthropogenic activities). The definition of cumulative implies that it is made up of accumulated parts, increasing by successive additions.

***Why is it an Issue?***

Cumulative effects analysis does not appear to be complete.

***How will resolution of this issue add value to the EA?***

Add substance to and refine conclusions of the cumulative impacts assessment.

***Who should provide the response?*** De Beers

**1.2.7 Sport Fishing**

**IR Response Number:** 2.1.3  
**EA Reference:** 6.4.1.5.2

***What is the Issue?***

We are not sure what is meant by the term “harvest” in De Beers’ response to IR 2.1.3.

***Why is it an Issue?***

The IR stated: Will De Beers’ employees and contractors be allowed to fish in the RSA? This IR was somewhat addressed in IR-2 (Response 2.1.3), i.e., mine personnel will not be permitted to harvest fish during all phases of the project. Does the term “harvest” apply to any form of angling?

IR  
Not  
technical  
issue.

***How will resolution of this issue add value to the EA?***

Clarify type of impact.

***Who should provide the response?*** De Beers

**1.2.9 Impacts to Aquatic Community**

**IR Response Number:** 3.4.7a

***What is the Issue?***

De Beers states that effects up to 20% of the aquatic community would not adversely affect aquatic ecosystem function, and references (Suter, et al, 1995) to support their assumption. However, the basis for Suter’s 20% threshold is not ground-truthed in northern ecosystems, which do not necessarily have comparable ecosystem dynamics (i.e., diversity, abundance, etc.). De Beers also references Bruce and Versteeg (1992) to assert that a 20% effect on a population will have little overall impact relative to natural variability in community and population structure and function. It is not necessarily logical to leap from a 20% threshold in populations and apply the same threshold to ecosystems, especially when ecosystems lack diversity and are less robust to change (i.e., as with northern ecosystems). Finally, De Beers’ claim that organisms will flow in and out of an ecological system and have niche overlap may not be wholly representative of northern environments where there is limited diversity and species abundance.

***Why is it an Issue?***

The impacts assessment is based on the assumption of the 20% threshold, which may not be applicable for RSA and in subarctic, in general. A more robust analysis is needed to reduce uncertainty in assessing impacts.

***How will resolution of this issue add value to the EA?***

Reduce uncertainty in assessing impacts.

*Who should provide the response?* De Beers

### **1.2.10 Impacts to Aquatic Community**

*IR Response Number:* 3.4.7b

#### ***What is the Issue?***

Response does not consider that an affect to 20% of the species in 20% of a water body could be much greater than the multiplier (0.04). If the 20% of the water body affected supported 100% of the affected (sensitive) species than it appears that the effect to that/those species would be far greater. Respondents appear to indicate that *Ceriodaphnia dubia* is the most sensitive species. Their response assumes that distribution of this species in the lake is uniform.

#### ***Why is it an Issue?***

Many studies in other lake systems have demonstrated otherwise. Are there data to support the uniformity of distribution of this species in this lake which would then be supportive of the 20% threshold. The overall impact rating consideration of ‘spatial scale’ is not supported well (see second sentence of this response). It is akin to a mixing zone in a lake. The response regarding magnitude of effects is not comforting. The toxicity data referenced for *Ceriodaphnia* appear to come from literature values, so it is unclear if the tests conducted were relevant to the site conditions. Their response suggests that chronic toxicity is not considered “lethal”, when in fact the difference between acute and chronic is principally temporal – not an effects qualifier per se.

#### ***How will resolution of this issue add value to the EA?***

Clarify the basis for impacts related to toxicity effects.

*Who should provide the response?* De Beers

## **1.3 Wildlife and Wildlife Habitat**

### **1.3.1 Wolverines**

*IR Response Number:* 3.5.1 and see Sec 1.3.2 of Issue Rationale Document

*EA Reference:* 10.4.1.3.4

#### ***What is the Issue?***

This issue was addressed in Response 3.5.1 of the Report with regard to the GNWT’s request. However, although the Snap Lake EA (section 12.7.4.3.6) acknowledged that the loss of 16 wolverines in the Lac de Gras area since 1998 constituted a cumulative effect, we are still in agreement with GNWT that this issue has not been adequately addressed in the EA report (e.g., the Snap Lake wolverine surveys were conducted in April of 1999 and 2000, whereas wolverine densities are believed to be higher in November and December).

If wolverines have estimated home ranges varying between 48 km<sup>2</sup> and 535 km<sup>2</sup> (as noted in section 10.4.1.4.3 of the EA) and are not necessarily contiguous with one another, is it likely that the 100-km long survey around the project footprint conducted along the perimeter of a 25 km x 25 km square (i.e., for a total area of approx. 625 km<sup>2</sup>) would have missed the home ranges of some wolverines. It would appear that a more rigorous sampling strategy could be designed to account for migration habits, habitat diversity, home range and terrain variability.

***Why is it an Issue?***

De Beers notes that cumulative impacts from the Snap Lake Diamond Project on wolverine are expected to be low, but the confidence in making this prediction is also low. De Beers also notes that they are “aware of the limitations of using snow track counts to index the relative abundance of wolverines,” but that “no practical alternatives were proposed by GNWT during review of baseline data collection methodology.” They further note that they “remain interested in practical alternative survey methods and will continue to follow the development of more sensitive and reliable survey methods with interest.”

***How will resolution of this issue add value to the EA?***

Practical and sensitive methods for determining the relative abundance of wolverines in the project area need to be implemented to make defensible valid impacts assessments.

***Who should provide the response?*** GNWT and De Beers

**1.3.2 Raptors**

***IR Response Number:*** 3.10.22 and see Sec 1.3.2 of Issue Rationale Document  
***EA Reference:*** 10.4.1.3.6 and 10.4.2.3.1

↑ recommendation not a technical issue.

***What is the Issue?***

The responses to these information requests prompted further questions regarding road construction / use and blasting. The EA notes in section 10.4.2.3.1 (Linkage Analysis) that the operation of winter and esker access roads will occur subsequent to the birds migrating south and prior to the birds returning in the spring.

***Why is it an Issue?***

Based on the response we are unsure whether the construction of esker access roads also occur outside pre-nesting and nesting periods for raptors. Further, if any raptor nests are found within 2 km of the project footprint, it is not clear whether blasting activities will be suspended during the pre-nesting and nesting periods (approximately May 1 to June 15). The minimum distance for blasting activities to be suspended is not provided, when it may be possible that a raptor nest or nests are found closer than 10 km to the project footprint.

← IR not technical issue.

***How will resolution of this issue add value to the EA?***

Currently, impacts to raptors from various project-related activities are in question. Resolution of the issues will clarify potential impacts to raptors.

*Who should provide the response?* De Beers

### **1.3.3 Impact Assessment of COSEWIC-listed VECs**

*IR Response Number:* 3.10.23, and see Secs 1.3.1, 1.3.2 and 6.2 of Issue Rationale Document

*EA Reference:* 10.4.2

#### ***What is the Issue?***

The original request asked for an explanation for the apparent discrepancy between the intensive surveys conducted for waterfowl and upland breeding birds and the more cursory studies conducted on COSEWIC-listed VECs such as wolverines, grizzly bears and peregrine falcons. The response (i.e., greater densities and observing opportunities for waterfowl and upland game; greater logistical and financial constraints on the sampling design for wolverines, grizzly bears and raptors) indicates that the approach used may result in an inadequate data base for assessing impacts on COSEWIC-listed Valued Ecosystem Components, or at least one that is less adequate than for less vulnerable species. De Beers further notes that the sampling design for more elusive species with larger home ranges must rely on long-term data, and that baseline data on grizzly bears, wolverines and raptors has continued to be collected in 2001 and 2002. However, one of the technical issues raised by MVEIRB in their report (Rational of Technical Issues – De Beers Snap Lake Diamond Project, section 1.3.1) questions whether two years of data is enough upon which to base impact predictions. We concur with this observation. Examples provided in the Technical Issues report included studies conducted on grizzly bears, caribou, raptors and wolverines.

#### ***Why is it an Issue?***

If the sampling design for grizzly bears, wolverines and raptors must rely on long-term data collection, are further studies planned for these species other than baseline data collected in 2001 and 2002 (including the development, operation, closure and post-closure stages)?

#### ***How will resolution of this issue add value to the EA?***

Improve baseline and reduce uncertainty in impacts assessment.

*Who should provide the response?* De Beers and GNWT

### **1.3.4 Wildlife-Human Interactions**

*IR Response Number:* 3.10.24 and see Secs 1.3.3 and 1.3.4 of Issue Rationale Document

*EA Reference:*

p. 10-185

***What is the Issue?***

The original request involved costs and plans for relocating “problem” animals such as wolverines and grizzly bears. De Beers responded that relocating problem animals was the responsibility of RWED, but they further noted that they would “focus efforts on avoiding the creation of ‘problem’ animals through the removal of rewards and by negative reinforcement where necessary.” They go on to say that they are “reviewing plans for handling food waste and [are] considering incineration immediately after their production to eliminate the need for storage.”

***Why is it an Issue?***

- a) Plans for negative reinforcement include chasing animals away, notifying RWED, using rubber bullets, and other means. Would rubber bullets be used on smaller problem animals such as foxes or wolverines?
- b) Given that 1) relocation is not considered an option; 2) that there already exist cumulative impacts on wolverines from other projects, and 3) that the potential for cumulative impacts to develop for other VECs such as grizzly bears and wolves, is De Beers willing to commit to a plan to remove attractants through immediate incineration, or would there be a scenario where this option would be considered unfeasible based solely or primarily on its cost?
- c) De Beers notes that personnel will be educated on the risks associated with feeding wildlife (usually at the expense of the wildlife) and careless disposal of food garbage; however, it is often tempting to “befriend” or “help” a wild animal by offering it food. Personnel may also sometimes ignore or forget instructions not to feed wildlife or to leave debris that may attract wildlife. Will there be any consequences for personnel who ignore, disobey, or neglect these instructions, and if so, what will these consequences be?

***How will resolution of this issue add value to the EA?***

Improve understanding of potential success of proposed or to-be-developed mitigation strategies.

***Who should provide the response?*** De Beers and GNWT

## **2.0 GEOTECHNICAL**

### **2.1 ARD Issues**

#### **2.1.1 Containment Berms**

***IR Response Numbers:*** 3.10.1

***What is the Issue?***

De Beers reports in IR 3.10.1 that external containment berms will be constructed partly of non-acid generating rockfill. The north pile development plan indicates that preproduction metavolcanic rock will be used for construction of the north side of the

starter berm. De Beers states that approximately one-third of the metavolcanic rock is acid-generating.

***Why is it an Issue?***

De Beers has not specified how they will identify non-acid generating rockfill for berm construction. Further, berms containing potentially acid generating metavolcanic rock may generate acid and leach metals to the receiving environment or inhibit water treatment.

***How will resolution of this issue add value to the EA?***

Reduce the uncertainty associated with using PAG rock for construction purposes.

***Who should provide the response?*** De Beers

**2.1.2 Waste Rock Management Contingency Measures**

***IR Response Numbers:*** 3.10.3

***What is the Issue?***

De Beers comments that in case of acid generation in the metavolcanics, "Contingency measures for the metavolcanic material placed on site include removal to an oxygen-limiting environment if necessary". No details of the contingency measures are provided.

***Why is it an Issue?***

The potential removal of acid generating metavolcanic rock from the north pile may significantly effect the operation and performance of the containment system.

***How will resolution of this issue add value to the EA?***

Reduce the uncertainty associated with using PAG rock for construction purposes.

***Who should provide the response?*** De Beers

**2.1.3 Potential Impact of Acidic Surface/Bog Waters**

***IR Response Numbers:*** 3.10.5

***What is the Issue?***

An assessment of the acidic surface/bog waters will be provided in the 2002 Acid/Alkaline Report.

***Why is it an Issue?***

These waters may deplete the NP within the waste rock or kimberlite in the rock piles, leading to acid generation and metal leaching. The potential impact of these waters needs to be assessed and reviewed.

***How will resolution of this issue add value to the EA?***

Reduce the uncertainty associated with the operation of the rock piles.

***Who should provide the response?*** De Beers

**The following two IRs were submitted to the MVEIRB but not found in the Ruling Document, and we are unsure as to why they were left out.**

The issues described in the following IR are still very critical to understanding and assessing potential impacts to Snap Lake, and we would like these addressed in the technical sessions:

**EA Reference: 9.4.2.2.4 Impact Analysis Results, and Appendix IX.7, Water Quality Modeling**

Preamble: Significant changes to the water quality of Snap Lake and other water bodies will result from project activities. Much of the residual impacts analysis is dependent on the results of water quality modeling, yet the results are not without uncertainty. Based on the modeling, the environmental consequences of residual impacts to the water quality of Snap Lake are deduced to be either low or negligible. Clearly, this conclusion is counter-intuitive, knowing that this relatively small lake (and associated small watershed) will be the sole source of dilution for >25 years.

Request: A more robust analysis and discussion of model assumptions and uncertainty is required. Please provide explanations for the following seven model issues:

- 1) It is stated that the RMA models assume depth-averaging. This assumption is not applied year round. The discussion on page 9-218 and 9-219, and Figure 9.4-10 attempt to describe this condition.
  - 1a) How were temperature and density contrasts of the effluent and ambient lake water characterized during the ice-cover season (or majority of time)? and
  - 1b) What is the sensitivity of the model conclusions to these assumptions?
- 2) The CORMIX model is used to simulate the mixing process in the near-field environment, and assumes steady-state conditions. It is not clear what were some of the underlying assumptions for applying the CORMIX model. It appears that because CORMIX was used for the near-field (i.e., diffuser), the model assumes that a steady-state and infinite supply of water for dilution is available. It is clear, however, that Snap

Lake is a relatively small water body with many inlets and embayments and with a limited circulation.

- 2a) Please explain what is meant by steady-state and how this assumption is applicable to the year-round hydrodynamics at Snap Lake.
  - 2b) Does this assumption apply to water quality as well as hydrodynamic conditions?
  - 2c) How were the RMA models and CORMIX models integrated?
- 3) On page 9-219, it is stated that derived bulk dilution factors were 34:1 for the first seven years and 12:1 for the next 18 years.
- 3a) Please explain the logic in assigning only two constant dilution factors for only two time periods (i.e. reasoning for simplified variability), and
  - 3b) explain what the limiting factors were in the derivation of these factors.
- 4) With respect to the RMA models:
- 4a) Please explain the operating assumptions for the RMA models and how they are applicable or not applicable to the modeling of the subarctic, limnological, biological and physiographical conditions found at Snap Lake (and any other water bodies simulated for this study).
  - 4b) Please provide the manual that describes for example the model derivation, assumptions, calibration routines, and input and output, etc. for these models.
- 5) The RMA models are two-dimensional (i.e., assume depth averaging). It is not clear what the sensitivity of the results is to this assumption. Similarly, it does not appear as if the degree of uncertainty was considered during subsequent analyses (i.e., residual effects).
- 5a) Please provide an uncertainty analysis that addresses the sensitivity of each parameter (i.e., temperature, density, etc.) to changes or un-modeled scenarios, and other plausible hydrodynamic and water quality conditions that were not (i.e., stratified conditions) or could not be modeled.
- 6a) During the ice-cover season, aside from reducing wind shear to zero, were there any other model assumptions or considerations that were different than the ice-free season?
- 6b) For example, was ambient lake temperature and density assumed to be constant throughout the ice-cover season?
- 6c) Were density plumes considered?
- 6d) Also, please explain how these assumptions varied during freeze-up and break-up of the lake ice.
- 7a) Were all inflows portioned to specific areas of the lake (i.e., the sub-watersheds) or were they assumed to occur uniformly over a fully-mixed water body?
- 7b) Please provide the map that shows the sub-watershed delineations, and explain how this map was derived and utilized within the model framework.

### **Fish Abundance**

***IR Response Number:***

IR not forwarded by MVEIRB

**ER Reference:**

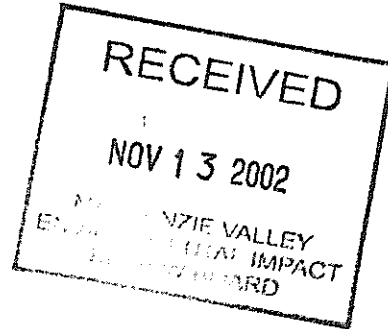
## 9.5.2.5 Key Question F-4

Preamble: As described in comments on previous Key questions 1-3, the linkage determination and impact analysis is in question. Since much of Key Question – F4 analysis is correlated directly to these previous analyses, it is invalid. From a practical perspective, changes in fish abundance is perhaps the most important end result and therefore must be a complete and inclusive analysis for prediction of the impact. It is basically the culmination of all the physical and ecological affects from the Project. Rather than looking at all of the potential impacts and attempting to determine a resulting impact on fish populations, the analysis here is the opposite. The direction in this section is to eliminate all of the small or “negligible impacts” from the analysis. Worse yet, it appears that overall fish abundance changes are only considered if two or more individual impacts are present. This makes no sense from a biological or practical perspective.

Requests: 1) Provide a practical and scientific based approach to predict changes in fish populations. 2) From these results, reassess residual impacts and corresponding mitigation.

# DE BEERS

12 November 2002



Mackenzie Valley Environmental Impact Review Board  
Box 938, 5102 – 50<sup>th</sup> Street  
Yellowknife, NT  
X1A 2N7

Attention: Louie Azzolini, Environmental Assessment Officer

Dear Louie:

**SUBJECT:                    Submission of De Beers' Written Comments on the Gartner Lee Ltd. Issues Rationale Document for the Public Registry**

As per its commitment given at the 8 November 2002 Pre-technical Session Conference, De Beers Canada Mining Inc. (De Beers) hereby submits comments on the Gartner Lee Ltd. Issues Rationale Document to the Mackenzie Valley Environmental Impact Review Board (the Board) for submission to the public registry. These comments are outlined below and are organized according to the issue number and title, as assigned by Gartner Lee Ltd.

## **1.0 ENVIRONMENTAL IMPACTS**

### **1.1 Water Quality/Quantity**

#### *1.1.1 Water Treatment Plant – Operation and Capacity*

This level of detail is appropriate to a Water Licensing phase and should be deferred to that stage. From an assessment point of view, De Beers has stated that we will reach the treatment levels and implement stated contingency planning, the details of which are appropriate to the Water Licensing stage, as stated by Gartner Lee Ltd. This is not an outstanding technical issue for a technical session.



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

### *1.1.2 Water Treatment Plant – Water Management Pond*

This level of detail is appropriate to a Water Licensing phase and should be deferred to that stage. From an assessment point of view, De Beers has stated that we will implement stated contingency planning, the details of which are appropriate to the Water Licensing stage, as stated by Gartner Lee Ltd. This is not an outstanding technical issue for a technical session.

### *1.1.3 Groundwater – Impacts on Lakes (quantity/quality)*

This issue was specifically addressed with the submission of the North Lakes Technical Report to the public registry on October 3, 2002 and was also discussed at the North Lakes Technical Information Session on October 9, 2002. This is not an outstanding technical issue for a technical session.

Operational and long-term loading estimates were dealt with in the EA under Appendix IX.1 and again in the North Lakes Technical Report. This is not an outstanding technical issue for a technical session.

Phosphorous issues should be dealt with under issue 1.1.7 (see below).

### *1.1.4 Groundwater – Inflows to Mine and Pumping System*

As stated by Gartner Lee Ltd., this information is required to substantiate the treatment requirements for the Water Treatment Plant, and is directly related to issues 1.1.1 and 1.1.2. This level of detail is appropriate to a Water Licensing phase and should be deferred to that stage. From an assessment point of view, De Beers has stated that we will reach the treatment levels and implement stated contingency planning, the details of which are appropriate to the Water Licensing stage, as stated by Gartner Lee Ltd. This is not an outstanding technical issue for a technical session.

### *1.1.5 Increase in Total Dissolved Solids (TDS) in Snap Lake*

Maximum TDS levels that will be achieved in Snap Lake are below any recognized effect levels for aquatic organisms. To this end, no shift in community structure is predicted and there is no associated need for a technical session.



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

### *1.1.6 Treatment of Drinking Water*

De Beers commits to all potable water being filtered and chlorinated to NWT drinking water standards. A more detailed description of the potable water treatment system will be provided to the MVLWB during Water Licensing. Given the stated commitment, this is not an outstanding technical issue for a technical session.

### *1.1.7 Accuracy of Phosphorus Model*

De Beers strongly disagrees with the statement that the phosphorous model is inaccurate and predictions invalid. However, it is apparent that reviewers are not able to reconcile the counter-intuitive results. For this reason, De Beers considers that a tech session to discuss the results of phosphorus modeling would be worthwhile.

### *1.1.8 Water Quality – Impacts on North and Northeast Lakes*

The North Lakes Technical Report and Technical Information Session (October 2002) thoroughly addressed impacts on the North & Northeast Lake. This is not an outstanding technical issue for a technical session.

## **1.2 Aquatic Habitat**

### *1.2.1 Impact on Lake Sediments*

De Beers considers that a Technical Session on this topic would further contribute to an understanding of the EA. No further information on the Issue Statement is required.

### *1.2.2 Lake Level Fluctuations*

IR 3.10.17 responded that water levels would increase (not decrease) by only 33-53mm. Given the small magnitude of the predicted change, it would be very difficult to distinguish this magnitude of change as depicted on a plan view, and there would be no added value to the impact assessment. This is not an outstanding technical issue for a technical session.



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

### *1.2.3 Inadequate Baseline Information on Lake in Headwaters of S-27*

This issue has been wholly addressed within the EA. Site plan details in Section 3 show that S-27 is within the LSA, but no infrastructure infringes on the lake, and the road and magazine were sited to specifically avoid any stream crossing or infringements on any lakes in that sub-basin. This is not an outstanding technical issue for a technical session.

### *1.2.4 Pore Water Quality/Northeast Lake Habitat*

The North Lakes Technical Report and Technical Information Session (October 2002) thoroughly addressed impacts on the North & Northeast Lake, including this issue. This is not an outstanding technical issue for a technical session.

## **1.3 Wildlife and Wildlife Habitat**

### *1.3.1 Lack of Wildlife Baseline Information*

Wildlife baseline data collection programs were reviewed by communities and regulators prior to initiation of the program, and therefore do not require a technical session. The issue of uncertainty is thoroughly addressed in the impact predictions.

Grizzly bears IR 2.5.19, 2.5.20, grizzly sign in 2.5.19 d) and 4.12.8.

Caribou- 2.5.15, 2.5.18 and 4.12.4, 4.12.5, and 4.12.6

Raptor surveys- 3.10.22.4.12.10, 4.12.11

Wolverine track surveys- 4.11.19 and 4.12.19

This is not an outstanding technical issue for a technical session.

### *1.3.2 Wildlife Study Design*

Wildlife study designs received review from communities and regulators prior to initiation of the program and do not warrant a technical session. Further detail has been provided in the IRs:

Grizzlies: 2.5.20, 4.12.7, 4.12.16

Raptors: 3.10.22, 4.12.10, 4.12.11

Wolverines: 2.5.21, 3.5.1, 3.10.24, and 4.12.9



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

Accuracy of impact predictions and success of mitigation will be determined through continued monitoring. This is not an outstanding technical issue for a technical session.

### *1.3.3 On-site Wildlife Management*

De Beers has commented substantially on the issue of wildlife management in the EA and IRs 2.5.25 and 2.2.12, however a technical session on this topic could be considered valuable.

### *1.3.4 Waste Management*

Substantial detail on the present waste management program was provided in the EA (Appendix III.3) and in IR's 2.5.30, 2.5.31, 4.11.28 and 2.2.4. More complete details on waste management will be provided during the appropriate phase of the regulatory process. The efficacy of the program will be measured through mandatory monitoring and reporting under the auditing component of the Environmental Management System (EMS). This is not an outstanding technical issue for a technical session.

### *1.3.5 Wildlife Training*

De Beers has already committed in the EA to training all personnel in environmental practices including waste management, wildlife encounters, prohibiting animal feeding, etc. Training needs and implementation are identified through the ISO 14001 EMS, which is subject to audit. An assessment of the training program will not further contribute to the EA. This is not an outstanding technical issue for a technical session.

## **2.0 GEOTECHNICAL**

### **2.1 North Pile – Residual Fe/ARD**

This issue can be included in a North Pile Technical Session which would also cover thermal conditions, climatic change, and paste composition.



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

## **2.2 North Pile – Slope Stability, Rate of Freeze Back/Seepage Pressures**

The issue as stated by Gartner Lee Ltd. comes down to clarifying whether De Beers is committed to providing adequate instrumentation, monitoring, & ongoing analysis. De Beers is committed to these issues and will provide details during the appropriate regulatory phase. This is not an outstanding technical issue for a technical session.

## **3.0 SOCIAL ECONOMIC AND CULTURAL COMPONENTS**

### **3.1 Cultural Resources/Land Resource Use**

#### *3.1.1 Accommodating Cultural Practices*

This is not an outstanding technical issue in that it deals with minor variations in work practice that should clearly be seen as an operational procedure. This is not an outstanding technical issue for a technical session. The issue of 2 weeks in/2 weeks out rotation has been thoroughly dealt with in the EAR, IRs 1.33, 1.38, 2.5.33 and Non-conformity Item #6.

#### *3.1.2 Adequacy of Mitigation*

De Beers considers that a technical session will provide an opportunity for the company to present an update on the status of developing partnerships, as well as providing Government agencies and communities an opportunity to outline how they can contribute.

### **3.2 Economy**

#### *3.2.1 Prediction of and Commitment to Northern Benefits*

This issue statement is incorrect and has been dealt with comprehensively in the EA and IRs 1.20, 1.27, 1.36, 2.5.57, 2.5.59, and 2.5.45. De Beers does have stated targets; specifically, to employ as many qualified aboriginal people as possible in all phases of the project. This target is not quantitative as we expect an increase over time due to the implementation of the Impact Management Measures. These measures will assist increasingly more



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

aboriginals and northerners to become qualified for a range of positions at Snap Lake.

As per other impact assessments, assumptions were made to enable economic analysis to take place (assumed 60% of the workforce is northern, and 30% of this 60% would migrate to the NWT). The issue of "spending targets" is similarly addressed in the EA and in IRs 1.28, 1.41, 2.2.5, 2.5.46 and 1.28. Estimates will be further refined during the detailed engineering. This is not an outstanding technical issue for a technical session.

### *3.2.2 Adequacy of Economic Data (Statistical Information)*

#### *3.2.2.1 Other Operating Surplus*

The company's profits are proprietary, beyond the Terms of Reference and should not be considered an outstanding EA issue. Estimates of direct GDP are accurate because 'other operating surplus' was not used in the Input-Output model. There is no outstanding issue for a technical session.

#### *3.2.2.2 Inconsistent Labour/Employment Data*

This is simply a clarification requirement that will be addressed by De Beers for submission to the public record.

#### *3.2.2.3 Tax Benefits*

This is simply a clarification requirement that will be addressed by De Beers for submission to the public record.

### **3.3 Government (Municipal/Territorial/Federal/First Nations)**

#### *3.3.1 Adequacy of Regional (highways, education, hospitals) and Community Infrastructure*

This is not an outstanding EA issue for the Snap Lake Diamond Project. De Beers Conformity Response and IR's 2.5.6, 2.5.15, 2.5.48, and 2.5.55 indicate an absence of methods for estimating effects on infrastructure. Moreover, in *Communities & Diamonds – 2001 Annual Report*, the GNWT reports that



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

"systems are not in place to quantify impacts on government." As acknowledged by Gartner Lee Ltd., this is not a De Beers issue, and a long-term solution outside the EA process may need to be developed.

### **3.4 Community**

#### *3.4.1 Adequacy of Mitigation Measures – Continued Consultation/Liaison*

This issue statement is unclear. However, to ensure complete understanding of the Mine Management Advisory Committee (MMAC), De Beers would propose that a technical session be held to further discuss the MMAC, including how it will operate and the role of community liaison personnel.

#### *3.4.2 Adequacy of Mitigation Measures – Fly-in/Fly-out, Directly to Communities*

IR 2.5.47 states "For the primary communities other than Yk, Rae-Edzo, Dettah & N'dilo, De Beers will provide flights to and from the mine site that do not pass through Yellowknife." The term "when possible" is not included in this commitment. Further, the intent is to take advantage of the recently opened airstrip at Rae/Edzo, however, it is not a commercial airstrip and no discussion has occurred to date with the Rae/Edzo Band regarding permission. In providing this commitment, the concern expressed by communities regarding stopovers in Yellowknife is negated and there is no outstanding technical issue for a technical session.

## **4.0 SCOPE OF DEVELOPMENT**

### **4.1 Confirmation of Production Rates**

The production rate has been confirmed at 3000 tonnes per day in the EA and IRs 2.4.11, 2.5.60, 2.6.5, 3.11.3 and 4.8.9, and is therefore production rate is not considered an outstanding issue.



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

De Beers considers that questions related to the effects on dilution and the relationship to the waste rock pile would benefit from further discussions at a technical session. A definitive issue statement is required here.

## **5.0 ABANDONMENT AND RESTORATION**

### **5.1 Reclamation Closure Planning**

A Reclamation and Closure Plan has been provided at an appropriate level of detail in relation to the permitting process (Appendix III.11). Further detail will be provided at the pertinent regulatory phase. This is not an outstanding technical issue for a technical session.

### **5.2 Revegetation**

The level of detail regarding revegetation planning provided in the EA is appropriate to this stage of the permitting process. Beyond this, further detail will be provided according to regulatory requirements at the pertinent regulatory phase.

## **6.0 CUMULATIVE IMPACTS**

### **6.1 Methodology**

#### *6.1.1 General CEA Methodology*

Firstly, the ToR do not require De Beers to follow the methods outlined in the *Cumulative Effects Assessment Practitioners Guide (CEAPG)*. Second, and more importantly, following the CEAPG without modification would require us to contravene the ToR; CEAPG requires significance be addressed, yet the ToR specifically forbid that. Additionally, the framework provided in the Practitioners Guide is fully intended to allow flexibility. This is not an outstanding technical issue for a technical session.



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

### *6.1.2 Socio-economic – Categories of Analysis*

Socio-economic cumulative effects assessment is still evolving. Recognizing that there are limitations in the methodology, De Beers will provide a table for submission to the public registry illustrating the linkages between the 20 issues and the 5 broad categories as requested. Outside of this, the issue of the limitations to methodology is inherently beyond the scope of a technical session for any single project. This is not an outstanding technical issue for a technical session.

### *6.1.3 Consideration of Other Developments*

As stated in IR 4.8.5, the CEA process under the Practitioners Guide ensures that assessment focuses on those projects that are likely to have a measurable impact, and that analysis remains manageable and practical. Considering this in light of another principal of using any available information for analysis, CEA inherently focuses on those projects for which some assessment or other documentation exists. Moreover, the Terms of Reference state that, for CEA, “the analysis should present data and analyses that are verifiable in nature, and quantitative where data are available”. This is not an outstanding technical issue for a technical session.

## **6.2 COSEWIC Wildlife Species**

The additional concern for COSEWIC listed species (state it) has already been considered in the residual impact assessment. This is not an outstanding technical issue for a technical session.

## **6.3 Employment Predictions**

This issue was addressed in IR 1.27 and was not raised again during the IR process. This is not an outstanding technical issue for a technical session.



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

## 7.0 BIODIVERSITY

### 7.1 Methodology/Scope

The Terms of Reference did not require consideration of biodiversity, nor did the Conformity analysis identify biodiversity as a deficiency. De Beers provided this additional information to enhance the vegetation component of the EA and in consideration that the biodiversity of wildlife is directly related to that of wildlife habitat (vegetation). This is not an outstanding technical issue for a technical session.

We would respectfully request that you consider these points when determining issues which should be carried forward to a technical session. We would also refer you to De Beers' submission at the pre-hearing conference of a proposed framework for the technical sessions. This letter clearly outlines the objectives, principles, protocols, and format that would contribute to an effective and efficient process that would benefit all parties and again should be taken into consideration when reviewing the above information.

Should you have any questions on this information, please feel free to contact the undersigned at (867) 766-7322.

Sincerely,  
**SNAP LAKE DIAMOND PROJECT**

Robin Johnstone Ph.D.  
Senior Environmental Manager



**DE BEERS CANADA MINING INC.**

#300 – 5102 50<sup>th</sup> AVENUE  
YELLOWKNIFE NT X1A 3S8 CANADA  
TEL (867) 766-7300 FAX (867) 766-7347

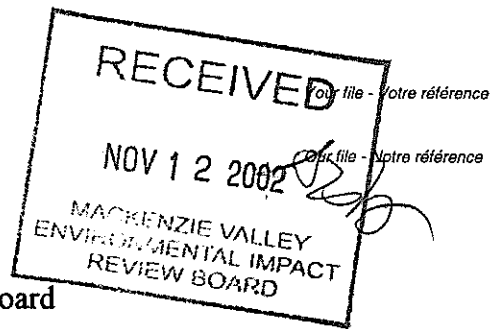


Indian and Northern  
Affairs Canada  
www.inac.gc.ca

Affaires indiennes  
et du Nord Canada  
www.ainc.gc.ca

November 8, 2002

Gordon Wray, A/Chair  
Mackenzie Valley Environmental Impact Review Board  
Box 938, 5102-50th Avenue  
Yellowknife, NT  
X1A 2N7



**Re: Rationale for Technical Issues for the Pre-Hearing Conference and Technical Sessions, De Beers Snap Lake Diamond Project**

Dear Mr. Wray,

Please find attached a list of Indian and Northern Affairs Canada's (INAC)'s outstanding issues and supporting rationale for discussion at the Pre-Hearing Conference.

These issues are considered critical to the evaluation of the environmental effects of the DeBeers Snap Lake Project and must to be discussed during the upcoming technical sessions set for the end of November, 2002.

We trust that this submission meets the Mackenzie Valley Environmental Impact Review Board's requirements. Should you require further assistance please do not hesitate to contact me at 669-2616 or Fraser Fairman at 669-2587

Sincerely,

Tamara Hamilton  
Environmental Scientist  
Indian and Northern Affairs Canada

## **Water Resources DeBeers Review Team List of Topics and Issues for the MVEIRB EA Technical Sessions**

### **Water Quality/Quantity**

#### - adequacy of baseline

The baseline data currently available are insufficient for many key variables (eg. phosphorus, benthos, zooplankton, etc.).

Rationale: Evaluation of effects on WQ and ecological receptors requires an understanding of baseline conditions in receiving water systems including spatial and temporal variability in wq, sediment quality, and biological indicators.

#### - derivation of site specific water quality benchmarks

DIAND doesn't agree with all of the methods or underlying assumptions that were used to support the EA. And DIAND believes that applications of alternate methods and/or alternate assumptions would have resulted in more stringent benchmarks.

Rationale: The assessment of the effects of releases of toxic and or bioaccumulative substances is dependent on the development of conc./response relationships for key variables in water, sediment, and biological tissues. The methods and underlying assumptions that are used to derived site specific benchmarks can substantially influence the results of the assessment.

#### - selection of impact assessment criteria

DIAND does not agree with the impact assessment criteria that were selected for use in the EA. More specifically the cut-offs for identifying minor, moderate, and major effects were not stringent enough. For eg. HC20 values identify the concentrations of COPC's above which adverse effects on 20% of the aquatic community are likely to occur. DIAND believes that major effects on northern ecosystems are likely to occur if a much smaller proportion of the aquatic community is adversely affected (ie. particularly of they are keystone species).

Rationale: The selection of impact assessment criteria is central to the EA in that the criteria provide a basis for predicting if an adverse effect will occur and evaluating the magnitude and aerial extent of the effects.

#### - water treatment plant, operation/capacity

i) Design criteria are for removal of sediment material only.

Rationale: There is a need to consider alternate designs to address the removal of other constituents (eg. phosphorus, metals, ammonia, major ions).

- ii) The EA needs to consider the higher concentrations of connate groundwater likely to occur in the vicinity of the mine workings below depths of 125m.

Rationale: Assessment of water treatment plant performance and impacts to Snap Lake during mining operations requires reliable characterization of the quality of mine water discharge, in particular connate groundwater quality. The characterization of connate groundwater quality used in the EAR is based on average analytical results for groundwater samples collected during the AEP from the upper parts of the proposed mine (<165m depth). Based on the expectation that connate groundwater salinity will increase substantially with depth and considering the results of Debeers groundwater upwelling analysis and north lakes investigations, TDS, chloride, other major ions, and phosphorus concentrations of connate groundwater used in the EAR are likely underestimated by factors of 2 to 3.

- impacts of effluent discharge on Snap Lake

There will likely be higher levels of several water quality variables than have been predicted in the EA.

Rationale: The EA assumes complete mixing of effluent within the lake. Therefore, impacts on aquatic organisms following full mixing in the lake are likely to have been underestimated. In addition, the characteristics of the effluent are likely to impede mixing during the winter period under ice. (ie. due to the negative bouyancy of the effluent). Furthermore, the potential for complete mixing of the effluent with lake water during the open water period is uncertain due to the lack of information on the effects of currents on mixing in the lake.

- Accuracy of phosphorus model

The EA underestimates levels of the groundwater releases, overestimated in-lake concentrations during the critical open water period.

Rationale: Releases of phosphorus to Snap Lake and associated in-lake concentrations and loadings may be substantially higher than those predicted in the EA. Accordingly, the predictions in the EA are likely to be substantially underestimated the effects of phosphorus releases on the trophic status of Snap Lake. In addition, secondary effects of eutrophication (ie. depressed levels of dissolved oxygen under ice) are likely to have been substantially underestimated.

- Releases of ammonia to Snap Lake

The water quality benchmarks that were used to assess the effects of ammonia in Snap Lake are not conservative (ie. benchmarks do not consider the toxicity of the ionized ammonia fraction).

Rationale: Adverse effects on aquatic life would likely have been predicted had more appropriate benchmarks been used in the assessment.

## **Aquatic habitat**

### - impact on lake sediments

The fate of the dissolved metals fraction of the effluent discharge was not considered in the EA.

Rationale: The dissolved metals are likely to be rapidly absorbed by phytoplankton, and ultimately deposited in lake sediments. Therefore, concentrations of metals in sediments could be substantially higher than would be the case if only the particulate metals fraction was considered in the EA.

## **Geotechnical/North Pile**

The plans for construction, operation and closure of the north pile depend on the physical properties of the paste. These properties include; grain size distribution, pore water content and chemistry, and quality and quantity of any additional process water.

The proponent has acknowledged that there is limited experience with paste technology as applied to processed kimberlite tailings. There are few cases involving surface discharge of paste tailings. There is no prior operating experience with this technology in permafrost regions.

The proponent has acknowledged that further testing is required to solve several aspects of the north pile design. In addition to the issues the proponent intends to address, there are several considerations which remain outstanding.

The proponent has not addressed the implications of a higher moisture content in the paste than assumed or large internal ponds in the north pile, both of which could result from operational considerations or practical limitations.

DIAND envisions that the ramifications of these issues may include:

- water management considerations for pore and free water
- increased seepage from the pile
- slope stability on closure

In addition, the anticipated performance of the perimeter ditches will be difficult to achieve and requires further consideration.

The following must be addressed in detail to resolve the above general issues:

1. Paste properties which must be further characterized include:

- grain-size variations in the full mix paste to be deposited in the north pile, in particular in the 29% fine fraction, and as may occur due to changes in the ore, footwall dilution, and backfilling and/or north pile berm construction,
- variations in pore-water chemistry and the freezing-point depression due to the presence of solutes,

Operational issues which must be further evaluated include:

- potential discharge scenarios which may be the outcome of the experimental discharge work in the start-up of operations, including the effects of higher water content in the paste delivered to the north pile, ice accumulation in the north pile, steeper slopes at paste discharge points, encapsulation of thawed material during paste discharge.
- north pile internal-water pond management, considering the depth and potential for talik formation, and the effects of the initial internal ponds on ground surface temperature, including thawing of permafrost and increased seepage.
- perimeter ditch design and efficiency.

Thermal modelling issues which must be further evaluated include:

- several aspects in the geothermal model, including: geothermal gradient, assignment of n-factors, and thermal properties of the construction materials. Table 10.2-7 of the EA submission should be reviewed.
- unspecified freezing characteristics of the PK fines and full mix PK, and their implication for distribution of latent heat with temperature, in particular the unfrozen water content characteristic of the full-mix paste.
- the assignment of frozen conditions to the pile when the calibration data underestimate ground temperatures by up to 3°C, and the bulk of the pile is estimated at within 0.3°C of 0 °C several years after construction.

Slope stability issues which must be further evaluated include:

- the effect of elevated pore pressures in wedges of PK (full mix or fines)
- freeze/thaw characteristics of the PK coarse/grits and the potential for evolution of this material into a frost-susceptible material.

### **Cumulative Impacts**

The Cumulative effects assessment presented in the EA is insufficient to evaluate cumulative effects.

Rationale: DIAND believes that the EA currently underestimates the effects of various mining activities and discharges on aquatic organisms. In addition, the interactive effects of various mining activities and discharges have not been fully evaluated. Furthermore, the interactive effects of the Snap Lake project with other land and water use activities within the Lockhart River Basin (ie. locally), Slave geological province (ie. regionally) and broader areas (ie. globally) have not been evaluated.

## Louie Azzolini

---

**From:** Glenda Fratton [gfratton@gartnerlee.com]  
**Sent:** Wednesday, November 13, 2002 12:49 PM  
**To:** Louie Azzolini  
**Cc:** tdemarco@sympatico.ca  
**Subject:** Re: FW: October workshops in Calgary and technical sessionschedule for wildlife



Workshop  
Participants.doc

Louie:

Attached is the list of participants that attended the Calgary Workshop. As the Issue Rationale document was based on the outcome of the workshop, there is no other useful information to offer from the workshop

Glenda

Glenda Fratton, M.Sc., P.Biol.  
Gartner Lee Limited  
840 7th Avenue SW, Suite 1605  
Calgary, Alberta T2P 3G2  
Tel: (403) 262-4299 ext. 121  
Fax: (403) 250-5330  
e-mail: gfratton@gartnerlee.com

>>> "Louie Azzolini" <lazzolini@mveirb.nt.ca> 11/13/02 11:06AM >>>

Glenda, can you please provide Ms. DeMarco the list of those that physically attended that meeting. Please copy me on that correspondence.

Sincerely,  
Luciano Azzolini

-----Original Message-----

From: Terry DeMarco [mailto:tdemarco@sympatico.ca]  
Sent: Tuesday, November 12, 2002 6:46 PM  
To: Louie Azzolini  
Cc: Janet Hutchison  
Subject: October workshops in Calgary and technical session schedule for wildlife

Hello Louie,

A couple of questions for you.

Gartner Lee's "Rationale of Technical Issues" document and the accompanying cover letter make reference to a Technical Workshop held in Calgary on October 15 and 16, 2002. Could you please advise as to who attended this workshop? Also, is there any information from the workshop that it would be helpful for the parties to review prior to the technical sessions?

With respect to the schedule for the technical sessions themselves, I understand that certain subject-matters will be covered on certain days between November 25 and December 6. Our consultant on wildlife issues has indicated that it

would present some difficulty for him to be available on November 26 and 27. I suspect that wildlife impacts, because they are tied to a number of other issues, would best be scheduled later rather than earlier in the technical sessions in any event but would appreciate any efforts that can be made to avoid scheduling the wildlife discussions on November 26 and 27.

Thank you.

Terry DeMarco

**List Participants at the October 15 &16, 2002 Calgary Workshop**

<b>Name</b>	<b>Company</b>	<b>Role</b>
Vern Christensen	MVEIRB, Yellowknife	Executive Director
Joe Acorn	MVEIRB, Yellowknife	EA Officer
John Donihee*	Canadian Institute Of Resources Law, Calgary	Legal Counsel to MVEIRB
Stephen R. Morison	Gartner Lee Limited, Calgary	Facilitator, Terrain/Geology
Glenda Fratton	Gartner Lee Limited, Calgary	Vegetation (ELC/Biodiversity)
Heidi Klein	Gartner Lee Limited, Calgary	Cumulative Effects
Tom Pye	Gartner Lee Limited, Calgary	Hydrogeology
Rob Dickin	Gartner Lee Limited, Burnaby	Hydrogeology
Dave Osmond	Gartner Lee Limited, Burnaby	Aquatics
Patty Hogg	Gartner Lee Limited, Yellowknife	Wildlife & Wildlife Habitat
Neil Hutchinson	Gartner Lee Limited, Bracebridge/Markham	Surface Water Quality
Jim Edmondson	Consilium, Yellowknife	Socio-economics
Ed Weick	Consilium, Ottawa	Socio-economics
Roy Ellis	Independent Consultant, Yellowknife	Economics
Mark Watson	EBA Engineering, Edmonton	Geotechnical
Tony Keen	A.J. Keen Mining Consultants Inc., Vancouver	Reclamation & Mine Engineering

*\* John Donihee participated only in the late afternoon component of the October 15, 2002 session by providing an overview of the technical session process.*

**Note:**

*Eric Denholm, Gartner Lee Limited and Peter Usher, Consilium provided written input on Acid Rock Drainage and Traditional Knowledge/Traditional Land Use (respectively) prior to the workshop, but were not in attendance at the workshop. Their material was presented and discussed, however. Steve Morison presented on behalf of Eric Denholm, and Ed Weick presented on behalf of Peter Usher.*