May 27, 2002

Luciano Azzolini
Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
BOX 938
YELLOWKNIFE NT X1A 2N7

Dear Mr. Azzolini:

Re: SNAP LAKE DIAMOND PROJECT ENVIRONMENTAL ASSESSMENT

Please find attached the third round of Information Requests from Indian and Northern Affairs Canada for the Snap Lake Diamond Project.

I will be the primary contact person that will be responsible for handling any questions related to the Information Requests. The following is my contact information:

Environment and Conservation Division
Indian and Northern Affairs Canada
PO BOX 1500, YELLOWKNIFE NT X1A 2R3
Phone: (867) 669-2616
Fax: (867) 669-2701
Email address: hamiltont@inac.gc.ca

If you have any questions or concerns regarding these Information Requests, please do not hesitate to contact me.

Sincerely,

Tamara Hamilton
Environmental Scientist
Environment and Conservation Division

Attachment

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No.: L-10

Section*Social, Economic and Cultural Components*
Land and Resources Use

Source:Dept. Indian Affairs and Northern Development (DIAND)

Date: May 27th, 2002

Reference: Sections 6.4.2.2, 6.4.2.4, 6.6.2.3, 6.4.2.4

ToR Line: Section 2.7.2. IV & V
Lines 442 to 455

To: De Beers Canada Mining Inc.

Preamble: The Terms of Reference call for De Beers to analyze and describe the impact from the development on land and resource users, including traditional, seasonal and permanent camps & cabins. In response, Section 6.4.1.6 (page 6-71), De Beers states permanent cabins are likely within the Regional Study Area, but are unable to provide further details on ownership, purpose and location because of the lack of land use records relating to this use.

The very nature of some of these activities, may preclude the requirement for authorizations and records to be kept, consequently, alternate means such as additional consultations, aerial tours, etc should be employed to first, confirm there existence and second, whether they will be impacted by the project.

Request: Please confirm the existence of any permanent cabins with the Regional Study Area. Include location and if known, the owner and purpose of the cabin.

Where cabins exist, include an assessment of what the potential impact would be from the project.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-6

Hydrogeology

6.1 Source: Ken Raven, Intera Engineering Ltd.
On behalf of Indian and Northern Affairs Canada

Reference: EAR, Section 9.2.2; Appendix IX.1, Sections 5.

TOR Line: 337 to 341, 344 to 350, and 381

To: De Beers Canada Mining Inc.

Preamble: The GoldSim model, in calculating mine water loadings, considers instantaneous release of consolidation water from mine panels backfilled with cemented PK paste. At any time the overall effect of this release is calculated to be minor due to the limited number of mine panels releasing water (est. to be ~2) and the relatively small volume of consolidation water relative to the total volume of pumped mine water. However, because the mine panels will not be completely backfilled/resealed and a permeable layer will exist above the backfill, groundwater will continue to inflow to the mine via backfilled mine panels throughout the operating phase of the mine. Such operational inflows and leaching from backfilled cemented PK paste will contribute ongoing chemical loading to the mine water discharge, beyond the instantaneous loading provided by consolidation water. The existing GoldSim models do not consider this loading of mine water due to leaching of chemicals from the backfilled mine panels during mine operations. Since leaching of cemented PK paste under post-closure conditions is shown to create elevated levels of pH, and selected metals (Al, Cr, and Mo), leaching of backfilled mine panels during mine operation may create additional loadings to Snap Lake.

Request: Please provide:

(a) The explanation and justification for why incremental chemical loading from leaching of mine panels backfilled with cemented PK paste during mining operations is not included in the GoldSim model.

6.2 Source: Ken Raven, Intera Engineering Ltd. on behalf of INAC.

Reference: EAR, Section 9.2.2; Appendix IX.3, Section 2.4

TOR Line: 221, 337 to 341, and 351 to 355.

To: De Beers Canada Mining Inc.

Preamble: Subsidence of the hanging wall bedrock above the mine workings is expected to occur as mining progresses and mine pillars are removed. This settlement of the mine roof will create minor movements within the overlying rock mass that will likely result in increases in bedrock hydraulic conductivity. The existing MINEDW model, used to simulate groundwater inflows to the mine, assumes that the hydraulic conductivity of the hanging wall rock is increased by factors of 10 near the mine to 3.3 at the assumed neutral axis (i.e., halfway from mine roof to the bottom of exfoliated zone), but that these increases only occur after mining is complete, when drain nodes are not activated. Small changes in fracture opening and/or fracture interconnection caused by subsidence can create large increases in groundwater inflow to the mine during the operational phase because the bedrock hydraulic conductivity is entirely due to fractures. If the subsidence-induced changes in bedrock hydraulic conductivity extend locally to the exfoliated zone, the increases in groundwater inflow might be substantial. The rationale or basis for the assumed timing, spatial distribution and magnitude of changes in hanging wall hydraulic conductivity due to subsidence are not given.

Request: Please provide:

(b) An explanation and rationale for the assumed spatial distribution and magnitude of changes in hydraulic conductivity of the hanging wall bedrock due to mine subsidence.

(c) An explanation and rationale for the assumption that subsidence-induced increases in hydraulic conductivity of the hanging wall bedrock do not occur during the mining operation when flows are strongly directed toward the mine working.

6.3 Source: Ken Raven, Intera Engineering Ltd. on behalf of INAC.

Reference: EAR, Section 9.2.2.2.3; Appendix IX.1, Section 6

TOR Line: 221, 337 to to 341, 363 to 367 and 380

To: De Beers Canada Mining Inc.

Preamble: Section 6 of Appendix IX.1 summarizes the expected impacts of the North Pile on shallow groundwater and Snap Lake due to leaching of emplaced PK paste and other wastes. Most of the detailed analytical work is provided in supporting Appendices and reports which are not part of the EAR, but which are listed as being available. Review of the expected impacts of the North Pile on shallow groundwater quality and on Snap Lake requires review of the supporting Appendices and reports.

Request: Please provide:

(d) Appendix D - North Pile and Site Water Balance, listed in Appendix IX.1 - Mine Site Water Quality

(e) Appendix I - Results: North Pile Seepage, listed in Appendix IX.1 - Mine Site Water Quality

(f) Appendix J - Results: North Pile Discharge, listed in Appendix IX.1 - Mine Site Water Quality

(g) Documentation of the application of the SEEP/W model used to estimate the volume and quality of water seeping from the North Pile and Water Management Pond, if not described in the above requested appendices.

(h) The Golder Associates Ltd, 2001 report titled: "Snap lake Diamond Project Surface Engineering Optimization Study North Pile Management", submitted to AMEC Simmons Mining & Metals, in December.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-23

Long-term seepage from the North Pile

23 Source: Water Resources - Department of Indian and Northern Affairs

References: EAR, Section 9.3.2.2.3, Section 9.2.2.7.3, Section 10.5.2.6; Appendix IX.1, Section 6.3

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: The GoldSim model assumes 10% of net precipitation will infiltrate the North Pile and 1% of net infiltration will recharge the deeper flow system connected to Snap Lake. These infiltration estimates assume that the bulk of the North Pile remains in a frozen state. Section 9.2.2.7.3 of the EAR states that higher infiltration rates would occur if the North Pile does not freeze, but that the scenario of a frozen North Pile is more conservative since it results in higher estimated chemical concentrations in the seepage. The rationale for this assumption is not provided and it is not clear that the assumption is conservative with respect to both short-term and long-term chemical loading from the North Pile to Snap Lake.

Request: DeBeers respond to the following questions with supporting information and/or data:

a) How will conditions of global warming and thawing of the North Pile affect these infiltration estimates, long-term estimates of dissolved chemical loading to Snap Lake, and Snap Lake water quality?
b) What is the total volume of processed kimberlite porewater that will be released into Snap Lake upon thawing of the North Pile and what will the short-term effect of this discharge on Snap Lake?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-22

Long term physical stability of the North Pile

22 Source: Water Resources - Department of Indian and Northern Affairs

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: The North Pile is considered to be stable in the long term either if it remains frozen or if it is in a thawed state. The transient impacts of thawing of the North Pile on its stability are not discussed. Surface processes have not be adequately described.

Request: DeBeers respond to the following questions with supporting information and/or data:

a) It is anticipated that pockets of brine and ice lenses will occur throughout the pile. What is the long term implications of these brine pockets and ice lenses on the creep behaviour and deformation characteristics of the North Pile?
b) In the context of global climate warming, as the frozen North Pile thaws, what are the transient implications of ice rich zones for the stability of the pile?
c) What are the thaw consolidation characteristics of the kimberlite paste and how are these expected to influence the stability of the North Pile under long-term thawing?
d) How will surface runoff from the top of the pile down the side slopes be managed after closure?
e) Describe the freeze-thaw characteristics with respect to particle degradation of the coarse and grits.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-21

Thermal modelling of the North Pile

21 Source: Water Resources - Department of Indian and Northern Affairs

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: Thermal modelling of the North Pile is described in section 10-46 to 10-49. Clarification is required regarding the boundary conditions and thermal properties of used in the modelling.

Request: DeBeers respond to the following questions with supporting information and/or data:

a) On page 10-48 the EA Report indicates that initial foundation temperature profiles are presented in Appendix 3.1. These temperature profiles appear to have been omitted and are required.
b) Page 10-46 states that the heat flux along the lower boundary of the north pile area is 0.004 watts per square metre. What is the empirical justification for this geothermal flux?
c) Regarding the simulated surface temperatures of the North Pile an N-factor of 1.8 is used to convert from monthly air temperature. What is the justification for this number given that the surface will be freely evaporating?
d) The material properties used in the thermal analyses of the North Pile are presented in Table 10.2-7. What is the volumetric latent heat content of the various materials included in the table and how is the latent heat distributed with temperature below zero?
e) The thermal conductivities and volumetric heat capacities for all materials in Table 10.2-7 with the exception full mix kimberlite paste are estimated from previous experiences with similar materials (p10-46). References to these previous experiences are required.
f) In terms of thermal conductivity and heat capacity, please provide the

values of these quantities for water and ice, and the constituent earth materials.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-20

Freezing properties of the kimberlite paste in the North Pile

20 Source: Water Resources - Department of Indian and Northern Affairs

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: The kimberlite paste in the North Pile is expected to freeze following deposition. Part 9 of the EA (hydrology and water quality) indicates that cryoconcentration and other hydrologic processes induced by freezing will have little to negligible impact on water quality in the North Pile. The following Information Request is made in order to obtain info on the rationale for this position.

Request: DeBeers respond to the following questions with supporting information and/or data:

a) What is the anticipated ranges in grain size compositions of the kimberlite paste deposited in the north pile, particularly when underground back filling is and is not occurring?
b) What is the range of material properties (as in Table 10.2-7) associated with the variations in grain size composition of the kimberlite paste to be deposited in the North Pile?
c) What are the ranges of frost susceptibility associated with the range of grain sizes of the kimberlite paste material deposited in the north Pile?
d) What is the extent of ice expected in the kimberlite paste material?
e) What is the expected increased concentration of pore-water solute in the kimberlite paste as a result of freezing?
f) What is the anticipated depression of the freezing point of this pore-water?
g) What is the anticipated increase in volume of pore-water or ice as a result of freezing and where will this be accommodated?
h) What is the effect of temperature on the viscosity of the paste?
i) How would increased pore-water solute concentrations affect the

predicted seepage quality from the North Pile?

j) Please describe the scope and schedule for any ongoing or planned testing on the kimberlite paste material?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-18

Water Management in the North Pile

18 Source: Water Resources - Department of Indian and Northern Affairs

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: Sources of water within the North Pile are precipitation and bleed water from kimberlite paste. Variations in paste properties or in upset conditions could result in excess water in the North Pile.

Request: DeBeers respond to the following questions with supporting information and/or data:

a) What are the expected designs, depths and approximate service life of the water ponds in the north pile?
b) What are the implications of the internal water ponds on the thermal regime of the North Pile and its foundation?
c) What is the potential for seepage loss in the vicinity of these ponds?
d) What is the expected volume of bleed water?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-17

Placement logistics of kimberlite paste in the North Pile

17 Source: Water Resources - Department of Indian and Northern Affairs

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: The kimberlite paste will contain a higher clay content and crystals of minerals with very high hardness. Re-mixing of the fines, grits and coarse kimberlite will vary with crushing and backfill requirements.

Request: DeBeers respond to the following questions with supporting information and/or data:

a) Examples are required of paste technology being applied to kimberlite tailings?
b) Describe and provide the results of the bench-scale and or pilot-scale testing of kimberlite paste that has been conducted on Snap Lake kimberlite?
c) Describe the abrasion properties of the kimberlite paste?
d) Provide examples and or analysis of the pumping of paste over the horizontal distances involved at this site?
e) Clarification is required on the geometry (average and maximum thickness) of the discharge during kimberlite paste placement in the North Pile?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-15

Influence of Nitrogen Inputs to Snap Lake

15 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: Baseline levels of ammonia, nitrite, nitrate, and TKN are relatively low in Snap Lake, with levels highest in March and lowest in July/August. As nitrogen represents an essential nutrient for aquatic plants, it is important to evaluate the effects of nitrogen inputs on the trophic status of Snap Lake and downstream waterbodies.

Request:

a) To what extent could nitrogen concentrations currently be limiting to the growth of aquatic plants in Snap Lake and why?

b) A 40% increase in the levels of chlorophyll *a* is predicted based on the predicted increases in levels of trace nutrients in Snap Lake. Was this increase in the levels of chlorophyll *a* taken into account when the levels of dissolved oxygen in Snap Lake were predicted?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-14

Assessment of the Effects of Ammonia on Aquatic Ecosystems

14 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: Based on the analyses that were presented in DCMI (2002), ammonia was not considered to be a substance that would adversely affect aquatic organisms in Snap Lake. However, ammonia can adversely affect aquatic organisms at relatively low concentrations. Therefore, more information is needed to determine if the analyses that were conducted adequately evaluated the potential effects of ammonia on aquatic organisms.

Request:

a) The toxicity of ammonia is due to the toxic effects of two forms of the substance, unionized ammonia and ionized ammonia (ammonium). The revised Canadian Water Quality Guidelines consider the toxicity of unionized ammonia only. While this approach is reasonable for alkaline pHs, it substantially underestimates the toxicity of total ammonia at acidic pHs. As such, the Canadian WQGs should not be used exclusively to evaluate the potential effects of ammonia on aquatic organisms. To what extent were the Canadian WQGs used to determine that ammonia is not likely to adversely affect aquatic organisms in Snap Lake and/or downstream areas?

b) Would the results of the analyses have been different if a WQG of 2 mg/L was used for total ammonia at low pHs?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-13

Key Factors Associated with Effects on Aquatic Ecosystems

13 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: DCMI (2002) indicates that releases of total suspended solids are the primary factor that is likely to adversely effect water quality conditions in the vicinity of the Snap Lake mine site. However, there are a number of other factors that could adversely affect water quality and associated uses of aquatic ecosystems.

Request:

a) Please provide the underlying rationale for the conclusion that water quality impacts on Snap Lake are likely to be primarily due to Total Suspended Solids (TSS).

b) More specifically, please describe why releases of phosphorus, ammonia, and metals are not considered to be associated with impacts on Snap Lake. In addition, impacts on sediment quality conditions in Snap Lake were dismissed because it was thought that TSS was unlikely to settle within the lake. Please provide the rationale for this assumption and comment on the adequacy of the baseline sediment quality data for assessing such effects, should they occur.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-12

Impact Assessment Criteria

12 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: DCMI (2002) have developed impact assessment criteria for assessing the potential effects of mining activities on aquatic ecosystems in the vicinity of Snap Lake. These criteria suggest that effects on the aquatic community are likely to be negligible, low, moderate, and high if <5%, 5 to 10%, 10 to 20%, and >20% of the aquatic community are predicted to be adversely affected by changes in environmental conditions in response to mining activities (the percent of the waterbody affected is also considered in applying these criteria).

Request: Some of the questions that emerged from the review of the impact assessment criteria include:

a) The impact assessment criteria appear to assume that all of the species that exhibit greater sensitivities than the prescribed percentile of the aquatic community used to generate the site-specific water quality benchmarks (i.e., HC5, HC10, and HC20) would exhibit some chronic toxicity if chemical concentrations exceed the benchmarks. However, this approach assumes that adversely affecting even as much as 20% of the aquatic community would not adversely affect aquatic ecosystem function. To what extent is this assumption supported by the results of research and other studies on the functioning of northern ecosystems?

b) To what extent has the magnitude of effects on sensitive species been considered in the assessment of the magnitude of effects on the ecosystem as a whole (i.e., an HC20 is intended to define an EC20 for the species that represents the 20th percentile in the aquatic community risk model. However, this concentration could represent an EC50, LC50, or higher

for more sensitive species)?

c) To what extent does the analysis of percent of waterbody affected consider the potential for key habitats (e.g., spawning shoals) being incorporated within the affected area?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-11

Influence of Phosphorus Inputs on Snap Lake

11 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: DCMI (2002) have used a 10% increase in the loadings and concentrations of phosphorus as predictors of effects on the trophic status of Snap Lake.

Request: The evaluation of phosphorus inputs to Snap Lake was conducted using data on total phosphorus concentrations. Because the predicted concentration of Total Phosphorus (TP) in mine water (10 ug/L) was similar to the baseline level of TP in Snap Lake (10ug/L), it was concluded that Phosphorus inputs from the mine are unlikely to be problematic. To further evaluate the relevance of this conclusion, please compare the predicted levels of Total Dissolved Phosphorus and Ortho-Phosphorus in mine water to the existing levels of these substances in Snap Lake. In this way, it will be possible to evaluate the potential increases in the levels of bioavailable phosphorus.

Application of the selected predictor of effects on trophic status necessitates the establishment of baseline loadings and concentrations of phosphorus in Snap Lake. What statistical procedures will be used to establish baseline loadings and concentrations from the water quality data that have been collected to date? To what extent does the selected predictor of effects consider the secondary effects of nutrient enrichment on Snap Lake (i.e., the potential for oxygen depression under ice), particularly in light of the low dissolved oxygen concentrations that were measured in March, 1999?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-10

Derivation of Site-Specific Water Quality Benchmarks

10 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: Appendix IX.8 of DCMI (2002) describes the procedures that were used to derive site-specific water quality benchmarks for chemicals of potential concern (COPCs) at the Snap Lake mine site. These procedures generally followed the methods that have been recommended by the Canadian Council of Ministers of the Environment. However, more information is needed to fully understand the procedures that were used and the associated results.

Request: The following questions and information needs emerged from the review of Appendix IX.8:

a) The CCME has applied the aquatic community risk model approach to the derivation of Canadian WQGs for only one substance (i.e., ammonia). The associated procedures have not yet been described in the protocol for deriving water quality guidelines for the protection of aquatic organisms. Given that this approach has not yet been formally adopted by the CCME, please describe why the aquatic community risk model approach was considered to be relevant for defining site-specific water quality benchmarks. Also, please indicate why the procedures that are described in the CCME protocol document were not utilized.

b) The CCME methods indicate that site-specific water quality objectives should be derived using one of four procedures, one of which is the recalculation procedure that was described in Appendix IX.8. Using this procedure, the toxicological data set is refined to make it more appropriate to the site under investigation. Then, the site-specific water

quality objectives are calculated using the same methods that were used to derive the Canadian WQGs. Please indicate why the procedures that are described in the CCME protocol document were not utilized for any of the metals investigated.

c) The aquatic community risk model approach was used by the CCME to derive the Canadian WQGs for ammonia. Using this approach, the guideline was derived by calculating the lower 95% confidence limit of the 5th percentile concentration of the aquatic community risk model. However, the site-specific benchmarks that were derived in DCMI (2002) were derived by determining the 5th percentile concentration of the aquatic community risk model. Please describe the rationale for deriving site-specific water quality benchmarks using procedures that differ from those that have been applied by the CCME.

d) Some data on the toxicity of copper to coho salmon was excluded from the site-specific toxicological database based on reason "D" (i.e., species not known to occur at the site). Yet, other data on this species were included in the database. Please describe the rationale that was used for excluding some data and including other data on this species).

e) An acute-to-chronic ratio of 7.8 was reported for the brook trout. Please describe why this ACR was not used to convert short-term LC50 data for other salmonids to chronic toxicity thresholds. Also, please indicate which ACRs were used to convert acute toxicity data to chronic toxicity data when ACRs were not available for a particular species?

f) All of the data on *Pimephales promelas* was excluded from the site-specific toxicological data. However, the results of biological surveys conducted in Snap Lake indicate that cyprinids do occur in this basin (i.e., lake chub). Therefore, the data on other cyprinids should have been included in the database. Please describe the rationale that was used for excluding data on cyprinids from the database.

g) All of the toxicity data for metals were normalized to a water hardness of 50 mg/L (i.e., in Table IX.8-1). Yet, the species mean chronic values reported in Table IX.8-2 were normalized to 180 mg/L water hardness. Please describe the rationale that was used to select these water hardnesses for deriving site-specific water quality benchmarks and their relevance for use during the early years of mine operation (i.e., when in-lake water hardness is likely to be low).

h) Various ecologists have used the term 'keystone species' to describe species which are of fundamental importance in terms of maintaining the structure and/or function of an ecosystem. Please describe the extent to which the keystone species in the Snap Lake Ecosystem have been identified and the extent to which they are among the most sensitive 5% of the aquatic community (i.e., they would not be protected by water quality benchmarks that are based on the 5th percentile of the aquatic

community risk model).

i) For cadmium, were the key data that were used to generate the Canadian water quality guideline considered for inclusion in the site-specific toxicological data set? If not, why not?

j) For hexavalent chromium, why was a linear, rather than a logistic, regression selected for describing the relationship between concentration and cumulative percent affected?

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-9

Seepage from the North Pile

9 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: DMCI (2002) has predicted the water quality characteristics of seepage from the North Pile. These predictions indicate that the concentrations of several metals could be elevated in this seepage, including Al, Cd, Cu, Pb, Ni, and Se. The potential effects of wastewater from this and other sources has been evaluated using various mixing models and other tools.

Request: Although the potential effects of wastewater from the DCMI facility have been evaluated by predicting the concentrations of various chemicals of potential concern (COPCs) in Snap Lake and comparing them to chronic toxicity thresholds, it is uncertain if the effects of relatively undiluted seepage have been fully evaluated. Please provide additional information which describes the potential for relatively undiluted seepage being released into benthic habitats through porous gravels and which predicts the potential effects of such releases on benthic communities and fish (i.e., eggs and alevins that utilize shoals with upwelling groundwater flows for spawning).

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-8

Baseline Environmental Quality Conditions

8.3 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: To support the determination of baseline environmental quality conditions, DeBeers Mining Canada Inc. (DMCI) compiled information on the biological characteristics of Snap Lake and a reference lake. These data are important for evaluating the effects of mining activities on receiving water systems within the Lockhart River drainage basin.

Request: Several questions emerged regarding the application of the baseline data on the biological characteristics of Snap Lake and the reference lake for determining if changes have occurred in response to mining activities. More specifically:

a) Was there significant spatial (i.e., within lake; between open water and nearshore sites) variability in the abundance and structure of phytoplankton, zooplankton, benthos, and fish communities? If there was significant within lake spatial variability in the biological characteristics of these lakes, how will the baseline data be used to evaluate the effects of mining on aquatic organisms within the Lockhart River drainage basin (i.e., how will the data from multiple sites be used to assess impacts)?

b) Were there significant differences between lakes in the abundance and structure of phytoplankton, zooplankton, benthos, and fish communities? How will differences between Snap Lake and the reference lake be addressed in the subsequent evaluations of environmental effects? How will the suitability of the reference lake for use in the long-term AEMP be assessed?

c) What is the statistical power of the existing data in terms of being able to

detect changes in the phytoplankton, zooplankton, benthos, and fish communities (i.e., are the existing data sufficient to distinguish a 20% difference in phytoplankton abundance in Snap Lake with a 95% level of confidence)?

d) With only one year of data for most variables, how will inter-annual differences in biomass, relative abundance, and other variables be assessed?

e) With the limited data set, how will seasonal differences in benthic invertebrate community structure be assessed and factored into the evaluations of the effects of mining activities?

f) Please comment of the sufficiency of the available biological data in terms of characterizing baseline biological conditions in Snap Lake and associated waterbodies.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-8

Baseline Environmental Quality Conditions

8.1 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: To support the determination of baseline environmental quality conditions, DeBeers Mining Canada Inc. (DMCI) compiled information on the water quality of Snap Lake, associated inflow streams, outflow streams, small lakes, and a reference lake. These data are important for evaluating the effects of mining activities on receiving water systems within the Lockhart River drainage basin.

Request: Describe how the baseline water quality data will be compared with the results that are obtained during mining. More specifically, describe how the limited data from various sites within a lake will be compiled and used to determine if water quality conditions have changed over time in response to mining activities. In this description, it is important to discuss the statistical power for determining differences that are provided by the existing baseline data (i.e., are the existing data sufficient to distinguish a 20% difference in cadmium concentrations in Snap Lake with a 95% level of confidence). Also, how will less than detection limit results be treated in the analyses of temporal variability in water quality characteristics and what is their influence on the statistical power of the existing data? Finally, please comment on the sufficiency of the available data for characterizing baseline water quality conditions.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-8

Baseline Environmental Quality Conditions

8.2 Source: Don MacDonald, MESL;
On behalf of Indian and Northern Affairs Canada

TOR Line:

To: DeBeers Canada Mining, Inc.

Preamble: To support the determination of baseline environmental quality conditions, DeBeers Mining Canada Inc. (DMCI) compiled information on the sediment quality characteristics of Snap Lake and a reference lake. These data are important for evaluating the effects of mining activities on receiving water systems within the Lockhart River drainage basin.

Request: The baseline sediment chemistry data include information on the physical and chemical characteristics of four samples from Snap Lake and four samples from the reference lake. Several questions emerge following a review of this data, including:

a) Although the levels of metals in sediment from the reference lake were roughly 50% of those observed in Snap Lake, it was suggested that levels were similar in both lakes. Describe criteria that were used to determine that concentrations were similar in the two lakes (i.e., was a statistical analysis conducted to determine if concentrations were statistically similar)?

b) Several chemicals of potential concern (COPCs) were not measured in sediments, including PAHs, PCBs, and OC pesticides. As these substances can be either contributed to the environment due to mining activities (i.e., PAHs) or their environmental fate can be altered in response to mining activities, please provide some rationale for not determining the levels of these COPCs under baseline conditions.

c) The levels of certain substances are much higher than would be expected under baseline conditions (e.g., lead at 500 ppm in one sample). As baseline sediment quality data will be used to evaluate the effects of mining activities, it is important to ensure that the information in the baseline sediment quality database is reliable. Therefore, please discuss the reliability of apparent outliers relative to the quality assurance data that were generated along with the sediment chemistry data.

d) Please comment on the sufficiency of the available data in terms of characterizing baseline sediment quality conditions in Snap Lake. In this discussion, please describe the statistical power of the existing data in terms of evaluating divergences from baseline conditions.

De Beers Canada Mining Inc. (De Beers)
Snap Lake Diamond Project

Information Request - Round Three
May 27, 2002

Indian and Northern Affairs Canada
Information Request No. W-7

Treated Water Effluent

7.1 Source: E.K. Yaremko, Northwest Hydraulic Consultants Ltd.
Indian and Northern Affairs Canada

Reference: EIA and Appendices, Snap Lake (De Beers) Diamond Project

TOR Line:

To: De Beers Canada Mining Inc.

Preamble: The proposed location and configuration of the outfall line and diffuser has been outlined. Results of the near-field mixing modeling have been summarized and there has been some generalized comment concerning far-field mixing. Has the subject of lake circulation been addressed quantitatively?

Although it has been shown that selected indicators will become adequately mixed within a 60 m radius of the diffuser, there remains the possibility that some elements will tend to settle out locally and accumulate in the absence of strong lake circulation, particularly during the winter months.

Request: Please provide:

1) Has a study of the lake circulation pattern been undertaken and if so, where has it been reported?
2) If the proponent has a good understanding of circulation in Snap Lake, how has this been combined with an assessment of far field mixing of effluent discharge?