

Balint, David

From: Balint, David
Sent: Wednesday, November 13, 2002 3:18 PM
To: 'lazzolini@mveirb.nt.ca'
Cc: 'robin.johnstone@ca.debeersgroup.com'; Lange, Marc; Dahl, Julie
Subject: Fish and Fish Habitat Issues re DeBeers Snap Lake Project

Louie:

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.

A faxed submission will be forthcoming.

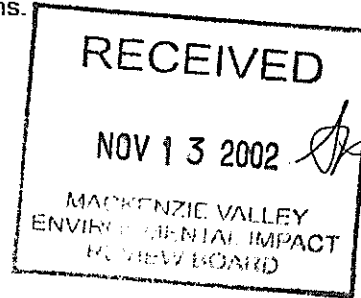


DeBeersIssuesPreHear
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Dave Balint

Habitat Biologist
Department of Fisheries and Oceans
Western Arctic Area
Central & Arctic Region
101-5204-50 Avenue
Yellowknife, NT X1A 1E2

Phone 867 669-4926
FAX 867 669-4940
Email Balintd@dfo-mpo.gc.ca





Fisheries
and Oceans

Pêches
et Océans

Fish Habitat Management
Suite 101, 5204-50th 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, 5102-50th 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

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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

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 (Cr^{+6}) is more hazardous than trivalent chromium (Cr^{+3}). Examples in the literature state that fish are sometimes more sensitive to Cr^{+3} than to Cr^{+6} and in soft water, Cr^{+3} is more toxic to fish than 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

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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

Louie Azzolini

From: Louie Azzolini
Sent: Wednesday, November 13, 2002 4:30 PM
To: 'JHutchison@nucleus.com'
Subject: De Beers Issue Rationale

Janet, I spoke with Mr. David Woo and informed him that I would accept your clients submission tomorrow morning before lunch time. I hope I did not give you my cold last week.

Luciano

Luciano Azzolini
Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
Box 938, Yellowknife, NT. X1A 2N7
Phone (867) 766-7053; Fax (867) 766-7074
mveirb.nt.ca