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Veronica Chisholm
Permitting Manager
De Beers Canada Inc

July 18, 2012

Re: Deninu Kue First Nation - Information Request Round 2 Gahcho Kue Diamond Project

Dear Ms. Chisholm,

LGL Limited has reviewed the Gahcho Kue Fish Habitat Compensation Plan - Update (June 29, 2012) and the Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the proposed Gahcho Kue Project – Initial Development Process (June 27, 2012) on behalf of the Deninu Kue First Nation (DKFN). We are pleased to present to you the additional information request in order to obtain further information, receive clarification on issues and concerns and to improve an understanding to the implications of the project on natural resources that are important to the DKFN.

IR Number: DKFN #1

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Fish Habitat Compensation Plan

References: Gahcho Kue Fish Habitat Compensation Plan – Update (June 29th, 2012)
Section 2.1 Approach (page 2)

Preamble

The fish habitat compensation options follow the federal Department of Fisheries and Ocean's policy and guidelines. While we agree with the compensation options, implementing these options in a hierarchical manner does not always meet the best interest of local first nations.

Request

The options preferred by De Beers Canada have time horizons longer than a lifetime and tremendous unpredictability in outcome. The preferred option of the DKFN is to fund the rehabilitation of fish habitat close to a First Nations community. We request that this option be considered and discussed with DFO and the individual FN communities.

IR Number: DKFN #2

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Fish Habitat Compensation Plan

References: Gahcho Kue Fish Habitat Compensation Plan – Update (June 29th, 2012)
Habitat Compensation Plan Options 1 and 2

Preamble

De Beers has opted to create similar habitat and increase productive capacity of existing habitat at or near the development site. This will partially be done by raising the water levels of smaller lakes west of Kennady Lake.

Request

Increasing the water levels of lakes within the D, E and N watersheds poses a risk to the environment, particularly from the potential release of methyl mercury. This risk is unpredictable in its outcome. While the plan admits that monitoring will be done to identify issues, such as potential increases in mercury, mitigation options for this impact are not identified. Further, the shallow lake complex in the D,E and N watersheds will still be shallow after raising water levels and it is questionable whether this action would add any over wintering habitat to the area. Therefore, we request that De Beers reconsider the habitat compensation options as mentioned in IR Number; DKFN #1.

IR Number: DKFN #3

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Fish Habitat Compensation Plan

References: Gahcho Kue Fish Habitat Compensation Plan – Update (June 29th, 2012)
Section 2.2.1.1 Operations

Preamble

The design of habitat compensation features is focusing on two areas: developing rocky reef habitats; and establishing vegetated bays to provide spawning and rearing habitat for Northern Pike.

Request

The establishment of more rearing and spawning habitat for Northern Pike may change the species composition of the lake towards this predator at the expense of other predators and smaller prey fish. Due to the unpredictable outcome of implementing these measures, monitoring is being planned; however, once detrimental effects to the fish community have been identified from this predator-prey imbalance mitigating this effects will be more challenging. We request that De Beers reconsider the habitat compensation options as mentioned in IR Number; DKFN #1.

IR Number: DKFN #4

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Fish Habitat Compensation Plan

References: Gahcho Kue Fish Habitat Compensation Plan – Update (June 29th, 2012)
Section 3.1.1 Project HSI Models

Preamble

Habitat suitability index (HSI) models are proposed to assess the losses associated with the Project on fish habitat and the relative gain in habitat developed through habitat compensation. Models are based on previous examples in the north, recent literature on northern fish species and are adjusted as required for the specific habitats and fish species that are affected.

Although the fish population in the majority of Kennady Lake will be killed through the dewatering of the lake it is essential to properly describe the baseline fish population as the benchmark for the desired status and habitat compensation following closure of the mine. De Beers carried out three daytime hydroacoustic surveys of which one had to be disregarded based on technical difficulties and thus tried to enumerate the Kennady Lake fish population. We feel for the following reasons that this task has only been partially completed if at all:

- Fish, especially larger fish (>20cm) evade boats during daytime especially in shallower lakes such as Kennady Lake and to our knowledge all hydroacoustic surveys to date have been carried out during daytime. From our own experience and firmly supported by the literature (i.e. MacLellan and Hume 2010) the results of daytime hydroacoustic surveys generally produce significantly lower overall fish densities and particularly significantly lower densities of fish larger than 20 cm. Larger fish due to their higher swimming speed can evade the boat at a higher rate than smaller fish before being detected in the narrow beam of the hydroacoustic sonar. Although we appreciate the short period of darkness found in summer at the Gahcho Kue project site, the month of September will accommodate the completion of night-time hydroacoustic surveys. In addition to a short dark period, De Beers also stated safety concerns for the completion of hydroacoustic surveys at night. We therefore recommend to use the daylight hours to geo-reference safe transects and follow those transects when carrying out the survey at night.
- De Beers only processed and included the hydroacoustic data for fish larger than 18 cm in their estimate of the Kennady Lake fish population. Typically, the number of fish smaller than 18 cm makes up the majority of the fish density of a lake and therefore likely the majority of fish have not been included in the fish population estimate. We appreciate that De Beers was mainly concerned with the fish that are in the size classes large enough to be harvested for consumption when the lake is dewatered but this approach neglects to detect and describe the majority of fish in Kennady Lake and is therefore unsuitable as a baseline study.

- De Beers referred to a peer-reviewed paper (Hartman and Margraf 2007) to justify that the daylight hydroacoustic surveys are suitable to describe a fish population in high latitude lakes. In our opinion and based on our own experience with hydroacoustic surveys the Hartman and Margraf (2007) paper is not suitable to show that daytime hydroacoustic surveys are as effective as night-time surveys. Hole Lake, the lake surveyed by Hartman and Margraf has glacial water and is likely naturally turbid; therefore, it is not as strongly influenced by daylight as a non-glacial lake. Hole Lake is also small (approximately 50 ha) and has very variable and high fish densities of up to 9,834 fish/ha (Hartman and Margraf 2003). Comparisons with the conditions in Kennady Lake can therefore not be appropriate.
- Based on our own experience in oligotrophic lakes, daytime fish target densities determined by hydroacoustic surveys are always lower than night-time densities and daytime surveys are always biased towards smaller fish. Typically daytime survey densities were between 5-7 times lower than night-time densities (Bussanich et al. 2006, Plate et al. 2011, Plate et al. 2012a and Plate et al. 2012b). The application of this knowledge to the Kennady Lake example would mean that the small fish population in Kennady Lake was hugely underestimated by carrying out the surveys during daytime. In addition, the numbers of fish smaller than 18 cm, in most cases the majority of fish in a lake were not described at all.

Request

The HSI Model is very simplistic and does not consider the effects of predation or intra-specific competition. Please see IR Number DKFN #3 for potential outcomes that are not considered. Therefore the resulting gains in habitat units for each species remain to be an educated guess and the calculation of habitat gains are the same. The adequate estimation of the fish population in Kennady Lake is an essential part of the baseline assessment and habitat compensation planning. Effective baseline surveys need to be carried out before any assessments can be made on the significance of effects and the description of the habitat compensation goals for the Gahcho Kue Project.

Request for Additional Baseline Work:

- **Timing Recommendation:** The new moon phase (which ensures a dark night) and a long dark period from 9:35PM to 5:49AM and from 8:00PM to 7:05AM in the Gahcho Kue Project area can be expected in the time periods around August 17, 2012 and September 15, 2012. We recommend to carry out the surveys during either one of these periods.
- **Survey Frequency Recommendation:** We recommend carrying out at least three night time surveys to reduce the confidence bounds of the calculated fish estimates.
- **Data Analysis Recommendation:** De Beers mentioned that they had difficulties to analyze the number of hydroacoustic targets <18cm length because of signal to noise ratios. We therefore recommend to send the hydroacoustic raw data to Don Degan at Aquacoustics Inc. (<http://www.aquacoustics.com/>) to be analyzed using his extraordinary experience with hydroacoustic data and the "Echoview" software that specifically sorts targets from noise.

IR Number: DKFN #5

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Fish Habitat Compensation Plan

References: Gahcho Kue Fish Habitat Compensation Plan – Update (June 29th, 2012)
Section 4.2.1 Lake Habitat Gain Areas

Preamble

Under the subsection "Unaltered Habitat" on page 20 it is stated: "This category of habitat gain includes areas that were dewatered during the operations phase but are refilled at closure, and otherwise remain unaltered from pre-development conditions in terms of substrate and depth characteristics".

Request

It is completely unrealistic to believe a lake bottom that will be dewatered for 15-20 years; being exposed to wind, sun, rain, snow and ice throughout this period will remain unaltered from pre-development conditions as a lake bottom. Therefore, we request that all "Unaltered Habitat" be taken out of the Habitat Gain category and be added to the category of habitat that has been harmfully disrupted or altered.

IR Number: DKFN #6

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Water Quality Objectives and Sediment Quality Objectives

References: Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the proposed Gahcho Kue Project – Initial Development Process Section 1.0
Introduction

Preamble

It is recognized that monitoring will be conducted to meet the standards identified in the WQO and SQO. Details of this monitoring will be identified in the Aquatic Effects Monitoring Program that will be resolved during the regulatory process.

Request

Although De Beers is not legally required to present the details of their suggestions for the Aquatic Effects Monitoring Program before the regulating permitting, we request that these details be provided during the EIS process to further solidify De Beers' commitment to meeting the WQOs and SQOs.

IR Number: DKFN #7

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Water Quality Objectives and Sediment Quality Objectives

References: Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the proposed Gahcho Kue Project – Initial Development Process Section 2.0 Process for Development of the Water and Sediment Quality Objectives.

Preamble

Point 4 on page 2 mentions additional work being completed at Snap Lake and Ekati to develop site-specific water quality objectives for several components. Snap Lake Mine is developing site-specific WQOs for total dissolved solids, strontium and nitrate. Ekati Mine has developed site specific WQOs for nitrate and strontium.

Request

We request that De Beers provide the specific WQOs that were established for these mines and the reasons that new WQOs are being developed. This is essential to inform interveners which water quality parameters unexpectedly turned out to be much higher than expected during operation. The Gahcho Kue project can learn from these results and should include relevant parameters into the potential substances of potential concern list.

IR Number: DKFN #8

Source: LGL Limited

To: De Beers Canada Inc.

Subject: Gahcho Kue Water Quality Objectives and Sediment Quality Objectives

References: Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the proposed Gahcho Kue Project – Initial Development Process Table 1 Predicted Water Quality in Kennady Lake during Post-closure.

Preamble

Table 1 provides only the CCME guidelines for water quality. It is well known that for many parameters CCME Water Quality Guidelines do not exist, and this is admitted on page 2 (point #1) of the Initial Planning Process document.

Request

We request that water quality guidelines for all parameters be presented. Values from the US EPA, FAO or other regulating agencies can be used where CCME guidelines do not exist, as was stated on page 2 of the document.

Literature Cited:

Bussanich, R.J., R.C. Bocking, K.M. Field, R.N. Nordin, K. Bannar-Martin, M.E. Perga, and A. Mazumder. 2006. Assessment of rearing capacity for consideration of re-introducing Sockeye Salmon to the Coquitlam Reservoir. Prepared for the BC Hydro Bridge Coastal Fish and Wildlife Restoration Program by LGL Limited, Sidney, BC, and Water and Watershed Management Program Department of Biology, University of Victoria. BCRP Report No. 05.Co.13.

Hartman, K. J. and J. Margraf 2003. A hydroacoustic survey of Hole Lake, Togiak Refuge, Alaska. Misc. report by Wildlife & Fisheries Resources Program, West Virginia University, Morgantown, West Virginia. Cited In: Draft Study Plan with the Project Title: Genetic Relationship of lake trout *Salvelinus namaycush* on Togiak National Wildlife Refuge.

MacLellan, S.G. and J.M.B. Hume 2010. An evaluation of methods used by the freshwater ecosystems section for pelagic fish surveys of Sockeye rearing lakes in British Columbia. Canadian Technical Report of Fisheries and Aquatic Sciences 2886.
Plate, E.M., P.N. Johnson, R.C. Bocking and D.J. Degan 2011. Assessment of Kokanee abundance in Coquitlam Reservoir, 2010. Prepared for the BC Hydro Bridge Coastal Fish and Wildlife Restoration Program by LGL Limited, Sidney, BC.

Plate, E.M., P.N. Johnson, R.C. Bocking, D. Robichaud and D.J. Degan 2012a. Assessment of Kokanee abundance in Coquitlam Reservoir, 2011. Prepared for the BC Hydro Bridge Coastal Fish and Wildlife Restoration Program by LGL Limited, Sidney, BC.
Plate, E.M., P.N. Johnson, R.C. Bocking and D.J. Degan 2012b. Assessment of the feasibility of re-introducing Sockeye salmon to Powell Lake – Year 1 Biological Studies. Prepared for: Tla'amin Treaty Society, C-69 RR#2 Tla'amin Road, 4885 Salish Drive, Powell River, BC, V8A 4Z3 and Department of Fisheries Oceans.

Please let me know if you have any questions or comments on the information presented above. I can be reached by email at mdentremont@lgl.com or by phone at 250-656-0127.

Kind regards,



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