Fisheries and Oceans Canada | Pêches et Océans Canada

Eastern Arctic Area
Iqaluit Office

P.O Box 358.
Iqaluit NU X0A 0H0

Tel: (867) 979-8007
Fax: (867) 979-8039

Region Arctique de L'est
Bureau de Calgary

C.P. 358
Iqaluit NU X0A 0H0

Tél: (867) 979-8007
Téléc: (867) 979-8039

Your file Votre référence
2AM-JER0410

Our file Notre référence
NU-00-0068

June 10, 2011

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
PO Box 119
Gjoa Haven NU, X0B 1J0

Dear Ms. Beaulieu:

Subject: DFO Comments, Renewal of the Nunavut Water Board, Type A Water Licence, Jericho Diamond Mine

Fisheries and Oceans Canada (DFO) received the application to extend the water licence for the Jericho Diamond Mine on February 4, 2011 from the Nunavut Water Board. The proponent, Shear Diamonds (Nunavut) Corp. (Shear) is requesting a renewal of the water license that has currently been extended until March 1, 2012. After reviewing current and historical documents pertaining to the operations at the mine, DFO has the following comments and questions pertaining to the mandate of protecting fish and fish habitat to contribute to the review of this water license renewal.

As you may be aware, DFO has concerns regarding the fish habitat compensation that has not been completed at the mine to date. DFO has had conversations with Shear to move forward the issue of incomplete compensation. DFO's understanding is that Shear is in the process of making written commitments to construct and monitor the fish habitat compensation measures included in the *Fisheries Act* Authorizations within an appropriate amount of time.

According to DFO's records the following compensation measures have not been completed to date:

- **Channel enhancement on the lower 150 metres of Stream C1** – Construction of sinuous configuration, riffles, boulders and low flow channel as well construction of a long narrow pool.

- **Connecting Channel (Stream 021) between Lakes 02 and 03** – Work to enhance fish passage in stream 021 between Lake 02 and Lake 03. DFO has had discussions with Shear about the effectiveness of this compensation initiative. Previous fisheries information suggested that Stream 021 was used as a migration corridor for adult fish between the two lakes and it was thought that enhancing the connection between the lakes would be beneficial. However fisheries assessment work done in 2005, 2006 and 2007 has suggested that modifications to stream 021 may be counter productive. Given this recent information, consultants working on behalf of the previous owners of the mine have recommended that an alternative compensation strategy would be desirable because the habitat in Stream 021 is

currently functioning as rearing habitat for sub-adult age classes of fish and should not be disturbed. DFO would ask Shear to suggest alternative habitat compensation measures to be substituted in place of the stream 021 modification and submit these suggestions to DFO for review, comments and approval.

- **13 rock shoals in various surrounding lakes**
  - Creation of 5 rock shoals along the southeast shore of Interbasin Lake
  - Creation of 2 rock shoals within Lake 02. Consisting of one shoal along the north/south shore and one shoal along the east/west shore within Lake 02
  - Creation of 2 rock shoal along northeast shore of Lake 03
  - Creation of 4 rock shoals along south shore of Lake 04

DFO also acknowledges that 8 rock shoals were completed in the winter of 2006/07; six of the shoals were constructed within Carat Lake and 2 within Lake 01. The Carat Lake causeway (water intake) fish habitat enhancement project was also been completed but this may need to be repaired giving the erosion and ice scour that has been identified during the preliminary assessment of the mine by Shear.

With respect to the water license application, DFO recommends that the water license have the potential to be progressive in terms of being applicable to the mine operating under care and maintenance as well in production. At this point in time there is some uncertainty if, or when the mine will transition from care and maintenance however the water license should be able to be functional should the proponent decide to put the mine into production.

DFO also has concerns regarding the large amount of water that is currently accumulated within the open pit at the mine as well as potential contamination of the water that is contained within the pit. The large volume of water and the potential for the water to be contaminated with various deleterious substances and elevated nutrient levels could create challenges for the treatment and removal of the water within the pit. It is unclear if the PKCA infrastructure that is currently in place would be able to accommodate this large volume of water contained in the open pit, assuming it is of appropriate water quality to pump into the PKCA. The PKCA has a finite ability to treat and filter the water that is pumped into this area before releasing the water downstream into stream C3 and eventually into Lake C3. DFO recommends that the water pumped into the PKCA should be of appropriate quality such that upon release from the PKCA there is not likely to be any adverse impacts to the aquatic receiving environment.

The 2010-2011 workplan produced by Shear identifies that some of the infrastructure associated with the PKCA is not constructed per design dimensions and elevations. The workplan mentions that additional construction will be required to bring the infrastructure into conformity with design criteria and to contain effluent, wastewater and run-off generated from the mine should the mine transition into full operation. DFO recommends that if the infrastructure associated with the PKCA is not sufficient to appropriately handle waste material and run-off generated from the mine, then a timeline should be determine as to when the infrastructure will be upgraded to an acceptable level.

The 2010-2011 workplan also mentions that the causeway that is associated with the water intake in Carat Lake has experienced some erosion and ice scour. Once the extent of the erosion has been assessed, DFO recommends that the review of the plan to repair the causeway be circulated to DFO to determine whether the repair work will involve potential impacts to fish or fish habitat.

Preliminary investigations during the winter of 2011 have shown that the dry processed kimberlite fines located in the PKCA are susceptible to mobilization via wind. This migration of the processed kimberlite fines via wind creates issues with the fines migrating outside of the PKCA and over the southeast dam. Evidence collected during the winter of 2011 reveal possible contamination of the two lakes located south/south east of the south east dam (South East Dam Lake and an unnamed lake). DFO recommends that these two waterbodies should be included in the spectrum of sampling performed in the aquatic effects monitoring plan (AEMP) to determine if there are aquatic effects caused by the migration of the processed kimberlite fines outside of the PKCA.

DFO recommends that it would be beneficial for Shear to review previously completed baseline fisheries assessment reports produced for the mine and perform fish sampling to determine if fish are present in the two lakes located southeast of the south east dam.

The AEMP report also mentions that the lake labelled as Reference 1, which was previously used as the control lake is within the zone of influence of the mine and a new control lake will need to be identified. DFO recommends that it may be worth having more than one control lake to cross reference sampling data that is gathered during the AEMP monitoring program, as there may be no, or little historical data available for the control lake that is yet to be decided upon. This would be beneficial as the additional control lake could identify any local (spatial) deviations within control lakes. Sampling data from each control lake can be compared to each other as well as to the lakes within the zone of influence of the mine. The sampling data gathered during the AEMP at the control lakes can be "verified" with data from the other control lake (s). This verification of control data will help to identify anomalies in the data from the control lake (s) instead of potentially suggesting a possible false effect in the sampling locations at the "impacted" lakes.

DFO recommends that a minimum of one duplicate sediment deposition trap to be deployed at each sampling location. This extra trap would still allow for a sample to be obtained if the primary trap is altered, un-retrievable, damaged or compromised during recovery (Section 5.0 AEMP Report).

It is acceptable to DFO that the fish population and health studies that are outlined in Section 7.0 of the AEMP are not performed during the care and maintenance operations of the mine. However if issues are identified in the AEMP that may suggest increased metals concentrations or other factors that may effect fish health, DFO recommends that the fish population and health portion of the AEMP should be reinstated. The expectation would be that once, or if the mine transitions into operation, the fish population and fish health portion of the AEMP would be performed in entirety.

Section 7.3.5 of the AEMP report states that a one time zooplankton and phytoplankton sampling will be conducted during the care and maintenance phase of the mine and then annually if the mines proceeds into operation. DFO recommends that the sampling frequency of zooplankton and phytoplankton be conducted on an annual basis during care and maintenance because the phytoplankton and zooplankton abundances and community structure is correlated closely with other factors in the AEMP that affect lake health. Changes in lake health may be identified through deviations in zooplankton and phytoplankton community structures. It is important to identify changes in abiotic aquatic characteristic and the potential to translate into effects in the biotic factors and have potential to move up the food chain. Annual sampling of zooplankton and phytoplankton will also be valuable historical data to refer to if the mine does proceed into processing operations in the future.

Section 7.4.1 mentions that periphyton sampling will only be conducted in three watercourses as part of the AEMP. DFO recommends that the periphyton sampling be extended to all the lakes within the

zone of influence of the mine. Periphyton is of vital importance to the aquatic health of watercourses and lakes and both should be monitored as part of the AEMP.

If you have any questions concerning the above or would like to discuss in greater detail please contact me directly by telephone at (403) 292-8675 by email at Robert.Bedingfield@dfo-mpo.gc.ca

Sincerely,

Bobby Bedingfield
Fish Habitat Biologist
Eastern Arctic Area, Iqaluit Office

cc. Derrick Moggy, DFO Eastern Arctic
Allison Rippin-Armstrong, Shear Diamonds Ltd.
Amanda Hanson, Nunavut Impact Review Board