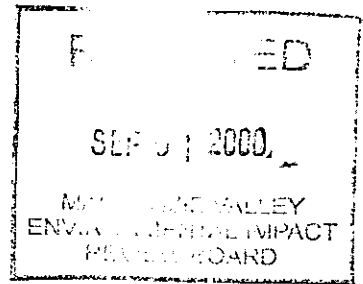


FISHERIES & OCEANS CANADA  
TECHNICAL REVIEW COMMENTS re:  
BHP's ENVIRONMENTAL ASSESSMENT REPORT  
for

SABLE, PIGEON AND BEARTOOTH KIMBERLITE PIPES (April 2000)



## INTRODUCTION

The Department of Fisheries and Oceans (DFO) has reviewed the Environmental Assessment Report (EAR) for BHP Diamonds Inc.'s proposed expansion of their Ekati™ project in the Lac de Gras area of the Northwest Territories.

The following submission identifies the concerns and recommendations of the Department of Fisheries and Oceans that have not been satisfactorily addressed in the EAR or related documents (Project Description, Responses to Information Requests, related baseline data reports).

## DEPARTMENTAL MANDATE

The Department of Fisheries and Oceans is responsible for the management and protection of fishes and marine mammals and their habitats. DFO achieves this through administration of the *Fisheries Act*. DFO's approach to the conduct of fish habitat responsibilities is outlined in the DFO "Policy for the Management of Fish Habitat" (1986), the overall objective of which is to increase the productive capacity of fish habitat through conservation, restoration and creation of habitat. A step toward net gain of fish habitat is the "No Net Loss" policy, which requires the compensation of unavoidable habitat losses through fish habitat replacement on a project-by-project basis. Based on this objective, the Department must ensure that compensation for fish habitat associated with the proposed project is adequate.

The current assessment of the BHP expansion project is conducted pursuant to the *Mackenzie Valley Resource Management Act* (MVRMA). DFO's role in this assessment is to provide specialist advice to the Mackenzie Valley Environmental Impact Review Board (MVEIRB). DFO's Minister is a "Responsible Minister" under the MVRMA. DFO offers the following comments to the MVEIRB to assist them in their assessment decision on this proposed project.

### DFO'S MAIN CONCERN: No Net Loss of Fish Habitat

#### 1. No proven compensation.

This expansion will result in the complete loss of productive fish habitat in 5 lakes (Sable, Two Rock, Beartooth, Pigeon Pond, Big Reynolds Pond) as well as having a negative impact on fish habitat in other lakes and ponds (to be further discussed). If the project is approved, BHP will request DFO to authorize the destruction of this fish habitat under S.35 of the *Fisheries Act*. In several places in the EAR (eg. p.4-71), BHP states that "compensation provisions will be specified" in a DFO Authorization. This seems to imply that DFO will provide a solution for the proponent. It is the onus of the proponent to propose compensation and prove it will provide no net loss of fish habitat. However, to date, BHP has no proven mechanisms for compensating the loss of habitat to achieve No Net Loss. Compensation for the lake habitat lost due to the original project is still unresolved.

#### 2. Flooded Pits not acceptable compensation.

BHP's assertion that the mined-out open pits will be restored to "productive fish habitat" is questionable. Beyond the questions about the time required to flood the pits, impacts on

hydrologic regime while refilling, impacts on "donor" lakes if natural recharge is supplemented by active pumping from neighbouring lakes, etc., there are several unknowns regarding the productivity of this type of reclaimed lake, which would have the physical characteristics of a virtually bottomless nutrient sink. The only remotely comparable example of a reclamation attempt provided in the written information is that of the Island Copper pit which involves a quite different ecological system: a saltwater rather than freshwater aquatic system. No detailed information was provided.

While we are certainly interested in the potential results of such an experiment, DFO has already made it clear to BHP in previous meetings that under DFO policy, flooded pits are not acceptable as habitat compensation in part due to the potential for unacceptable levels of heavy metals. Indeed, the Project Description (PD p.4-9) identifies a potential pit water quality problem from the pit walls at Sable. As correctly stated (EAR p.4-76), the creation of aquatic habitat associated with flooded pits is part of the reclamation of the mine site not fish habitat compensation.

### 3. Backfilling pits with processed kimberlite (PK).

BHP's proposal to use the mined-out pits as processed kimberlite dumps should be assessed cautiously and critically. In accordance with Sections 36 of the *Fisheries Act*, the release of deleterious substances into fish habitats is prohibited. It has not been proven that the use of processed kimberlite will not result in water quality concerns. More study and modelling needs to be done on the toxicity of kimberlite, the prediction that a meromictic lake will become established, the remobilization of contaminants, etc. both in the pit-lake and downstream before the potential of this proposal can be assessed. The assumption that pits can be used for PK storage and also reclaimed as "productive fish habitat" lakes is unsupported.

In connection with the above comment, DFO concludes that BHP's assessment of alternatives is biased and dismissive with regard to the option of backfilling some pits with waste rock instead of processed kimberlite (and/or capping). The mining plan does not sufficiently provide rationale that waste rock cannot be used as pit-lake (more stable) substrate.

### 4. Lost stream habitat compensation.

It appears that the only proposed compensation for the lost stream habitat, some of which is not quantified, is the temporary diversion of the Pigeon Stream around Pigeon Pond. Bearclaw-Beartooth-Panda Stream will be diverted through a pipeline, providing not even temporary fish habitat replacement.

It has not been shown that Pigeon Diversion Channel will completely replace Pigeon Stream habitat lost, even if it is assumed that the constructed habitat will be of similar quality to that of the natural stream. BHP asserts that additional stream habitat will be added to the system when Pigeon pit is reclaimed as a lake and linked back into the system, but there is no supporting information to demonstrate that hydrologic flows will be sufficient to maintain fish habitat in both parallel streams. The construction of the diversion should mimic the course of "least resistance" as streams and rivers normally do.

No compensation is planned for Little Reynolds and Big Reynolds streams, because they are alleged to have been included in the original project compensation, but no calculations are presented (or found) to confirm this.

No compensation for the "temporary" (>10 years) loss of Beartooth inflow and portion of outflow stream.

Stream habitat compensation is insufficient as proposed. It has not been sufficiently demonstrated to DFO that the no net loss objective has been satisfied with the proposed plan.

***DFO recommends that BHP be required to provide acceptable fish habitat compensation proposals before their expansion proposal be approved.***

## **ADDITIONAL CONCERNS**

### **1. Inadequate Baseline Information.**

There are several waterbodies that will be affected by the expansion development that have not been assessed for fish/aquatic habitat or water quality. Some of the impacted waterbodies that have been inadequately assessed include the following:

**Horseshoe Lake** - There is no baseline data available. There is no recognition given that it may be impacted, although Ulu Lake (potentially affected by waste rock runoff) is assessed. Horseshoe Lake may be also potentially affected by waste rock runoff as well as discharge from Two Rock Sedimentation Pond.

**Fay Lake** will be potentially indirectly affected by Pigeon Stream Diversion (sediment associated parameters) however there is no baseline data available.

**Bearclaw Lake** - There is no fisheries baseline data although it is likely to be indirectly impacted by dam construction at its outflow.

**Big Reynolds** - fish sampling in August only

**Little Reynolds** - There has been no fisheries assessment of Pond or inflow or outflow streams.

**Beartooth Lake** - needs more thorough baseline assessment in order to compare pre- and post-experiment lake productivity to obtain good assessment of reclamation concept potential.

**Sable Road stream crossings** - not all water crossings identified; none (except Pigeon Stream) adequately assessed. Additional lakes within 1-3 km of road may be impacted by dust; no baseline assessments.

**Ursula and Little Exeter lakes** - No baseline data for the Ursula lake and its outflow streams or Little Exeter yet make predictions of negligible impact from drawing off 16 to 22% of flow to fill Sable Pit. There is no hydrologic data upon which to base recharge rate assumption or to assess impact to donor lake or downstream habitat.

Overall, the aquatic baseline data (sediment, benthos, plankton) are generally insufficient. Single water quality samples were collected even though it is acknowledged that "water quality parameters change seasonally" (EAR p.3-44). For Sable Lake, samples were collected after exploration drilling. No sediment data were collected for Sable or Beartooth lakes. Only a single collection of phytoplankton samples was collected in four of the lakes.

***DFO recommends that baseline data gaps be adequately filled prior to further development activities being initiated.***

### **2. Unsubstantiated conclusions/assumptions about fish habitat.**

There are several waterbodies that are assumed by BHP or their consultants not to support or provide fish habitat. These assumptions are not well-founded. Baseline survey data and "ground truthing" do not support the conclusions made by BHP about significance, predicted effects and negative impacts on fish and aquatic habitat. BHP repeatedly makes statements like "this stream does not support fish habitat". However, BHP's conclusions plainly contradict the evidence – eg. that the Bearclaw-Beartooth stream "does not possess fish habitat for any life stage of grayling or

lake trout" (EAR p.4-124), although a juvenile lake trout and a juvenile arctic grayling were caught there during baseline surveys (EAR p.3-98). Obviously, the assumption that Bearclaw-Beartooth stream is "unlikely [to provide] habitat for fish because it is ephemeral, very shallow and has an average gradient of 11%" (EAR p.3-102), cannot be extrapolated to the final conclusion that was reached.

Several other streams (eg. Beartooth-North Panda, Two Rock-Horseshoe, Little Reynolds inflow and outflow) are also stated not to have suitable habitat characteristics and not to support fish habitat. A recent site visit to the proposed expansion areas revealed that in August, some of these streams deemed to be impassable or "ephemeral" did not appear to be so, which considerably changes assumptions about use and importance of these habitats. As long as sufficient flow is available for a very short period of time, fish do move when the opportunity is available. Furthermore, even a stream which is impassable for fish migration cannot be assumed to lack any habitat value.

Similar unsubstantiated conclusions are made about some pond and lake habitats. Although it may freeze to the bottom in winter, a shallow pond, like Little Reynolds Pond, cannot be assumed it "only has value as a possible migration corridor..." (EAR p.3-93) and is "unlikely to support any significant fish habitat" (p.3-91). (The additional argument that the downstream connection to Long Lake is severed – as a result of BHP's previous activities – and therefore any value for fish migrating into the Reynolds Ponds system is precluded, is specious.) In fact, although unsurveyed, Little Reynolds Pond, appears to share characteristics similar to Pigeon Pond, which does contain fish. It may provide seasonal nursery (rearing) or feeding habitat. Even if fish are not present in a particular stream, pond or lake, the production of aquatic invertebrates or other indirect support to the fish life processes is relevant. Fish habitat is defined (as BHP accurately defines on p.4-68 of the EAR) in the *Fisheries Act* 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". In this case, although fish may not have been captured, the "habitat" available still contributes to the life processes of fish.

***DFO recommends that BHP re-evaluate, using the appropriate definition of fish habitat, the waterbodies that will be affected by the development, in order to properly assess compensation requirements.***

### 3. Waste Rock Seepage:

BHP's statement (EAR p.4-74) that Panda Pit waste rock "has been shown to be inert with respect to runoff quality" is not correct. Over the last two years, seepage from the Panda waste rock storage pile has had pH values ranging from 5.3 (freshet 1999) to 3.4 (June 2000). Although BHP claims that pH values of natural tundra water range from 5.0 - 5.6, existing pH values of streams (Vulture-Polar, Grizzly Creek, Moose-Nero, etc.) within the claim block reveal pHs that remain above 6 (Figure 3.4-1, EAR).

This season, as directed by the Mackenzie Valley Land and Water Board, BHP initiated an enhanced monitoring and confirmation plan. Although DFO considers these studies required, the origin of the seepage problem will likely not be resolved for a couple of years and it is not known yet what real impacts will occur to nearby lakes. The uncertainty of this situation is relevant to the management of waste rock associated with the expansion, particularly in the case of Ulu and Horseshoe Lakes of the Sable development. BHP's conclusion that acid generation and metal leaching are "not expected to occur" (EAR p.4-75) need to be revised in light of the unpredicted acid drainage from the Panda Pit waste rock dump.

Furthermore, on p.4-6 of the Project Description, BHP states that waste diabase from Sable pit "may require special attention" because of its uncertain acid generation potential. This special attention is not clarified in the EAR.

BHP proposes mitigation of potential waste rock drainage problems by constructing frozen "rockfill" (waste rock) perimeter berms. The further mitigation measure of a 100m setback from the shoreline of Ulu and Horseshoe Lakes in the Sable Pit development may be inconsequential considering the steepness of the slope between the waste rock pile and Ulu. If the perimeter berm does not contain all runoff, there is a high probability that it will drain quickly into Ulu Lake. The lakes in the area have little capacity to buffer acidic inputs. DFO is concerned about the gradual acidification of lakes near the waste rock piles.

***DFO recommends that the characterization of acid drainage from the Panda Waste Rock pile, and construction and assessment of the proposed frozen perimeter berms be completed prior to approval of any further waste rock storage areas. Upon approval, DFO recommends synoptic water chemistry monitoring programs during spring melt and mid open water season on all surrounding lakes. DFO also recommends BHP provide contingency plans for collection and treatment of runoff if necessary.***

Acid Rock Drainage from roads, pads, etc. built with waste rock is not considered.

***DFO also recommends that roads and other infrastructures constructed from waste rock be similarly tested for ARD and associated contaminants prior to further use of waste rock for construction purposes.***

#### 4. Water quality- Phosphorus:

Predictions that concentrations of bioavailable orthophosphate released from the Two Rock sedimentation pond will be below background levels are based on assumptions derived from Long Lake PKC discharge results. The chemical/physical differences between the two containment areas (eg. natural lake sediment vs. processed kimberlite substrate; small volume vs. large; residence time), and how these factors may affect phosphorus contained or released from the Sable-Two Rock system, are not analysed. This is not acceptable considering that the prevention of eutrophication of downstream lakes hinges on the assumption that they are phosphorus-limited and release of nitrogen compounds downstream will have no eutrophying effect as long as phosphorus is contained. If the assumptions based on a different system are not applicable, the effects on water quality may be quite different. DFO remains unconvinced that the proposed mitigation for potential effects of elevated nutrients from the Two Rock sedimentation pond is sufficient.

There is a seemingly innocuous statement on p. 4-71 that mine water collected in sumps in Sable pit will be used for road watering. Baseline data (EAR p.3-47) indicate Sable Lake has phosphorus concentrations higher than other lakes in the area. This uncontrolled discharge of Sable sump water is not assessed for the potential impact of elevated nutrients in this water possibly entering streams at road crossings, etc. This use of Sable sump water is not recommended.

#### Water quality- Nitrogen:

BHP proposes that release of nitrogen compounds need not be controlled, since the aquatic systems are phosphorus-limited, so the control of phosphorus will be sufficient to prevent impacts on trophic status. This overlooks the potential water quality effect if the nitrogen is in the form of ammonia, which has related toxicity effects to aquatic life.

***DFO recommends comprehensive monitoring to detect early signs of water quality changes, and also that BHP have contingency plans in place if such occurs.***

5. Sediment control:

Construction of Pigeon Diversion Channel, breaching of Two Rock dams, and lake dewatering all have the potential to introduce sediments and sediment associated parameters to downstream waterbodies. Although mitigation for the Pigeon Diversion Channel is proposed, there will be some transport of sediment towards Fay Lake. What mitigation is proposed for lake dewatering is confusing, since the EAR p.4-87 states that lake dewatering will be conducted "after complete ice cover has formed", to minimize poor water quality, but on p. 4-80, lake dewatering will be conducted in October/November to ensure that a large portion of the volume is sent downstream "before winter freeze up". The potential release of accumulated sediment and associated phosphorus, from the breaching of Two Rock containment structures is not assessed.

***DFO recommends that silt curtains, etc. should be in place in Fay Lake prior to opening the Pigeon Diversion channel. All receiving waters should be monitored.***

6. Assessment of significance of impacts.

In reviewing the summary table (EAR p. 4-209), it is surprising that the effect of lake dewatering (completely draining fish-bearing lakes) on fish/aquatic habitat is judged to be not even "minor", but "negligible". The accompanying text attempts to explain this conclusion: Even without considering the optimistic prediction of creating "productive lakes" from refilled pits, BHP considers that the "initial loss of the small fish populations and associated aquatic habitats from these isolated self-sustaining lakes is considered to represent a negligible effect" (EAR p.4-213).

The assumption that Two Rock, Big Reynolds, Beartooth, and Bearclaw (which has not had any fisheries baseline assessment) contain "isolated and self-sustaining fish populations" (EAR p.4-69), is not correct. Site visits confirmed these lakes are connected to other waterbodies with streams that are at least seasonally passable. (Big Reynolds, and the downstream Little Reynolds Pond, are now isolated from larger systems, but only as a result of BHP's previous development which severed the connection between Little Reynolds Pond and Long Lake.) Therefore, the conclusion that it is probable that these lakes do not contribute to the fish gene pool in the region is unsubstantiated.

Biodiversity was dropped from the list of Valued Ecosystem Components identified for the original BHP Project. BHP provides no assessment of the significance or possibilities for mitigating the loss of biodiversity incurred by destroying fish populations that are actually distinct, such as the lake trout population in Sable Lake.

The text says nothing to justify the conclusion regarding impact of dewatering on aquatic habitats.

Similarly, flow and stream diversion has been apparently restricted to include only the Pigeon Diversion Channel, and is considered to have a negligible impact on fish/aquatic habitat. The impact of diverting flow around Beartooth into North Panda via a pipeline and completely circumventing the Bearclaw-Beartooth stream is also predicted to have a negligible effect (EAR p.4-73). It is not clarified how replacing a natural stream with a pipeline can have a negligible effect on aquatic habitat.

In the Section 4.2.2, BHP describes attributes used to assess the significance of predicted residual effects. It appears that the attribute of "ecological context", a "qualitative consideration...based on best professional judgement" is used heavily in these assessments. Professional judgement can include certain biases.