



BHP Diamonds Inc.

September 26, 2000

Gordon Lennie  
Chairperson  
Mackenzie Valley Environmental Impact Review Board  
5102-50th Ave.  
P.O. Box 938  
Yellowknife NT X1A 2N7

Dear Mr. Lennie:

**Re: Response to the Department of Fisheries and Oceans (DFO) Technical Review Comments on BHP's Environmental Assessment for the Sable, Pigeon and Beartooth Kimberlite Pipes (April 2000)**

BHP has in the following responded to the major issues raised by DFO in its technical review of the Sable, Pigeon and Beartooth EAR. The company would like to stress that the technical review has been the only vehicle used by DFO to raise many of these issues within the context of the current environmental assessment. Many of these issues would have been more appropriately expressed in the terms of reference, the conformity review or through formal information requests.

BHP understands that broadly speaking a Fisheries Authorization is a two step process. This understanding is supported by a legal opinion sought by BHP on the steps of the process in obtaining a Fisheries Authorization. The first process step is the environmental assessment of a proposal for development, followed by the licensing and permitting of the development, provided that step one is accomplished. In the case of the Sable, Pigeon and Beartooth proposal, the enabling legislation is the *Mackenzie Valley Resource Management Act* (the "Act"), particularly Part 5 which deals with the Mackenzie Valley Environment Impact Review Board (the "Review Board").

For the purposes of this discussion, the relevant sections are sections 114 and 115 of the Act. Section 114 speaks of step one referred to above, as establishing a process comprising a preliminary screening, an environmental assessment and an environmental impact review in relation to proposals for developments. In this case, the NWT Water Board who referred the matter to the Review Board completed the preliminary screening. The Review Board is required by section 115 to carry out an environmental assessment in a timely and expeditious manner having regard to the protection of the environment from the significant adverse impacts of proposed developments and the protection of the social, cultural and economic well-being of residents and communities in the Mackenzie Valley.

Upon completion of an environmental assessment of a proposal, the Review Board is required to take one of the actions set out in section 128.

Only upon completion of an environmental assessment may a designated regulatory authority issue a license, permit or other authorization for that development. It is at this second step that the Authorization required under the *Fisheries Act* may be issued. It is also at this second step that the Mackenzie Valley Land and Water Board determines what water license and land use permits are required. The terms and conditions, which are specifically contained in these licenses and permits, are not the mandate of the Review Board but rather the mandate of the licensing agencies in question. The mandate of the Review Board is to determine whether or not the licensing process can mitigate significant adverse effects.

DFO stated in a letter of clarification to Mr. Louie Azzolinie, Environmental Assessment Officer for the Review Board dated September 21, 2000 that a means for acceptable habitat compensation under the Fisheries Act has not yet been achieved. At this point in time, it is inconsequential that a suitable means for habitat compensation remains outstanding because compensation falls under step two of the process described above. This being said, BHP is committed to working with the DFO to develop acceptable habitat compensation plans. Preliminary discussions are underway in this regard.

Many of the comments raised by DFO in the technical review relate to details of compensation. Although these questions are ones best suited to the licensing phase, BHP has chosen to address them below.

#### **1. No Proven Compensation**

BHP agrees that proposals for fish habitat compensation have not been finalized. In the EAR, BHP has identified habitat that will be impacted and offered some potential compensation alternatives that we would like to pursue. As stated above BHP will work during the licensing phase to develop acceptable compensation programs.

BHP understands that the onus is on the proponent to develop compensation programs that are acceptable to DFO. It was not the intent of the EA to insinuate otherwise. BHP intends to work closely with DFO to ensure that proposals are developed to meet the requirements of the Fisheries Act.

DFO states that "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". This statement is false as a Fisheries Authorization was issued by DFO for the original project. Compensation for lost lake habitat was provided through the establishment of the Fish Habitat

Compensation Fund. Also, lost stream habitat was compensated through the construction and enhancement of the Panda Diversion Channel.

As it is our understanding that DFO would now prefer compensation alternatives for the loss of lake habitat that directly achieve the intentions of No Net Loss, BHP will work on this basis as part of the licensing phase. It is important to note, however, that this was not a requirement for the original project.

## **2. Flooded Pits Not Acceptable Compensation**

BHP suggested in the EAR that mined out pits could be restored to provide productive fish habitat. While it is valid that BHP has not yet proven that the mined-out open pits can be restored to productive fish habitat, BHP is confident that this goal can be achieved. This approach is now being pursued at several other mine sites in Canada, in particular for the mined-out pits in the oil sands area of Alberta and for the Diavik Diamond Project. Further, as DFO is undoubtedly aware, there is a growing bed of literature on the successful reclamation of mine pits into productive lakes elsewhere in North America and Europe.

During 1999 BHP investigated options for the reclamation of mined-out pits at the EKATI™ Diamond Mine and a number of strategies were developed (Rescan, 1999). These strategies were provided and discussed with DFO personnel a preliminary basis for future pit reclamation and aquatic habitat restoration.

The general approach to the reclamation of mined-out pits to lake-status was reviewed in Section 4.5.1.6 of the EAR. A brief discussion of the basic sequence of steps follows:

- After mining has been completed in the pit, all structures and equipment will be removed. The near-surface pit access ramp and upper bench will then be modified to provide a littoral zone. Constructing bays around the periphery of the pit will create additional littoral areas. Drill and blast of the high wall onto the upper benches can create graded shorelines.
- Once the critical habitat components have been constructed, the pit can be allowed to fill naturally or be fill-assisted by drawing water from a large, nearby lake. Using lake-water to fill the pits will ensure that the lake is seeded with the necessary primary and secondary producers of a lake ecosystem. Filling would be conducted over a number of years to minimize effects on the source-lake and the prevailing hydrological conditions.
- If necessary, fish stocks can be introduced into the lake once acceptable water quality conditions have been achieved. A monitoring program will be initiated

during the refill stage and would be continued until there was clear evidence that a viable fish community has been re-established.

The proposed approach described by BHP is very similar to that previously proposed for Diavik's mined-out pits in Lac de Gras, for which a Fisheries Authorization was awarded on August 2, 2000. BHP looks forward to ongoing consultations with DFO, leading to the development of satisfactory reclamation plans for compensating "temporary" aquatic and fisheries habitat losses to achieve an acceptable level of No Net Loss.

The majority of the pits to be reclaimed will be refilled with water obtained from suitable donor lakes over a period of time (2-25 years). Further information would be collected to support final design and ensure that the redirected water did not result in any adverse effects to donor lakes.

Although the new lakes will be deep compared to the original lakes, the relatively large, shallow water benches which will be located within the photic and productive littoral zones of each new lake are expected to provide new fish habitat to achieve an acceptable level of No Net Loss. In addition, because of the relatively inert and granitic nature of most of the host rock in the development area, trace metal contamination of the pit lake waters is not expected to occur. This prediction will need to be confirmed in the future as pit flooding proceeds at an actual site.

BHP is encouraged by DFO's statement that they are interested in the potential experiments such as the reclamation of mined out pits to become productive lake habitat. During the licensing phase, BHP will continue to work with DFO to determine how best to move forward with this particular alternative, while addressing technical concerns which currently exist.

### **3. Backfilling Pits with Processed Kimberlite**

The backfilling of mined out pits with processed kimberlite and its' subsequent restoration to productive lake habitat is a concept put forth by BHP in the EAR. It was also a concept put forth, and approved in the 1995 Environmental Impact Statement (EIS) for the existing development.

BHP concurs with DFO that the use of mined-out pits for processed kimberlite disposal needs to be addressed cautiously and critically. In particular, further evidence will be required to clearly demonstrate that processed kimberlite will not result in water quality concerns.

BHP recognizes that the specific, physical, chemical and toxicological characteristics of the processed kimberlite dictates the suitability of using this material as a "filler" for suitable mined-out pits. Toxicity and chemical testing has

provided BHP with confidence that processed kimberlite can be effectively used to in-fill certain mined-out pits located in close proximity to the processing plant, such as Beartooth, Panda and Koala, prior to their return to a viable lake status.

Beartooth pit is expected to provide the first opportunity, and could serve as a pilot project to evaluate this approach. The results obtained from anticipated research/monitoring programs and habitat reclamation efforts for this site will serve to further the information base upon which to develop future habitat restoration plans and methodologies for other candidate pits.

Progressive alternatives such as this are being investigated elsewhere. As a not too dissimilar example, the following excerpt from BC Report Magazine from November 1996 details a relevant experience from the Highland Valley Copper Mine in British Columbia. This example illustrates that it can not be assumed that metal leaching will be a problem in fish habitat reclamation.

#### On Trojan Pond

One of the signal achievements of Highland Valley's environmental program is the creation of a very productive rainbow trout fishery on the old Trojan tailings pond.

The old 26.5-hectare Bethlehem Mine tailings pond was closed in 1985. In 1991, Highland Valley Copper began working closely with the Ministry of Environment to see if the pond could be brought to life. The pond was stocked with about 1,500 Kamloops rainbow trout fry from the Loon Lake Hatchery. Over the next few years, the stocking program continued.

Success was almost immediate. According to Senior Environmental Engineer Bob Hamaguchi, growth rates of the fish far exceed those in other lakes in the region - 10-pound trout are common and 16-pounders are caught occasionally. The outstanding growth rates stem from low stocking densities and the abundance of invertebrate food, such as fresh water shrimp. In 1995, a 300-metre artificial spawning channel was built to allow the trout to spawn. The fry from this channel have been transplanted to other water bodies on the mine site.

Trojan Pond has become one of the premier fishing holes in the region. Trojan is well on its way to becoming a self-sustaining sport fishery; the spawning channel has proved a success, with the fish showing increased use of the channel since it was built in early 1995. "We're very proud of the Trojan experience," Mr. Hamaguchi says. "When proper resources, including time, are made available, incredible things can take place."

And that's not just Mr. Hamaguchi's opinion. Working closely on the project has been B.C. senior fisheries biologist Brian Chan. "We've had very good cooperation from the environmental section of the company," Mr. Chan says. "We've tried some experiments in seeking to establish fish habitat on some of the old pits on the property and they've gone to some lengths to make available manpower and equipment to supply some of these fisheries and I'm sure it will continue."

At the moment, fishing at Trojan Pond is closed to the public, but derbies are held occasionally. An invitation to one of these is something that few fisherman turn down - in spite of at \$125 registration fee (the majority of the fee goes to charity, and in 1996 \$9,000 was donated to Kamloops' Royal Inland Hospital).

And despite its status as a former tailings pond, the fish in Trojan Pond show declining amounts of copper concentration in muscle tissue, well below the levels considered contaminated.

BHP's July 19<sup>th</sup> response to DFO's information request provided additional basic information on the productive fresh water lake with a salt water substrate BHP created at Island Copper. While DFO has sought greater clarity on technical issues associated with this lake, it is important to remember that the company simply used the example to indicate previous experience in pit lake reclamation and not as a potential formula for reclamation of pits at EKATI™. BHP has indicated to DFO that we will provide them with access to the volumes of more detailed design and monitoring data on that pit reclamation that is currently archived in our Vancouver office if it will provide value to the discussion.

In summary, BHP concurs that the use of mined-out pits for processed kimberlite disposal and subsequently restored as productive fish habitat needs to be addressed cautiously and critically. BHP would like to further pursue this proposal with DFO through the licensing phase. BHP is willing to table this proposal as a "pilot project" designed to prove or disprove our contention that this is a viable alternative.

#### **4. Lost Stream Habitat Compensation**

BHP recognizes that the EAR did not provide detailed information on stream habitat compensation strategies for Little Reynolds, Big Reynolds, Bearclaw, and Beartooth streams. Again, the mandate of the EAR is to document potential adverse effects and mitigative strategies of the project, not to develop the detailed compensation strategies.

The EAR identified those streams that potentially contain fish habitat and might be affected by the proposed development. Based on the work reported in section 3.5 of the EAR, BHP has identified five streams, which may have fish habitat that might be affected. The potential habitat in question includes approximately 1,000 metres in the middle section of Pigeon Creek, 30 metres of the stream between Beartooth and Upper Panda Lakes and about 32 metres at each of three culvert crossings of largely ephemeral unnamed creeks along the Sable Road that potentially contain habitat. As a point of clarification, the approximately 1,500+ metres of stream including Big and Little Reynolds Ponds as headwaters, that formerly flowed into Brandy Lake which is now part of the Long Lake Containment Facility was compensated for in the original 1997 Fisheries Authorization.

BHP has suggested that the Pigeon Diversion Channel and subsequent restoration of Pigeon Pit will formulate the basis for stream compensation. BHP will provide further details to DFO during the licensing phase in pursuit of the commitment to develop acceptable compensation plans for the loss of stream habitat.

## **5. Inadequate Baseline Information**

In preparing the EAR, BHP presented necessary aquatic and fisheries baseline data from earlier sampling programs and from more recent surveys carried out during 1999. The data BHP provided is adequate for the needs of an environmental assessment. BHP acknowledges that further sampling will be required to support subsequent phases of the project. BHP is committed to collect all baseline data needed to support the impact predictions made in the EAR.

## **6. Unsubstantiated Conclusions/Assumptions about Fish Habitat**

The results of BHP's baseline aquatic and fisheries studies were summarized in the EAR. Although there may appear to have been some inconsistent wording at times, based on the available data and the extensive site experience of its fisheries biologists, BHP stands by the interpretations and predictions made by its technical personnel in the EAR.

BHP is also aware that DFO representatives flew over some of the small outflow streams after a heavy rain on August 30<sup>th</sup> this year. The company would be pleased to discuss any observations made by DFO from that brief over flight that may have resulted in questions regarding the interpretations and predictions documented in the EAR.

## **7. Waste Rock Seepage**

BHP shares DFO's concern about the possible gradual acidification (and contamination) of lakes near waste rock piles. In light of concern raised about the seepage quality from the waste rock generated from Panda Pit, BHP has implemented an Enhanced Monitoring and Confirmation Plan. This plan is expected to further the understanding of depressed pH levels experienced in the area and confirm whether or not they are naturally occurring.

With respect to natural background pH levels, BHP stands by its statements that values of natural tundra water in the claim block area generally range from 5.0-5.9 (and possibly lower) compared with pH values in streams which have remained above pH 6. Indeed, these naturally occurring pH values were recognized by the NWT Water Board in the Class A Water Licence recently granted by the Board to Diavik Diamond Mine Inc., wherein they established a pH range for surface runoff of 5.0-8.4 for the Diavik Project.

BHP's statement (EAR – P.4-74) regarding the potential for acid generation was correct and was taken out of context by DFO. The statement referred to two-mica granite, which has been shown to be inert with respect to runoff quality.

In addition to the Enhanced Monitoring and Confirmation Plan, BHP is developing further contingencies that include testing a proposed mitigation measure that limits waste rock drainage through the installation of engineered, frozen, rock-fill perimeter dams. BHP is optimistic that this proposed mitigation measure could significantly reduce drainage from those waste rock piles that may present a possible concern.

Acid rock drainage from roads, pads etc. built with waste rock has not been considered because granite has been used for all these construction purposes. Granite is a material of choice for the construction of roads, pads etc. across Canada and has not been shown to cause an ARD problem.

## **8. Water Quality**

DFO has recommended "comprehensive monitoring to detect early signs of water quality changes, and also that BHP have contingency plans in place if such occurs" for the water bodies downgradient of Two Rock.

The Aquatic Effects Monitoring Program (AEMP) at Ekati™ is designed specifically for this purpose. BHP has committed through the EAR (p 5-5) to expand its AEMP to include the areas of proposed development. Water bodies downgradient of Two Rock will be monitored under the AEMP program for any signs of effects.

Although not expected, should adverse effects be observed BHP will implement contingency plans. Potential contingencies include the installation of a physical-chemical water treatment system or the use of land treatment.

### *(a) Phosphorous*

The release of bioavailable phosphorous in any appreciable quantities to downstream waterbodies from the Two Rock sedimentation pond has the potential to cause undesirable effects, should nitrogen compounds also be available. Given that phosphorus is the limiting nutrient, its increase in a bioavailable form would likely result in increased biological productivity which in turn can result in a decline of winter dissolved oxygen concentrations. Indeed this effect was observed in some waterbodies downgradient of the sewage treatment plant discharge for the main camp. The water bodies have responded positively to the elimination of treated sewage effluent discharge to Kodiak Lake.

During prestripping phase of development, phosphorus in the pit sump will be attributable to the lake bottom sediments and till. Experience at Panda and Koala has shown that this phosphorus is found in the solid phase, not in solution. As such, removal of the solids through settling in Two Rock will remove both the solids



and the phosphorus. In fact, the table referenced by DFO (p 3-47) highlights the relationship of phosphorus to settleable solids.

During active mining, phosphorus will no longer be from lake bottom sediments and/or till. Rather, phosphorus is associated with the kimberlite ore. Experience with Panda Pit has shown that phosphorus is primarily found in the form of apatite, which is highly insoluble and therefore not bioavailable. Again, the removal of the solids will result in the removal of phosphorus.

In summary, settling of solids will result in the removal of phosphorus. Two Rock has been designed for this purpose. As such, BHP does not expect to have any appreciable quantity of phosphorus released to downgradient water bodies. Without the addition of phosphorus to downgradient water bodies, adverse effects are not anticipated.

DFO also raised concern on the use of pit water for the watering of roads. BHP's intent is to limit the use of water so that there is no run-off to adjacent waters. Without direct run-off no effects to adjacent water bodies are expected to occur.

#### *(b) Water Quality – Nitrogen*

BHP minimizes the source of nitrogen in pit water through the proper handling and storage of ammonium nitrate. Ammonium nitrate is used in the manufacture of explosives used for pit operations. However, careful management of ammonium nitrate will not eliminate all of the nitrogen compounds that will be discharged to Two Rock via pit water.

BHP agrees that nitrogen in the form of ammonia is toxic to aquatic life given suitable conditions. As such ammonia is carefully monitored in waters downgradient of Ekati™. To date however, nitrogen compounds have been observed primarily in the form of nitrate, not ammonia. Nitrate is not toxic to aquatic life. Similar observations are expected for water downgradient of Two Rock.

### **9. Sediment Control**

BHP concurs that the statements made on pages 4-80 and 4-86 are somewhat confusing. BHP intends to dewater during the fall (Oct/Nov) once there is ice cover on the lakes. By dewatering under lake ice, the effects of wind and wave action on sediment suspension are minimized. However, the timing also allows for the discharge of water downstream (as the water can still flow through the stream). By allowing the transport of water downstream, hydrological conditions for the next year will not be altered as the result of excess water storage in the streams.

BHP will be pleased to explain to DFO how water bodies at Ekati™ have and will continue to be dewatered to ensure that sediment releases are minimized. DFO's suggestion for a silt curtain at the mouth of Pigeon Creek to protect Fay Lake during construction fits with actions BHP already planned as part of its commitment to best practice.

#### **10. Assessment of Significance of Impacts.**

BHP stands by its impact predictions for fisheries-related issues and would be pleased to discuss them further with DFO and other interested parties. DFO is directed to the Section 4.2 of the EAR. Section 4.2 describes the methodology used to assess the significance of residual effects of the proposed development.

BHP trusts that this response clarifies information provided in the EAR. It is BHP's contention that many of the issues raised by the DFO technical review are related to the licensing phase and not the EA phase. The data used to support the EAR is sufficient for the purpose of determining whether or not the project can proceed to the licensing stage. As part of this, it is BHP's contention that we have suitably assessed and documented the potential effects to fish and fish habitat that will result in a need for a subsequent Fisheries Authorization.

Sincerely yours,



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