Bruce J. Donald
Reclamation Manager

January 20, 2004

Nunavut Water Board
Gjoa Haven, NU
X0B 1J0

Attention: Patrick Duxbury, NWB Mine Reclamation Coordinator

Dear Patrick;

Re: Polaris Mine Request to Place Contaminated Soils in LRDQL

Thank you for your letter dated January 8, 2004 resulting from discussions with Carl McLean and Holgar Hartmaier regarding our request to store additional metals contaminated soils in Little Red Dog Quarry Landfill ('LRDQL') and hydrocarbon contaminated soils in the mine. In your letter, there were four topics which you requested additional information to assist in reviewing our request. I will respond to each of these below:

1. ***Potential for Short Term Oxidation and Generation of Acidic Drainage and Related Metals Leaching***
   - The source of metals contaminated soils requiring disposal originate from both mine rock dumps and from lead and zinc concentrate dusts that had been spilled and/or tracked in the area of the process barge and product storage building. The waste rock dumps consist primarily of limestone rock but previously had ore stockpiled and/or mixed with them. The ore at Polaris is considered to be a 'clean' ore and has low iron sulphide content. This combined with the ore being hosted in a limestone deposit results in an ore not prone to produce ARD. The ore is processed on site to produce concentrates consisting primarily of zinc and lead sulphides. The majority of other minerals types mixed with the ore are separated and disposed of with the tailings during the milling process on site. The concentrates spilled and/or tracked have become mixed with local surficial soils and backfill materials. Section 5.1.6 of Volume 1 of the Polaris Mine Decommissioning and Reclamation Plan ('DRP') reviewed a number of rock types from the mine site area and considered their ML/ARD potential. Samples of limestone, dolomite, Green and Brown shales and other shale samples underwent analysis. The review concluded that there was little or no potential for ARD from any of the materials and that the potential for metals leaching was limited.
   - As a result of your letter, we have collected some samples of the metals contaminated soils and they are currently at BC Research facilities in Vancouver undergoing a series of tests to further document their ML/ARD potential. These results will not be available until the end of January but will document the actual properties of the soils that would be placed in LRDQL. We will forward these results as soon as they are complete. We ask that the approval process is not delayed waiting for this information as the plan proposed for placing them in LRDQL is environmentally safe regardless of these test results as explained below.
   - LRDQL was selected as the alternate disposal location as it is the most environmentally secure location other than the mine for a number of reasons:
     - LRDQL is a rock quarry which is essentially a small open pit mine. The quarry is a bowl shaped hole blasted into bedrock. As the snow melts in the summer and any rain that occurs within the quarry area are trapped in the quarry. As the quarry is surrounded by bedrock, the water is trapped in the bottom of the quarry and can not escape. Any precipitation penetrating the

Teck Cominco Limited / Environment and Corporate Affairs
Bag 2000/Kimberley, British Columbia, Canada V1A 3E1 · Tel: 250-427-8405 · Fax: 250-427-8451 · Email: bruce.donald@teckcominco.com

contaminated soils placed in the quarry prior to the final cover cap being placed will remain trapped within the confines of the quarry. If any metal is leached into the water within the pit, it will remain there until it becomes permanently frozen.

- The bedrock surrounding LRDQL is in permafrost (other than the relatively shallow active layer which temporarily thaws in the summer months). As the contaminated soils would be placed in what is essentially a frozen bowl, this is a second level of protection to prevent the migration of waters trapped in the quarry.
- LRD quarry was placed in this location as it is a limestone outcrop (with some dolomite). The limestone/dolomite have very low sulphur concentrations and high neutralization potentials. The limestone samples analyzed (reported in the DRP in Section 5.1.6 of Volume 1) had carbonate and neutralization potential close to the theoretical maximum values of 1000 kg $CaCO_3$/t. Any acidic solutions coming in contact with this material would be neutralized. This is a third level of protection within LRDQL.
- The LRDQL has more than adequate capacity to contain the volumes of demolition debris and contaminated soils. This is discussed in more detail later in this letter.

- As indicated in your letter, the potential for acidic drainage is a potential issue in the 'short term' until the permafrost is re-established in the LRDQL. We do not disagree that it will take a relatively short period of time for permafrost to be completely re-established. It is important to note that the average temperature at Polaris is -17 degress Celsius and so the majority of the materials being placed into LRDQL are in a frozen state when they are placed there. The plan is to relocate the metals contaminated soils into LRDQL as soon as regulatory approvals have been granted. The materials being moved between now and June are already in a frozen state so only the surface layers of the material will thaw during this summer prior to the cover cap being constructed. There are only a few months that the soils will be exposed to periods where temperatures are above freezing. The plan is to complete placement of the cover cap on LRDQL by the end of this summer (end of August 2004).
- The mine site has limited exposure to groundwater. Apart from the mean annual air temperature being -17 degrees Celsius, the area is described as a 'polar desert'. There is only a short period of time where air temperatures are above freezing and the total annual precipitation is only approximately 250 mm. The quantity of water that the contaminated soils will be exposed to this summer is limited.

2. Does LRDQL have adequate capacity to store all of the demolition debris and contaminated soils?

- Based on drawings of LRDQL produced from surveys as the quarry was mined, the volumes of LRDQL are as follows:
  - Bench 7 is at the bottom of the quarry and was never fully developed. A ramp was just starting to be constructed into it at the time the mine was closed. The ramp had a capacity of 3,000 cu.m. and has already been filled with demolition debris.
  - Bench 6 – has a capacity of 110,500 cu.m. This bench is approximately 50% full so that there is approximately 55,000 cu.m. of space remaining to fill Bench 6. There are no surveyors currently on site so the percentage filled was estimated from photographs. This estimate is conservative so there is at least the 55,000 cu.m. remaining on Bench 6.
  - Bench 5 – no fill has been placed in Bench 5. Bench 5 has 160,000 cu.m. of space available.
  - Bench 4 – no fill has been placed in Bench 4. Bench 4 has 215,000 cu.m. of space available.
- Volume of Materials remaining to be placed is as follows:
  - Demolition debris – the largest structure remaining at site is the Accommodation Building which will require 6,500 cu.m. of volume in LRDQL for burial (Section 5.3.4, Volume 1 of the DRP). Miscellaneous outbuildings are estimate to require 2,000 cu.m (Section 5.3.9., Volume 1 of the DRP). There are miscellaneous supplies and mobile equipment which have not been estimated. To be conservative, assume the total of all demolition debris will be 15,000 cu.m.
  - Contaminated Soils – as per our letter to the NWB and INAC requesting authorization to place up to 91,100 cu.m. of metals contaminated soils into LRDQL. This is a conservative estimate and we expect the actual quantities to be less than this.

Teck Cominco Limited / Environment and Corporate Affairs
Bag 2000/Kimberley, British Columbia, Canada V1A 3E1 · Tel: 250-427-8405 · Fax: 250-427-8451 · Email: bruce.donald@teckcominco.com

Based on the above information, Bench 6 will be completely filled and Bench 5 will only be partially filled. Bench 5 will have in excess of 100,000 cu.m. of capacity remaining. It is forecast that Bench 4 will remain un-filled leaving an additional 215,000 cu.m. of capacity.

Clearly, the remaining capacity of LRDQL is not of concern.

3. Method of Placement of Metals Contaminated Soils

It is proposed to use the metals contaminated soils as fill to bury the demolition debris and as general fill within the quarry. Other local fill is currently excavated and imported into LRDQL to bury the demolition debris to minimize void spaces as required in our DRP approvals. The metals contaminated soils are of similar sizing to the other fill materials being currently used and so are of suitable sizing for this purpose. Utilizing the metals contaminated fill will replace other fill materials required in LRDQL. The increases in contaminated soil volumes are creating scheduling challenges for the project. Eliminating the need to excavate other materials for fill in LRDQL reduces the work load and assists with reducing our scheduling challenges.

4. Contingency Plan for Storage of Petroleum Hydrocarbon Contaminated Soils

As identified in our letter dated December 19, 2003 we have capacity to store 126,000 cubic metres of hydrocarbon contaminated soils in the mine and our forecast is that there is 102,400 cubic metres of hydrocarbon contaminated soils to be stored. Your letter stated that it is prudent to develop a contingency plan for the storage of hydrocarbon contaminated soils in the event that we are unable to place them in the mine.

There are unplanned events that could occur disrupting our plans to place all of the contaminated hydrocarbons into the mine for storage. These include:

- Locating additional hydrocarbon contaminated soils not included in the current estimates. While this is not considered likely, we have encountered unknown hydrocarbon contamination elsewhere at the site (i.e. the dock cells). The estimates for the remaining hydrocarbon contamination volumes are conservative so some unexpected volumes would not necessarily result in a shortage of storage space underground. Current capacity in the mine more than the than the anticipated volumes of hydrocarbon contaminated soils. The potential to find sufficient quantities of new contamination to exhaust available space underground is considered to be of low probability.
- Hydrocarbon materials are transported into the mine primarily through the use of vertical holes from surface down into the mine workings as this is the most efficient method. These holes are referred to as raisebore holes. It is also possible to transport the soils by trucks and/or scooptrams into the mine via the main tunnels. This is a much slower process. Material being dumped down the raisebore holes can plug off the holes prematurely. We do not have the capability of making more of the raisebore holes and our schedules are reliant on extensive use of this method. In addition, some of the raisebore holes are located over stopes, allowing us to directly place material into the stopes that are not otherwise accessible. Losing these boreholes would reduce the capacity of storage within the mine. We are using grates at the top of the raisebore holes to prevent oversize material from being dumped down the hole to minimize the chance that plugging of the hole could occur. As the site is decommissioned, power generation and ventilation infrastructure are being gradually demolished. At some point, removal of these facilities will prevent further safe access to the mine.
- Substantial quantities of fuel and oils are stored and being utilized at the site. While the quantities of these are reducing as the project progresses, they will be required until the project is complete. If a spill were to occur before the reclamation work is completed in September, additional contaminated soils would be generated in excess of the current estimates. Depending on the size of the spill it is possible that inadequate capacity would remain in the mine to store the additional quantity of contaminated soils. Alternately, if a spill were to occur after the mine has been shut down and sealed, then it would not be available for storage of the contaminated soils.

Teck Cominco Limited / Environment and Corporate Affairs
Bag 2000/Kimberley, British Columbia, Canada V1A 3E1 · Tel: 250-427-8405 · Fax: 250-427-8451 · Email: bruce.donald@teckcominco.com

If the ability to place hydrocarbon contaminated soils underground were to be exhausted or the mine were to be inaccessible, as a contingency, we propose placing the remaining soils in LRDQL where the soils would be encapsulated by permafrost. As discussed above, this area is surrounded by bedrock that is permanently frozen (permafrost) which forms an impermeable barrier to contain any migration of contaminates. There is substantial surplus capacity remaining in LRDQL so that capacity of LRDQL to accommodate additional materials is not of concern. If storage of hydrocarbon contaminated soils in LRDQL were required, the following steps would be taken to securely encapsulate the soils:

- It would not be used as fill to bury other demolition debris or mixed with other fill materials.
- The hydrocarbon materials would be consolidated into one area to minimize its surface area.
- No free phase contamination would be placed into LRDQL
- The storage area in LRDQ would be surveyed before and after placement of the materials so both the location and the quantities are documented.
- No hydrocarbon contaminated soils would be placed in before the NWB and INAC were notified.

Please contact me if there are further questions or additional information required.

Yours truly,

Original signed by B.Donald

Bruce Donald
Reclamation Manager

Teck Cominco Limited / Environment and Corporate Affairs
Bag 2000/Kimberley, British Columbia, Canada V1A 3E1 · Tel: 250-427-8405 · Fax: 250-427-8451 · Email: bruce.donald@teckcominco.com