

January 26, 2004

Department of Indian Affairs and Northern Development
Box 100
Iqaluit, NU X0A 0H0

Attention: Carl McLean, Manager, Land Administration

Nunavut Water Board
Box 119
Gjoa Haven, NU X0B 0H0

Attention: Phyllis Beaulieu, Licensing Administrator

Dear Carl and Phyllis;

Re: Polaris Response to Questions Regarding Request to Store Metals Contaminated Soils in LRDQL and to Increase Storage of Hydrocarbon Contaminated Soils in the Mine

To facilitate the Nunavut Water Board and the Department of Indian and Northern Development in their consideration of our request to store additional contaminated soils in the Little Red Dog Quarry Landfill and underground in the mine, I would like to respond to comments submitted by Holger Hartmaier (BGC Engineering), Colette Meloche (Environment Canada) and Stephanie Hawkins (INAC). I have identified what I believe are the key comments made in each of the letters and responded to them in the order that they appear in the letters.

1. December 30, 2003 Letter from Holger Hartmaier, BGC Engineering

2.0 Comments on Proposed Plan

- Page 3 of Mr. Hartmaier's letter recommends that Teck Cominco propose a contingency plan in the event that storage space underground is exhausted.
 - *While we do not expect this to be necessary, a contingency plan was proposed in our letter dated January 20, 2004.*
- Page 3 recommends that Teck Cominco be requested to provide an accurate accounting of the volumes of contaminated soils disposed of and their locations.
 - *Our request (dated December 19, 2003) for disposal of additional quantities of contaminated soils was the result of a detailed review of the environmental sampling data and of additional assessment work done by Gartner Lee Ltd. We will report this information in detail in our quarterly reporting. Starting in our 4th Quarter 2003 report there will be an update of the quantities of contaminated materials remaining, quantities of contaminated materials stored, and where they are stored (i.e. in the mine and/or other locations).*

2.2 Disposal of Metals Contaminated Soils in LRDQL

- On page 4 Mr. Hartmaier recommends that Teck Cominco undertake a risk assessment to assess the potential for oxidation and short term release of acidic drainage before permafrost aggradation occurs.
 - *Teck Cominco has responded to this in our letter dated January 20, 2004 to Mr. P. Duxbury as he had requested that we assess the potential risks of placing metals contaminated soils in LRDQL.*
- On Page 4 Mr. Hartmaier indicates the concern that disposal locations of co-contaminated soils was not identified in our request and that the co-contaminated materials (soil that is contaminated by both metals and hydrocarbons) be disposed of in the mine.
 - *Consistently throughout the closure program, co-contaminated soils have and will be treated as hydrocarbon contaminated soils. Co-contaminated soils have been and will continue to be disposed of in the mine.*
- On page 4 Mr. Hartmaier recommends that metals contaminated soils can be used for both burial of demolition debris and fill on top of these lifts.
 - *Teck Cominco is in agreement with using metals contaminated soils as fill to assist in burying demolition debris. As there is currently exposed demolition debris awaiting burial in LRDQL and as it is essential that we start moving the metals contaminated soils to LRDQL as quickly as possible, this provides a location that the metals contaminated soils can be placed. This has the advantage that it preferentially places the metals contaminated fill as deep into the pit as is currently possible. If the current debris had to be buried with clean fill first, then it would not only delay the movement of the metals contaminated soils but would result in them being placed higher up in LRDQL.*
 - *As stated in our January 20, 2004 letter the extra volume of contaminated soils is creating scheduling problems that would be minimized by allowing the metals contaminated fill to replace other fill types for burial of debris in LRDQL reducing the quantities of materials that must be handled..*
- On page 4, Mr. Hartmaier recommends that the contaminated soils be placed below the -4 degree C isotherm.
 - *This is contrary to the cover cap design developed by BGC for Teck Cominco and approved in the Decommissioning and Reclamation Plan. The design of the cover cap was intended to thick enough to ensure the cover cap becomes the active layer and that the landfill is in permafrost below the active layer.*
 - *We believe that Mr. Hartmaier is confusing the objective of storing hydrocarbon contaminated soils in the mine where it is at least -4 degrees C. Apart from the desire to store hydrocarbon contaminated soils in areas well below freezing, the -4 degree C constraint in the mine originates from when the mine was operating and all mining and mine development was designed to remain in areas where the permafrost was at least -4 degrees C or colder. The concern was that the mining would encounter pockets of unfrozen brine (which is not frozen at 0° C) beneath seal level resulting in potential uncontrolled flows of water in into the mine. Also the underground workings are less stable at warmer temperatures creating safety concerns for the workers in the mine as the temperature approaches 0° C. The -4 degree C isotherm had no relationship to the secure storage of metals contaminated soils.*
- On page 4, there is a question of the capacity of LRDQ relative to the quantity of materials that must be placed there.
 - *As identified in Teck Cominco's letter of January 20, 2004 there is substantial excess capacity within LRDQL to handle all of the anticipated materials with no risk of running out of space.*

2.3 Landfill Cover Design Comments

- On page 5, Mr. Hartmaier states that based on the data supplied by the Teck Cominco that the active layer is up to 1.5 m thick.
 - *After a careful review of the thermistor data as a result of Mr. Hartmaier's comments, we have identified what is believed to be a technical problem with two of the thermistors that have apparently given spurious results which do not represent actual temperature conditions. In discussing the thermistors with previous mine staff, it has been determined that during mine operations, mine staff have from time to time, removed thermistors from the operational landfill and utilized them on a short term basis (i.e. over several days) to monitor temperatures in the mine and then replaced the thermistors back into the monitoring pipes at the Operational Landfill. In theory this should not impact readings but in practice it appears that either the thermistors were not replaced to exactly the same elevation or that the calibration of the thermistors have been thrown off due to the handling. To ensure that reliable and accurate readings are obtained after the cover caps have been completed, new thermistor strings will be purchased (all from the one supplier for consistency) and will include smaller spacing between the thermistor bulbs through the active layer for more detailed and accurate monitoring of the cover cap temperatures. Installing them sooner will not aid in obtaining better information this year as the cover cap is currently in the process of being constructed so the conditions being monitored are changing. While the new installations will be completed this summer, freeze back will not likely be fully established this summer so it will not be until the summer of 2005 that summer temperatures in the cover cap will be representative of the on-going performance of the cap.*
- On page 5, Mr. Hartmaier states that the thermistor readings indicate that the -4°C isotherm is at least 3 – 4 metres below surface and therefore the metals contaminated soils should be placed so they are at least 5 m below the top of the final cover.
 - *As previously stated, the intent was to place hydrocarbon contaminated soils within the mine where temperatures are at least -4°C . This has no relationship to the landfill cover design and the storage of metals contaminated soils. The cover design for the landfills was provided to Teck Cominco by an independent professional engineer who has permafrost experience (Mr. W. Savigny, P.Eng. of BGC). Mr. Savigny's design was to provide a cover cap that was thick enough to extend to the bottom of the active layer (with conservative assumptions used for global warming conditions). This means that the bottom of the cover is designed to prevent ground temperatures from exceeding 0°C not -4°C . Keeping the ground frozen is all that is necessary to prevent the metals contaminated soils from being in contact with ground water.*
 - *Mr. Hartmaier's recommendation to bury the metals contaminated soils at least 5m below surface is unnecessary to protect the environment but has the result of increasing the cover cap volumes (or fill volumes) by at least 65,000 cu.m.! Apart from the substantial cost, materials handling is the critical path of our project and we are concerned about having adequate time to complete work at the site by the end of this summer if materials handling requirements increase.*

2. January 14, 2004 Letter from Colette Meloche, Environment Canada, Environmental Protection Branch

- Page 1 of Ms. Meloche's letter indicates that EC recommends the metals contaminated soils be placed in the deepest possible point of the LRDQL to ensure complete encapsulation by permafrost.
 - *This is consistent with our desire to start placing metals contaminated soils into LRDQL as soon as possible before more debris/fill are placed there. This would place the metals contaminated soils as deep into the quarry as possible. As indicated previously, there is no chance that the quarry will become full as there is substantial excess capacity in LRDQL.*
- Page 2 of Ms. Meloche's letter states that placing additional hydrocarbon materials underground is acceptable provided that the placement of additional hydrocarbon contaminated soils follows the already approved protocols.
 - *Teck Cominco is in agreement with this other than the use of a wetted muck pile to separate the hydrocarbon contaminated soils from other areas of the mine. This was originally proposed when the hydrocarbon contaminated soils were restricted to a single separate area of the mine. We are now utilizing most accessible areas of the mine so this is no longer relevant. However it should be noted that the entrances to the mine will be sealed with plug consisting of a concrete based material at each of the four portals so that the mine itself will be permanently sealed.*
- On Page 2 of Ms. Meloche's letter indicates that the surplus volume in the mine after the final placement of hydrocarbon contaminated soils should be used up by the placement of metals contaminated soils rather than placing them in LRDQL.
 - *Remaining quantities of hydrocarbon contaminated soils are forecast to exceed the remaining quantities of metals contaminated soils. Placing soils underground is a much slower process than handling materials on surface where they can be handled with larger haulage equipment. Our experience to date is that materials can be placed underground at only half the rate that we can excavate and haul it on surface. Given this, the handling of hydrocarbon contaminated soils will be on-going long after we have completed handling the metals contaminated soils.*
 - *Placing of metals contaminated soils into LRDQL is the priority activity that would start as soon as possible. The majority of this material will be placed into LRDQL before spring. This ensures it is placed as deep into LRDQL as possible. If some of this material is intentionally held in stockpiles until it is known if there is adequate space remaining in the mine and there isn't, then this material will likely be the last or highest material placed in LRDQL which is contrary to EC's stated objective to have it placed as deep as possible in LRDQL.*
 - *Teck Cominco has two concerns with the additional volumes of contaminated soils. The first is the running out of room for the storage of materials in the mine which was the primary reason for our request. The second is not having enough time to complete work this year. The movement of contaminated soils is the most critical work on our schedule due to the limited amount of equipment we have at the site. Intentionally holding back on disposing of metals contaminated soils until all of the hydrocarbon contaminated soils have been placed underground could potentially result in not having enough time to complete disposal of the material by the end of the summer.*

- *Placing metals contaminated soils into LRDQL is an environmentally safe proposal so there is no reason not to place all of the remaining metals contaminated soils there.*
- In her concluding comments, Ms. Meloche indicates that in the event that the volumes of contaminated soils increase beyond the current forecasts, EC should be notified as further reviews would be necessary.
 - *Teck Cominco is in agreement with this requirement.*

3. January 21, 2004 Letter from Stephanie Hawkins, INAC Water Resources

- The characterization and selection and preparation of new underground areas must be rigorously applied.
 - *The primary criteria for selection of underground storage areas for hydrocarbon soils is that they are stored in areas of the mine that are at least -4⁰ C, that the approved protocols for storage are followed. These protocols will be followed other than the previous comments about the wetted muck pile. Documentation of site preparation and characterization will be reported along with the soils volumes and storage locations.*
- Ms. Hawkins recommends that metal contaminated soils be prioritized for placement in the deepest areas of LRDQL. It is also recommended that the mixing of contaminated and uncontaminated soils be minimized.
 - *The metals contaminated soils would be prioritized to be placed as deep into LRDQL as possible and the mixing of contaminated and non-contaminated soils would be minimized.*
- Ms. Hawkins recommends that surface run-off, if any, from LRQL be monitored until the thermistor readings indicated that freeze-back has occurred.
 - *This is a reasonable and prudent monitoring requirement and would be done.*

If there are any further comments or questions regarding our request, please contact the undersigned.

Yours truly,

Original signed by B. Donald

Bruce Donald
Reclamation Manager