September 22, 2003

Minutes of September 22-23, 2003 – Nunavut Water Board Technical Meeting on the Human Health and Ecological Risk Assessment for Nanisivik Mine

In Attendance:

Brent Murphy – EBA, Consultant for GN and DIAND
Stephanie Hawkins – DIAND
Susan Hardy – GN
Bernie MacIssac – GN
Bruce Trotter – GN
Ulysses Klee – Dillon, Consultants for NWB
Brian Leece – Dillon, Consultants for NWB
Levi Barnabas – Hamlet of Arctic Bay
Eric Denholm – Gartner Lee, Consultant for CanZinco
David Rae – JWEL, Consultant for CanZinco
Malcolm Stephenson – JWEL, Consultant for CanZinco
Bob Carreau – CanZinco
Bill Health - CanZinco
Dionne Filiatrault - NWB
Philippe di Pizzo - NWB
Bill Tillman – Legal Council for NWB
Patrick Duxbury - NWB

NOTE: ITEMS LISTED IN ITALICS IN THESE MINUTES WILL REQUIRE FOLLOW-UP IN THE FINAL REPORT

September 22, 2003

Meeting commenced at 9:40 with a round of introductions.

Bill Tillman explained how staff and consultants will represent the Nunavut Water Board ("NWB").

Sue Hardy asked how the results of the meeting would be reported to the NWB.

Dionne Filiatrault responded by saying that the NWB will be given a detailed report of the technical meeting and its results prior to any NWB approval of the Human Health Ecological Risk Assessment ("HHERA").

Levi Barnabas was asked to summarize some of the concerns that the residents of Arctic Bay have about the HHERA and the contamination at the mine site. Levi provided an overview of community concerns as outlined in his September 16, 2003 letter to the NWB. The concerns included, but were not limited to: The exposure to metals by former

workers of Nanisivik; the 1985 soil geochemistry survey; contamination of Arctic Bay's water source; concerns about game hunted between the Nanisivik and Arctic Bay.

The participants agreed to discuss the issues as presented in the Memo, dated August 22, 2003, sent by Dionne Filiatrault to the Nanisivik distribution list.

Presentation by David Rae:

David Rae began a presentation on the basic premises of the HHERA and the issues brought forward in the review. The presentation included, among other things, a list of soil lead concentration guidelines from various regulatory regimes in Canada and the U.S.

David described two-tiered United States Environmental Protection Agency ("EPA") guidelines for play areas and other residential areas, as well as the reasons for choosing lower guidelines in specific areas. He stated that the current 600 ppm lead Soil Quality Remediation Objective ("SQRO") for lead at Nanisivik fits well within the context of other guidelines used in Canada and the U.S.

David presented the Hazard Quotient equation, $HQ = \frac{\text{Sum of Site Intakes}}{\text{TDI} - \text{EDI}}$

and described the components that make up the Tolerable Daily Intake ("TDI") and the Estimated Daily Intake ("EDI").

Brent Murphy inquired about the old calculations presented in the original HHERA. In response David Rae reported that the calculation was not correctly presented and may have lead to some confusion.

Levi Barnabas stated his concern that people in Arctic Bay eat leaves and berries from plants in the region, and wondered how this might affect the HHERA.

David Rae described the role of the 1985 background Data and explained its relatively minimal role in the EDI calculations.

In describing the intake of lead from the environment, David Rae presented a graph illustrating the declining blood lead concentrations in children over the years since the mid 1980s.

Bill Tillman inquired if there were any Canadian jurisdictions that used the Canadian Council of Ministers of the Environment ("CCME") guidelines to set the SQROs. David Rae stated that neither Ontario, Quebec, B.C, nor the Atlantic provinces use CCME; instead they employ site specific risk assessment.

Bob Carreau stated that while 600 ppm is the upper limit of the lead SQRO, the majority of soil at the Nanisivik Site is not near those levels.

Levi Barnabas mentioned his community's concerns about living close to the tailings disposal area and stated that people are asking for legal advice to ensure they are protected from harm.

Ulysses Klee stated that he felt that despite the fact the Human Health Risk Assessment ("HHRA") has largely driven the process, the ecological component of the study is important and shouldn't be overlooked.

Sue Hardy said that while human health is the more important aspect of the HHERA for the purpose of the technical meeting, the ecological aspect should be considered, particularly in light of its implication to human health (via consumption of wild game).

Malcolm Stephenson agreed and said that at the HHERA's onset, the Ecological Risk Assessment comprised 50% of the effort dedicated to producing the document. However, in the late stages of its review he believed that the effort should be focused on the HHRA. Malcolm and Ulysses agreed to meet separately and report back to the group.

David Rae agreed with the HHRA focus.

Bill Tillman suggested that the three major issues, outlined in the August 22nd memo to the Nanisivik distribution list, be addressed. These included: selection of sackground metal concentrations in soil; calculation of background exposures; SQROs calculation methodologies.

Round Table Discussion of the 1985 Soil Geochemistry Survey

Brent Murphy requested to have a clear understanding of the role of the soil geochemistry data for the HHERA.

Bernie MacIssac stated that he wished to ensure that the numbers are right, that the calculations are correct.

Malcolm Stephenson stated that the 1985 survey was done before the sub-aerial deposition of tailings in WTDA ("West Twin Disposal Area"). The survey involved an extensive examination of soil in the Nanisivik region.

Malcolm Stephenson explained that on the map of the 1985 survey (posted for review by the participants), areas that were expected to be 'contaminated' by industrial sources around the mine site were noted.

Bob Carreau added that in 1985, the foot print of the mine was smaller than it is today as there was very little mineral exploitation in the east part of the mine at that time, therefore the range of industrially contaminated soil was limited.

Brent Murphy stated that issues surrounding uncertainty in the HHERA (i.e. how data is affected based on geology, sampling methods and conclusion) should be addressed in the revised report. He believed that more discussion was needed. *Malcolm Stephenson responded that issues related to uncertainty would be included.*

A discussion was held concerning the soil sampling regime, including the issue of fine-grain samples.

A question was asked if data points with elevated soil metal concentrations, associated with mining activities, were eliminated from the calculations. David Rae said they were.

Eric Denholm emphasized the usefulness of the 1985 data, because many comparable sites have nothing as thorough as the study.

Levi Barnabas asked a question regarding acid-rock drainage as it is a concern in the community that arose after Arctic Bay residents watched a National Film Board documentary filmed in the 1970's about the Nanisivik Mine.

Bob Carreau(?) responded by saying that acid-rock drainage concerns will be addressed through activities such as capping the WTDA.

Round Table Discusssion on SQRO Methodology

Dionne Filiatrault stated that regulators need to have confidence in the calculation of the SQROs.

Brian Leece emphasized the importance of describing uncertainty within the model.

Dionne requested JWEL to go through a step-by-step calculation so that the method for arriving at the SQROs could be well understood.

David Rae wrote out the following equation:

$$HQ = \frac{\text{Soil ingestion + soil dermal + soil inhaled + wildgame (TDI)}}{\text{Air + Water + Store bought food + Soil (EDI)}}$$

At HQ = 1, the SQRO is arrived at.

Bill Tillman asked if there would be a fundamental difference in the situation if a 200 ppm guideline (similar to the CCME) was used.

Brian Leece felt that some of the calculations may be questionable and stated that the effect of altering some parameter assumptions could lead to a change in the SQROs within a range of perhaps 350-900 ppm. However the changes could also be quite minor. He wanted to ensure that the methodology was scientifically defensible.

Bill Tillman wanted to know if the differences in the methodology were relatively trivial, then why so much time has been spent on it?

Bernie MacIssac wanted to know how the background soil concentration affects the SQROs.

David Rae stated the impact of the background soil is small relative to the whole calculation. He said that a value of 67.9 ppm was used as the EPC background for the general mine site in the calculations. He noted that a higher EPC will result in a more conservative SQRO.

Bill Tillman suggested that it would be good to have the various consultants sit together and go through the parameters and SQROs calculations in order to come to some agreement.

The participants were in agreement that this would be a good idea.

Bruce Trotter and Susan Hardy stated that in the upcoming discussion the issue of micronutrient deficiency in northern residents and the possible increase in metal uptake as a result of that deficiency should be addressed.

The consultants were given until 2:30 pm to meet and discuss before reconvening the meeting.

Discussion of Consultants meeting

The following points were made:

1. Soil metal concentration as it relates to uptake in off-site game was considered. A 30 ppm lead value as background for the site was taken. Ulysses Klee stated that this was in conformity with values found in Northern Quebec (30 ppm).
2. *The recalculated EDI would only consider supermarket food and ambient air contributions; drinking water was to go to the TDI.*
3. Inhalation of Pb was considered to be a minor component.
4. *The ratio of indoor dust to outdoor soil was revised to use the EPA value of 0.7 (from 0.38).* The sensitivity of the SQRO to this change was considered low.
5. Winter condition factors, which accounted for the snow cover at the site, were considered and a factor of 0.10 was chosen. Related to this item, Bob Carreau stated that snow fences had been used at Nanisivik to reduce dust movement and that anecdotal evidence about tailings blowing around the site may have been partially attributed to dust from quarried shale (which is of a similar colour)

6. *Drinking water consumption for the receptor was revised from 2L/day to 0.6L/day. Nanisivik site-specific water data was to be used.*
7. Soil adhesion factors were reviewed, a factor of 0.1 from the CCME was to be chosen.
8. Supermarket food was reviewed; the approach was accepted and considered conservative.
9. *A marine mammal consumption factor was to be brought into the model to reflect the dietary habits of local persons. The proportion of supermarket foods was to be reduced.* Information from the Northern Foods Contaminants Program was suggested by Ulysses Klee as a source of metal concentrations in country foods.
10. Skin surface area of dust exposure was reviewed.
11. An averaging factor for game was considered; 0.5 was agreed upon.
12. All previous items were not expected to dramatically change the SQROs.
13. The issue of micronutrient deficiency was discussed; however it was not predicted to produce a significant effect, particularly given the nature of the metal species present at Nanisivik.

Bob Carreau requested to know, if indeed the consultants were largely in accordance with the revised methodology, how and when the regulators would sign off the HHERA.

The possibility of a joint approval process was discussed. Philippe di Pizzo described how, in the Polaris Closure process, a joint system of approval with DIAND and NWB is being used. He stated that CanZinco would need to seek approval for the HHERA from DIAND, GN and NWB.

Bernie MacIssac asked how remediation of metal hotspots could possibly bring the EPC concentration for the townsite within the CCME guidelines for lead.

Bill Tillman mentioned that such a description of the site, as falling within the CCME guidelines, could be a good way to describe the remediation outcome.

Bob Carreau and Malcolm Stephenson expressed their concern that while they would like to use this concept to promote CanZinco's intended reclamation measures they however wanted to stress this was not a pre-established outcome of the HHERA, just a fortuitous end-point.

The meeting was adjourned at 4:00 pm.

<u>September 23, 2003</u>

Meeting commenced at 8:40 am.

Philippe di Pizzo opened the meeting and described the objectives of the rest of meeting, which primarily was to cover the remaining issues presented in Dionne Filiatrault's

memo, including: Assessment of petroleum hydrocarbons; chemical screening; identification of sensitive Receptors; risk assessment.

Philippe di Pizzo brought up the issue of the Underground Storage Plan which was recently submitted to the NWB by CanZinco.

Bob Carreau confirmed CanZinco's intention to deposit contaminated soil underground in a deep permafrost region.

Susan Hardy referred to the NWB's conditional acceptance letter of the Nanisivik Phase II Environmental Site Assessment ("ESA"). She wanted to know how any unreported spills, which may have occurred prior to CanZinco's acquisition of the Nanisivik mine, are to be identified and addressed. She also cited a recent spill that was reported by DIAND inspectors as an example of a possible problem.

Eric Denholm replied that it is the role of the ESA to investigate for unknown contamination and that it should be able to identify problem areas.

Bob Carreau stated that the spill that Susan Hardy mentioned had occurred at the main refueling area which has been well characterized in the ESA investigation.

Susan Hardy referred to concerns presented in the Toxcon report (received by the NWB June 19, 2003) about the screening of certain compounds and if some may have been somehow overlooked.

Brian Leece discussed the screening methodology and stated that he believed that JWEL had correctly assessed the chemicals of concern for human health.

Patrick Duxbury asked for CanZinco representatives to address concerns cited by Arctic Bay residents about the screening for possible risk from process chemicals used in the milling process.

Bob Carreau stated that the quantities of process chemical were small compared to the amount of tailings generated. Organic compounds tended to volatilize in the tailing disposal area.

Eric Denholm stated that it was his opinion that the risks posed from such compounds were extremely low.

Bob Carreau further mentioned that water from the West Twin Disposal Area has been tested, including acute toxicity tests with rainbow trout and these studies are confirmed as being non-lethal.

Dionne Filiatrault mentioned that the mine must monitor for water quality under the jurisdiction of the MMER (Metal Mine Effluent Regulation), which includes a number of tests, including chronic toxicity.

Levi Barnabas stated that there is a concern in the community that cancer rates have drastically increased among Inuit since the 1970s. He wanted the participants to know about how this may relate to Nanisivik as there is a perception among some Arctic Bay residents that there may be some link between the mine and cancer rates.

Patrick Duxbury stated that he has taken the position, through his interventions in Arctic Bay, that the species and quantities of lead at Nanisivik do not constitute a serious cancer risk. He also mentioned that during a public meeting in April a former worker at Nanisivik alleged that his skin disease (apparently a cancer) came from working at the mine.

Malcolm Stevenson and Ulysses Klee described some issues regarding the ecological aspects of the HHERA, including the choice of the gyrfalcon. Bob Carreau stated that on a recent visit to Nanisivik a gyrfalcon was sighted.

Philippe asked if any additional questions about the HHERA were left.

Malcolm Stephenson suggested that the addition of a Frequently Asked Questions section to the HHERA might be useful.

Susan Hardy asked how the lead carcinogen issue was to be described. *David Rae replied that a paragraph detailing the concern could be added to the report* and he further mentioned that the Tolerable Daily Index (TDI) is based upon no additional lead loading into the body.

Susan Hardy asked about aspects of the marine environment in the HHERA.

Brian Leece stated that consideration of the marine environment was partially incorporated through the addition of marine mammals in the dietary intake of local people as part of the TDI calculation.

Dionne Filiatrault stated that it is somewhat difficult to incorporate the marine aspect into the HHERA as the Department of Fisheries and Oceans has not participated in the review process, despite having being invited. There is likely to be some arrangements made separately between DFO and CanZinco in regards to marine environment concerns at Nanisivik.

Bob Carreau spoke about some current activities at Nanisivik, including the visit of the diamond driller to help further characterize the WTDA and the postulated talik.

In response to Dionne Filiatrault's question about the submission of the monitoring plan for Nanisivik, Bob Carreau stated that the monitoring plan required under the Licence will be submitted once all the monitoring instruments are installed.

Levi Barnabas stated that his community is very concerned with the reclamation and wants the clean up to occur as soon as possible.

Patrick Duxbury brought forward the concerns of some Arctic Bay residents who are concerned about the potential for tailings to somehow find their way into the water source of Arctic Bay.

Bob Carreau explained that this was a very unlikely scenario due to the dominant winds at the WTDA, the distance of Arctic Bay's water source from the tailings impacted area and the fact that water quality at Nanisivik's water source has historically met water quality criteria despite being direct adjacent to the WTDA.

There was a suggestion from the participants to review DIAND water quality tests from Arctic Bay's water source to address the community concerns.

Levi Barnabas asked about the disposal of waste oil drums in Nanisivik's landfill. Bob Carreau stated that up until 14 years ago, it was regular practice to dispose of waste oil barrels in this manner, as it was in many places. He however stated that environmental characterization around the Landfill has indicated that no movement of such contaminants from the Landfill has been observed. He believed that given the length of time since barrels were last disposed there, if no problems have occurred, it is very unlikely that they will be a problem in the future.

In concluding the meeting, Bob Carreau stated that he felt the meeting had gone well and that he believed both the regulators and the company had arrived at a common understanding about reclamation measures that will proceed from the HHERA.

Philippe di Pizzo said that such technical meetings may be required in the future. He asked when the revised HHERA might be expected.

Bob Carreau replied that they will try to deliver the revised report by October 15th.

Meeting was adjourned at approximately 10:15 am (?).