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~~February 14~~March 1, 2004

Mr. Phi~~l~~lippe di Pizzo
Executive Director – Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Re: Request for further information regarding Waste Disposal Plan for Nanisivik Mine - Water Licence NWB1NAN0208 – Part G – Item 16.

Dear Mr. d~~D~~i Pizz~~i~~o

Thank you for the ~~prompt~~ review of our waste disposal plan. The various parties raised many good points during the ~~review process which~~process, which we have considered and included in our revision of the plan (attached). ~~Some of the comments were repetitive however as different reviewers had similar concerns. I have since reviewed the plan and have made modifications to address most of the concerns.~~

~~The updated waste disposal plan accompanies this letter and~~In addition, we have ~~I have~~ responded to each point raised in your letter of January 6th. Your original comments appear in italics below and our response follows. ~~individually below.~~

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1. *That, given the pending submission of the revised Environmental Site Assessment for the Nanisivik Mine, as well as the NWB's recent acceptance of the Licensee's proposed Soil Quality Remedial Objectives, the Licensee should now be able to provide the approximate volumes of contaminated soil requiring storage underground.*

   The plan has been modified to include the volumes of contaminated soils as per the proposed SQRO's

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2. *That the Licensee should revise its estimates for the quantity of materials being disposed of underground in light of its recent agreement with Wolfden Resources to have certain industrial assets dismantled and removed from the mine site.*

   The demolition debris volumes listed in the plan have been reduced to reflect the transfer of assets to Wolfden Resources.

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3. *That the Licensee revises the Plan to account for the following components, which appear to have been omitted in the Plan: ANFO facility; ~~landfarm~~land farm material; storage shipping containers; end user tanks.*

The plan has been modified to include the ANFO facility, ~~landfarm~~land farm material and end user tanks. Shipping containers will be used to ship various materials off site. If there are any ~~leftovers~~ remaining containers they will be offered to the community of Arctic Bay, otherwise they will be included in miscellaneous/contingency volumes ~~requiring~~ for disposal underground~~storage in the West end of the underground mine~~.

4. *That the Licensee provides more detail as to when hazardous materials will be shipped off site and what materials will be sent out, other than the batteries and antifreeze that have already been mentioned in the text.*

Other material slated for shipment off site during the final year of reclamation includes chemicals from the mine's metallurgical lab, ~~the~~ remnant process chemicals used during the milling process, and transformers containing PCB's. This material is scheduled to be shipped off site ~~–~~ during the 2005 shipping season~~.~~ as this will ensure that all materials from tear down of facilities have been identified and can be shipped at the same time.

5. *That the Licensee provides greater detail as to how pipelines and vehicles will be drained of hazardous fluids.*

The tailings line was flushed out with water into the tailings deposition area shortly after production ceased~~.~~. When reclamation activities begin, this pipeline ~~, so this line only~~will ~~needs to~~ be dismantled and hauled underground. Fuel pipelines will be gravity drained into tanks/barrels and the contents burned in the site waste-oil furnace. The draining of hazardous fluids in abandoned equipment will take place on surface with the contents either burned or shipped off site in accordance with the NWT Hazardous waste management guidelines. The checklist for vehicle fluids will include antifreeze, engine oil, transmission oil, ~~H~~hydraulic ~~O~~oil (tanks and cylinders), brake lines, power steering fluid, grease and the removal of batteries.

~~**Arlene/Eric can you provide any info regarding procedure followed at Polaris**~~

6. *That the Licensee revises the Plan to ensure that materials posing the greatest risk to humans and the environment are stored in the deepest, most inaccessible underground areas.*

Due to the ~~orientation~~shallowness of the ore body that is, for the most part flat lying, the Nanisivik mine is not "deep" by mining standards. However, all areas designated for storage/disposal of material (whether it ~~be~~is contaminated soil or demolition debris) are a minimum of XX25 metres from "daylight" (surface), in competent rock, and remain at a constant temperature of -13ºC. ~~Every effort will be made to ensure that m~~Materials posing the "*greatest risk to humans and the environment*" (i.e. hydrocarbon contaminated soil) will be stored in the Lower Lens which is the deepest, most inaccessible ~~underground~~ area of the mines. ~~The Nanisivik mine is not a deep mine by mining standards, due to the location of the ore body that is for the most part flat lying and close to surface. However, there are areas throughout the mine which will facilitate the long term storage of waste rock, contaminated soils etc due to the relative elevation of these areas with respect to the mine entrances. The main factor with regards to the underground deposition of material whether it be soil or demolition debris is that all storage areas will be in a constantly frozen environment (-13ºC).~~

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7. *That the Licensee revises the Plan's Operating Procedures Flow Chart (Part 4) to include soil co-contaminated with both metals and hydrocarbons.*

The North Zone storage areas (Lower Lens) will be utilized to store both ~~H~~hydro ~~C~~carbon contaminated soils and co-contaminated soils. The Flow chart in Part 4 has been modified to acknowledge that some areas around the mine site are contaminated with both metals and h~~H~~ydrocarbons.

8. *That the Licensee revises the Plan's Operating Procedures Flow Chart (Part 4) to include more detailed information as to where each type of material is to be stored.*

The Flow C~~c~~hart submitted with the plan ~~is for~~depicts g~~G~~eneral operating procedures. Storage sites will be selected based on the material being deposited there~~. With regards to underground storage, .~~ N~~n~~on- contaminated demolition debris ~~can~~ will be stored in areas closer to the portals~~, where gravity is not a factor and the haulage costs may be reduced.~~ Material that is metal or hydrocarbon contaminated will be ~~incorporated into the fill~~placed in locations where gravity migration of contaminants ~~our of the mine portals~~ is not possible. ~~The main factor with regards to the underground deposition of material whether it be soil, waste rock or demolition debris, is that all storage areas will be in a constantly frozen environment (13ºC). Stope "x"will provide the same permafrost conditions as stope "y" and so on.~~

9. *That the Licensee include in the Plan, a complete materials balance table which describes the type and quantity of material being stored, as well as the location and availability of underground storage space. As part of this request, the Licensee is advised to re-examine and evaluate the values presented in the Plan.*

~~A spreadsheet~~Table 8 in the revised Plan, has been developed which includes detail as to where each type of material will be deposited. In some cases, more than one type of material may be deposited in the same storage area. ~~This detail was left out of the original submission because the mine has been inaccessible since October 2002 due to the temporary removal of ventilation services and the limited number of mine rescue personnel available to allow authorized entry into the mine workings. Modifications to the plan may have to be made after storage areas are available for inspection. If there is any significant rehab work required to facilitate safe access to a particular storage site, it may prove more economical to select an alternate site. The excess amount of space available in the mine allows us to have this much needed flexibility.~~ In general terms, ~~-~~metal contaminated material and demolition debris will be deposited throughout the mine while ~~and most of the H~~hydro ~~C~~carbon contaminated material will be deposited in the L~~l~~ower L~~l~~ens from 51 to 66 block.

10. *That, although the Waste Rock Disposal Plan is to be submitted separately under Part G, Item 8 of the License, the Licensee should include in the Plan information regarding the quantities and destination of waste rock that are intended for underground storage.*

There is 60,000 m3 ~~Volumes of Waste~~of w~~W~~aste r~~R~~ock that has been identified on surface and it is slated for deposition in the open pits prior to covering and contouring. ~~were included in the plan and have been slated for deposition in the open pits prior to covering and contouring. Sufficient~~ There is~~space~~ 120,000 m3 of space a~~, is a~~vailable in the pits and therefore no underground deposition of this material is anticipated.

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11. *That the Licensee is requested, as part of the revised Plan, to present details on existing or predicted subsidence over the mine workings.*

Underground stability of the Nanisivik mine, as with any mine, has been constantly monitored throughout the life of the project. This monitoring increased significantly in the late 1980's when, with much of the primary mining having been completed, plans were made for the recovery of the pillar ore by retreating from one extremity of the mined area to another. From that time, and with much of the funding provided through the Canada/Northwest Territories Mineral Development Agreement, the Mine engaged the Mining Research Laboratories of CANMET (now a part of the Mining and Mineral Sciences Laboratories of Natural Resources Canada) to assist with the geotechnical studies required. During the next decade, NRC and staff determined the in-situ stresses at the Nanisivik mine, and the properties of the geotechnical materials. This was followed with numerical modeling of possible extraction sequences and the design and installation of a monitoring system. Papers published during this period include the following:

~~*Three detailed reports regarding long term stability and subsidence were posted on the NWB web site in conjunction with the waste disposal plan submission in August 2003.*~~*Arjang, B. & Herget, G., 1989, "Post Pillar Recovery Strategies at Nanisivik Mine, Nanisivik, Northwest Territories. Phase 1: Ground Control Instrumentation and Stress Determination", Mining Laboratory Report MRL89-147 (TR), Natural Resources Canada, Ottawa, Ontario, November, 41 pp.*

Arjang, B; Herget, G. & Boudreault, A., 1991, "Geotechnical Site Investigations for Pillar Recovery In Permafrost at Nanisivik Mine, NWT", Mining Laboratory Report 91-124 (OP), Natural Resources Canada, Ottawa, Ontario, September, 14 pp.

Arjang, B; Herget, G. & Boudreault, A., 1991, "Geotechnical Site Investigations for Pillar Recovery In Permafrost at Nanisivik Mine, NWT", Proceedings, 2nd International Symposium on Mining in the Arctic, Fairbanks, Alaska, 1992 07 19-22, Sukumar Bandopadhyay and Michael G. Nelson (Editors), A. A. Balkema, Rotterdam, Netherlands, and Brookfield, Vermont, ISBN 90 5410 078 8, pp. 75-81.

Auer, L., 1998, "Ground Movement Monitoring at the Nanisivik Mine", Presentation given to Mine Occupational Health and Safety Committee (April 30, 1998).

Bétournay, M.C. and Udd, J.E., 2003, ""*Long-Term Stability Considerations and Engineering Applications for a Decommissioning Mine in Permafrost*"*", Proceedings, 7th International Symposium on Mining in the Arctic, Iqaluit, Nunavut, 2003 03 30 - 04 01, John E. Udd, Gertjan Bekkers & Michel Plouffe (Editors), Canadian Institute of Mining, Metallurgy and Petroleum, Montréal, Québec, March, pp.369-380.*

Herget, G. & Arjang, B., 1989, "Field Program and Preliminary Results of the Pillar Recovery Project at Nanisivik Mines Ltd., Northwest Territories (May, 1989), Mining Laboratory Report MRL 89-64 (TR), Natural Resources Canada, Ottawa, Ontario, June, 12 pp.

Judge, K., 1998, "Ground Movement Monitoring System - CanZinco's Nanisivik Mine, NWT", Mining and Mineral Sciences Laboratories Client Report MMSL 98-038 (CR), (Confidential), Natural Resources Canada, Ottawa, Ontario, June, 55 pp.

Judge, K.J. & Udd, John E., 2003, "Development of an On-line G~~*Geotechncial*~~*geotechnical Instrumentation System [at Nanisivik Mine] for Monitoring over the* ~~*internet*~~*Internet", Proceedings, 7th International Symposium on Mining in the Arctic, Iqaluit, Nunavut, 2003 03 30 -*

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04 01, John E. Udd, Gertjan Bekkers & Michel Plouffe (Editors), Canadian Institute of Mining, Metallurgy and Petroleum, Montréal, Québec, March, pp.285-294.

Udd, John E., Judge, K.J. & Auer, L.J.F., 2003, "A Case History on the Development of a Geotechnical Monitoring System at the Nanisivik Mine, Baffin Island", Proceedings, 7th International Symposium on Mining in the Arctic, Iqaluit, Nunavut, 2003 03 30 - 04 01, John E. Udd, Gertjan Bekkers & Michel Plouffe (Editors), Canadian Institute of Mining, Metallurgy and Petroleum, Montréal, Québec, March, pp.275-283.

Vongpaisal, S.; Udd, J. E. & Larocque, G. L., 1990, "Post Pillar Recovery Strategies at Nanisivik Mine. Phase 2: Ground Stability Evaluation", Mining laboratory Report MRL 20-27 (TR), Natural Resources Canada, Ottawa, Ontario, April, 51 pp.

Vongpaisal, S.; Herget, G.; Udd, J. E.; Larocque, G. L. & Bailey, F., 1991, "Post Pillar Recovery Strategies at Nanisivik Mine. Phase 3: Pillar Recovery Trial", Mining Laboratory Report MRL 91-123 (TR), Natural Resources Canada, Ottawa, Ontario, November, 26 pp.

Vongpaisal, S.; Herget, G.; Udd, J. E.; Larocque, G. E.; McNeil, W. H.; McConnell, J. C.; Boudreault, A. & Bailey, F., 1991, "A Strategic Analysis of Post-Pillar Recovery at Nanisivik Mine", Mining Laboratory Report 91-127 (OP), Natural Resources Canada, Ottawa, Ontario, November, 14 pp.

Vongpaisal, S.; Herget, G.; Udd, J. E.; Larocque, G. E.; McNeil, W. H.; McConnell, J. C.; Boudreault, A. & Bailey, F., 1992, "A Strategic Analysis of Post-Pillar Recovery at Nanisivik Mine", Proceedings, 2nd International Symposium on Mining in the Arctic, Fairbanks, Alaska, 1992 07 19-22, Sukumar Bandopadhyay and Michael G. Nelson (Editors), A. A. Balkema, Rotterdam, Netherlands, and Brookfield, Vermont, ISBN 90 5410 078 8, pp. 89-95.

~~With~~As part of our August 2003 Waste Disposal Plan submission, we submitted three of ~~a t~~the above referenced papers, which contained summary information regarding the studies at Nanisivik. These are posted on the NWB ftp site but may have been missed/overlooked by some reviewers, as they were not referenced in our submission as Appendices. This oversight ha~~ah~~s been corrected in our current submission.

As a ~~summary~~general ~~-~~comment on subsidence we include the following excerpt from ~~the 2003~~ Bourtenay et al (2003)~~paper~~:

> ~~"~~"~~Dr. Udd's 2003 paper, from one of the papersDr Udd in the appended (~~The Nanisivik mine and site properties have been reviewed in order to provide long-term stability considerations for decommissioning. Ground control issues of note include the instabilities, which are anticipated from the sublimation of the ice occurring in the weak sulphide and shale units. The resulting problems should be limited to localized ground falls. The shale unit can cave, but given its limited periphery exposure, such a failure cavity would not reach surface. No other failure type is expected to reach surface even if it begins over the full width of the main ore zone. ~~"~~Given this low physical hazard possibility, and the limited consequences that a failure to surface would generate, the long-term physical instability risks are very low.~~"~~"

12. *That the Licensee provides more information as to why certain underground storage areas have been selected. This should also include the geotechnical criteria for designating certain areas for contaminated material disposal.*

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Operator ~~S~~safety (mine rescue considerations), ventilation, equipment a~~A~~ccessibility, and relative e~~E~~levation ~~(~~to the portals, ~~)and t~~Temperature ~~are~~ have~~ve~~ been considered when selecting storage areas. As stated above, the underground workings have been reviewed in order to provide long-term stability considerations for decommissioning. This aspect is not expected to be problemate~~e~~ic.

~~Geotechnical stability of the Nanisivik underground workings haahs been identified as All areas underground are in permafrost with an expected constant temperature of -13°. The mine is not deep by mining standards, so there is little difference geotechnically between any of the selected storage areas. Most of the storage areas are at a lower elevation than adjacent mine openings. The West Wing Zones 1 and 2 are the only areas that are at the same relative elevation as the adjacent mine opening. These two areas have been slated to store demolition debris only.~~

13. *That the Licensee include, in the revised Plan, improved underground site maps showing the proposed storage locations and estimated quantities of waste material to be stored for each location. The maps must provide a scale, legend, areas of contaminated and non-contaminated clear demarcation between underground or aboveground storage areas.*

~~An~~ Scaled engineered drawings are included in the updated ~~map is included with the new submission of the plan.~~Plan, which contain the requested information.

14. *That the Licensee provides specific detail on the locations where material will be disposed of underground, including block areas; pit numbers; portal areas.*

See response to point 9 and 13

15. *That the Licensee provides more clarification as to why it intends to utilize open pits and surface areas for solid waste disposal when there appears to be ample underground space. If conditions exist that prevent underground storage of certain materials, the reasons should be given, and subsequent to this fact, engineering schematics will be required that detail the pits as waste disposal facilities.*

~~It has been decided that the surface pits will be utilized solely for the deposition of waste rock and metal contaminated soils. Solid waste will be deposited underground.~~In order to achieve the final contours of the open pits and to cover the sulphides in the ~~"~~"high wall~~,"~~" we ~~must ensure that we have enough material to fill them~~will require~~d~~ additional fill from that which exists in the waste rock piles. ~~It is f~~For this reason, ~~that~~ metal contaminated soils and ~~some~~ some demolition debris will be used to fill the excess volume available in the pits. Appropriate methodologies to minimize ~~ny~~void spaces will be followed as detailed in the revised Plan. ~~demolition debris that is required in the pits will be placed following similaraccording to the practices includied protocols established during the reclamation of other mines. These~~

16. *That the Licensee present in the revised Plan, a method for documenting waste disposal that includes: a schedule identifying time line and method of placement for each type of waste material; the submission of engineering maps that illustrate the location and placement of materials deposited at the end of disposal activities; the provision of a list of photo documentation; and the material disposal records to be kept on file by the Licensee, as well as those submitted to the regulators.*

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Engineered ~~plans~~ drawings of the underground workings are provided in the revised Plan. The information regarding placement locations and type of waste ~~are~~ is ~~provided~~ in the text, ~~as well as in the~~ in the ~~in~~ Tabular summary and on the drawing. ~~The placement information included in the revised Plan~~ All material disposed underground ~~in~~ in the open pits will be documented as suggested and photo records will accompany the documentation. The material will be disposed of underground in a practical sequence during 2004 and 20~~[illegible]~~

17. *That the Licensee, as was noted in several of the external reviews, strives to locate alternate uses for material slated for disposal, particularly vehicles, before their disposal underground.*

We acknowledge this point and as mentioned in the above response, we are actively participating in current studies and dis~~su~~cussions to identify alternate uses for the ~~there are still negotiations ta~~continued use of ~~king place to utilize~~ the Nanisivik i~~I~~nfrastructure.

We acknowledge this point and would add that we fully intend on ~~will strive~~ continuing with our past ~~practice~~exemplary safety performance~~s of~~ by ~~to~~ maintaining a safe and healthy worksite through ~~sound work practices,~~ good management, effective communication and teamwork.

~~Please contact me if you require any additional information regarding this matter.~~ We are hopeful that with this additional information in hand, the NWB will be able to proceed with approval of this plan. Please contact me directly, if you would like to discuss any aspects of this submission or require any additional information.

Regards,

Murray Markle
Site Manager – Nanisivik Mine

cc. Bill Heath, President – CanZinco Ltd.
Bob Carreau, Corporate Manager Environmental Affairs, BWR

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