



Water Resources Division
Nunavut Regional Office
Indian and Northern Affairs Canada
Iqaluit, NU X0A 0H0

CIDMS 240528

August 1, 2008

Dionne Filiatrault
Executive Director
Nunavut Water Board
Gjoa Haven, NU X0B 1J0

Re: 1AR-NAN0208, CanZinco Ltd., Nanisivik Lead-Zinc Mine, Renewal and Amendment Application, July 14, 2008 Site Visit

Dear Ms. D. Filiatrault,

Please be advised that representatives from Indian and Northern Affairs Canada Nunavut Regional Office (INAC-NRO) and the Government of Nunavut conducted a site visit of the Nanisivik Lead-Zinc Mine on July 14, 2008. The reason for the site visit was to monitor progress of the reclamation and closure plan activities and to support the INAC 's review of CanZinco Ltd.'s application to amend and renew water licence 1AR-NAN0208.

In attendance of the site visit were,

Robert Carreau, Vice President of CanZinco Ltd.
Geoff Claypool, BGC Engineering Inc.

Indian and Northern Affairs Canada, Nunavut Regional Office

David Abernethy
Gillian Martin
Melissa Joy
Andrew Keim
Kevin Robertson
John Brodie, Brodie Consulting Ltd.
Richard Trimble, EBA Engineering Consultants Ltd.

Government of Nunavut
Helen Yeh
Ken Wasylyshen

As you are aware, CanZinco Ltd.'s September 26, 2006 licence amendment application and February 21, 2008 licence renewal application were distributed for review on April 30, 2008. Comments were provided by the INAC-NRO previously in a letter dated May 28, 2008. This letter is attached for your information.

In the May 28, 2008 letter from the Water Resources Division, it was recommended among other things, that the Board consider granting an extension to water licence 1AR-NAN0208 retaining the current terms and conditions for one (1) year through the use of a written hearing. This extension would allow CanZinco Ltd. to update or revise its amendment application, if necessary, and allow interveners to perform comprehensive reviews of the project's reclamation status.

As a result of the site visit and review of the approved *2004 Reclamation and Closure Plan* the following recommendations/comments are provided to the NWB for consideration in the review/approval process of CanZinco Ltd.'s water licence 1AR-NAN0208 renewal and amendment applications. It should be noted that CanZinco Ltd. has completed many reclamation activities to date in a satisfactory manner.

1. Freeze-back of tailings within the West Twin Disposal Area Surface Cell is taking place and permafrost conditions will eventually prevail from the original lake bottom to the active layer. Elevated pore pressure has been observed in the tailings and the potential consequences of freezing (i.e., pingo formation and heaving) have been addressed in the BGC Engineering Inc. *2004 Assessment of Surface Cell and Test Cell Taliks*. BGC Engineering Inc. has suggested that the Surface Cell is a closed system. If this were the case, movement would result from the expansion of frozen water. Movement within the Surface Cell was not observed, leading to speculation that the Surface Cell may actually be an open system with an unfrozen conduit extending under the dam and up through the sub-aqueous tailings into the remaining portion of West Twin Lake. Ongoing freezing conditions could drive a plume of cryo-concentrated pore water into the lake. Potential impacts to the water quality of West Twin Lake do not appear to have been addressed in the BGC Engineering Inc. 2004 report.

CanZinco Ltd. should assess the potential of the West Twin Disposal Area Surface Cell to be an open system and determine the potential loading rate of contaminants into the lake through an unfrozen conduit. If necessary, CanZinco Ltd. should prepare contingency plans for the water treatment until the talik beneath the Surface Cell is frozen.

2. It is understood that L.A. abrasion tests were performed on selected samples of shale prior to their use as a cover material on tailings and open pits. For

the most part, this shale was frozen when quarried and is now subject to repeated freezing and thawing cycles. If not already completed, it is recommended that CanZinco Ltd. perform a long term freeze-thaw durability assessment on quarried shale to evaluate how shale cover material will breakdown when subjected to repeated freeze-thaw cycles. It is understood that shale has broken down into 'pea gravel' sized pieces within thermal cover test-pits. There is a possibility that this weathering will continue into the future, resulting in silt or clay sized particles that retain water, forming a soft surface that restricts vehicular access in the summer months (for monitoring) or may create an unstable surface beneath cover armour on slopes resulting in solifluction movements (i.e., gradual movement of cover material down slopes). However, the breakdown of shale cover material may be advantageous because fine grained materials would have a lower thermal conductivity, resulting in a thinner active layer and more effective thermal cover. As long as this material remains frozen, long-term durability will not be an area of concern, stability would only be affected in the thawing season.

3. Reclamation work consisting of a 2.2 m cover over unsaturated material (waste rock, pit walls, landfill) and a 1.25 m cover over saturated material (tailings) has been completed in many areas. In order to verify that the covers have been constructed to the required thicknesses, it is recommended that CanZinco Ltd. provide:
 - Plan view drawings showing the pre and post cover topography. Ideally, this would be complimented with isopach drawings of the cover thickness; and,
 - Construction records to show the volumes of material moved as a check on the isopach volumes. These records could be contractor's progress billings or production summary, or survey estimates of the volume removed from the quarries.
4. Fine grained material was observed in the West Twin Disposal Area spillway channel, originating from the side-slopes. CanZinco Ltd. should consider armouring the spillway side-slopes, along with the placement of riprap in the channel's bottom to trap fines during periods of flow. Although the spillway was cut into rock, channel bottom riprap should be installed to slow the design flow and minimized the transport of fines into West Twin Lake (a review of the Golder Associates Ltd. *2004 Detailed Design of West Twin Dyke Spillway* report prepared for CanZinco Ltd. mentions a 600 mm thick layer of $D_{50} = 300$ mm boulders to be positioned on the spillway base).
5. A small pond was observed on the West Twin Disposal Area surface cover in close proximity to the spillway inlet. This should be drained or filled with additional cover material.

6. A number of areas have been developed as shale quarries to provide reclamation cover material. The disturbance of these areas will result in permafrost thawing and the occurrence of ponded water that will exacerbate the thawing. Numerous depressions were observed in those quarries that were visited. CanZinco Ltd. should re-contour or fill all of these areas to minimize ponded water and future permafrost distress, with associated ground surface settlement. A new state of thermal equilibrium will eventually be achieved in these shale quarries but this will take several years, longer if there is any ponding of water.

7. Although the East Open Pit and East Trench appeared to have been backfilled satisfactorily, the surface was observed to be smoothly compacted with fine grained material. Erosion rills can develop in this smooth surface following a severe rainstorm or annual snowmelt, eventually forming gullies that wash away pit backfill. Although there is an upslope surface water diversion ditch, diversion/flow retarding berms, or a layer of coarse armouring should be constructed to create sheet flow rather than concentrated flow of precipitation runoff.

8. INAC was recently informed that the Nanisivik Lead-Zinc Mine is located in an active seismic zone (peak ground acceleration of 0.120 g for 2% exceedance in 50 years, Natural Resources Canada – Seismic Hazard Value per 2005 National Building Code). Although this has not been brought to the attention of CanZinco Ltd. to date, and is not a requirement per se of the 2004 Reclamation and Closure Plan, it is felt that it would be prudent for your company to assess the stability of various dump and pit shells for the design earthquake during worst case seasonal thaw conditions. This worst case scenario might consist of a coarse granular shell sliding over a weathered shale surface or layer of ice at the base of the active layer. The stability of the dumps or tailings area may be compromised if the loss of a slope cover section were to occur.

9. Project components that are not scheduled for reclamation should be identified. These include the main road from the airstrip through to the dock, laydown area at the dock and roads in the West Twin Lakes Disposal area.

Other Comments / Recommendations

- CanZinco Ltd. should assess the stability of all reclaimed open pits (i.e., Oceanview, East Open Pit, East Trench, and West Open Pit). Smoothly

compacted surfaces which comprise of fine grained materials are susceptible to erosion. These covers should be designed to create sheet flow rather than concentrated flow of precipitation runoff.

- CanZinco Ltd. advised, during the site visit, that the retention pond associated with the former East Adit Treatment Facility will be reclaimed such that natural drainage patterns are restored to the area. CanZinco Ltd. should confirm that water quality discharge requirements specified in licence 1AR-NAN0208 are met prior to the release of any water.
- CanZinco Ltd. should confirm its intent with respect to the completion of further reclamation activities including, but not limited to, the removal of existing buildings, closure of the two (2) remaining mine portals, treatment of hydrocarbon contaminated soils remaining on site, and the decommissioning of the fuel storage area.
- CanZinco Ltd. should also provide a plan that outlines ongoing site maintenance and repairs (i.e., erosion, subsidence, etc) as well as ongoing monitoring activities for appropriate geotechnical and water quality parameters.

Please contact me should you have any questions or comments concerning this review of site visit findings. I can be reached by telephone at (867) 975-4555 or email at AbernethyD@inac-ainc.gc.ca.

Regards,
Original signed by

David W. Abernethy
Regional Coordinator

Carbon copy:

Kevin Buck, Manager of Water Resources, INAC-NRO

Bernie MacIsaac, Manager of Field Operations, INAC-NRO

R. Carreau, Vice President of CanZinco Ltd.

Helen Yeh, Acting Manager, Land Use and Environmental Assessment,
Government of Nunavut, Department of Environment

Ken Wasylyshen, Regional Lands Administrator, Government of Nunavut,
Department of Community and Government Services

Attachment