Before the Nunavut Water Board
In the matter of:

an Application by
CanZinco Ltd.
for the renewal of
Water Licence
NWB1NAN9702
(Nanisivik Mine)

Written Intervention

By

Department of Indian Affairs
and Northern Development

July 7, 2002

Table of Contents

Introduction

This intervention to the Nunavut Water Board (NWB) is made on behalf of the Department of Indian Affairs and Northern Development (DIAND) with respect to the Application by CanZinco Ltd (the Licensee) for the renewal of Water Licence NWB1NAN9702. The Application seeks a renewal for the purposes of the abandonment and reclamation of the Nanisivik Mine.

Background

Water Licence NWB1NAN9702 was issued to Nanisivik Mines Limited in 1997 for industrial water use and waste disposal relating to mining and milling at the Nanisivik Mine. On February 20, 2001, the NWB transferred water licence NWB1NAN9702, including all erratum and amendments, over to Nanisivik Mine, a division of CanZinco Ltd. This licence was originally issued for a period of 5 years. Part H, Item 1 of this licence requires the Licensee to provide a revised Interim Abandonment and Restoration (A&R) plan. Part H, Item 8 of the licence requires a final A&R Plan for approval following notification that the mine is closing indefinitely.

More specifically, Part H, Item 8 required the Licensee to submit this final A&R Plan within 60 days of closure notification. As it became apparent that the Licensee was not going to be able to comply with this requirement, DIAND recommended to the Licensee that an application be made to the NWB to change both the submission date as well as the expiry date of the licence in order to reflect the timing of the cessation of mining activities. The NWB, after seeking comments from their distribution list, agreed to the amendment request and went encouraged the Licensee to submit the documents for their application for a water licence renewal by February 28, 2002.

In January 2002, an initial meeting of agencies that had a direct regulatory approval role was held to discuss the potential for a common approach to reviewing, and considering approval of the anticipated final A&R Plan. These agencies included the Nunavut Impact Review Board (NIRB) for the environmental assessment process, the Nunavut Water Board (NWB) for the water licence, the Department of Indian Affairs and Northern Development (DIAND) for certain land leases and for water licence considerations, the Government of Nunavut (GN) as represented by the Department of Sustainable Development (DSD) for Commissioner's land leases and other territorial matters, and the Department of Fisheries and Oceans (DFO) for the dock. As there was agreement to work together on a common approach, this message was given to representatives of Breakwater Resources Ltd. (Breakwater). The agencies asked Breakwater to develop a single A&R plan that would address the requirements of the three land administrators (DIAND, GN, DFO) as well as the requirements of the water licence. The A&R

plan prepared by Breakwater, entitled *Nanisivik Mine Closure and Reclamation Plan*, and submitted on February 28, 2002, attempts to do this.

NIRB initiated their environmental assessment process and determined that the project could proceed with only a screening (letter of May 10, 2002, from E. Copland to Minister R.D. Nault). NIRB recommended that the NWB hold a "comprehensive" hearing. Nevertheless, DIAND submits it is imperative that the NWB limit its hearing, deliberations and determinations to those issues that are within its mandate, i.e., water-related issues; and DIAND supports the NWB's decision conveyed in Mr. Di Pizzo's letter of June 13, 2002, to observe this limitation. Section 56(1) of the new waters legislation, the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (*NWNSRTA*), requires the Minister's approval for any Type A licence, and for any Type B licence in respect of which a public hearing is held. For a timely approval of any licence renewal, the terms and conditions proposed in the renewed licence must necessarily be uncomplicated by issues outside of the NWB's mandate and be enforceable by Inspectors under the *NWNSRTA.*

Scope of the Proceedings and of DIAND's Review

The Proceedings

The purpose of the public hearing is to evaluate the application by the Licensee for a renewal of Nanisivik Mine water licence NWB1NAN9702. When the current licence expires at the end of September, it will coincide with the end of the mining operations and the beginning of the reclamation activities. The renewed licence will therefore apply to activities related to the reclamation of the site. Accordingly, it is desirable that an approved A&R Plan be in place when the renewed licence takes effect, and thus DIAND's review of the A&R Plan is included in this intervention

DIAND is not opposed to the hearing's considering both the application for the licence renewal and the draft A&R Plan. However, DIAND submits that, in the weeks after the hearing, there should be follow-up discussion on the draft Plan which aims at producing a consensus among regulators as to the content of the Plan. The renewed licence itself should simply state that the Licensee is to implement the A&R Plan as approved, rather than setting forth particulars of the abandonment (or closure) and reclamation work that is to be done.

While the approval for the A&R Plan will play a fundamental part in the renewal of the water licence, DIAND would like to reiterate that we view these two elements as distinct and should be treated with such consideration. DIAND's intervention has therefore been separated into two sections. The first deals with issues arising under the current water licence, including our comments and concerns about the A&R Plan. In the second, we present our comments with respect to the renewal of the water licence.

Review of the Draft Abandonment and Restoration Plan

Given the large number of common issues that both the GN and DIAND wanted to be able to consider in reviewing the draft A&R Plan, we decided to jointly retain EBA Engineering Consultants Ltd. (EBA) to assist in this review. From EBA's report, those recommendations dealing with water-related matters have been incorporated into the relevant sections of this intervention. Additionally, our own comments based on our site knowledge have been incorporated.

DIAND has prepared its review of the draft A&R Plan in the following format:

For each mine component that the Licensee must address, this intervention will:

a. provide some relevant historical context
b. provide a summary of what the Licensee proposes
c. provide the departmental position (including overlap issues, etc.)
d. make a recommendation to the NWB for additional information requirements or licensing considerations.

As specified in Part H, Item 2 (a) of the current licence, the mine components required to be considered within an approved A&R plan include:

i. Open Pits
ii. All abandoned and active solid waste disposal sites
iii. Underground workings
iv. West Twin Disposal Area and associated piping facilities
v. Waste rock storage areas
vi. Water management structures (dams, diversion channels, intake and delivery system)
vii Dump ponds
viii. Borrow pits, ore storage stockpiles, and other disturbed areas
ix. Surface structures (process plant, camps, concentrate storage building and associated structures)
x. Petroleum and chemical storage areas
xi. Any other areas potentially contaminated with hazardous materials
xii. Any facilities or areas which may have been affected by development such that potential pollution problems exist

Current Licence Issues

Abandonment and Restoration Plan

Omissions or Erroneous Statements

DIAND would like to point out the following corrections that need to be made to the *Nanisivik Mine Closure and Reclamation Plan*.

First, it is incorrect to state that the operation of the mine is governed solely by the water licence. The majority of the mine's physical infrastructure, as well as the West Adit and town site rest upon land leased from the Commissioner, while the West Twin Disposal Area, East Adit area, Area-14, K-Baseline and Ocean View areas are all leases on federally-administered land. All of these land tenure documents also have legal requirements that the company is obliged to comply with. Also, the dock area is under the administration and controlled by DFO and the mine could not operate without the benefit of this facility. Such omissions and simplifications are made throughout section 1.3 - Licenses and Mineral Title (page 1-2), particularly in the 1st, 3rd and 5th paragraph. Likewise, in the numerical list of reasons for reclamation in section 7.2 - Possible Continued Use of Mine Facilities (page 7-2), the legal requirements of the land leases should also be included.

Also, as a point of clarification, the federal government divested itself of the shares it held in Nanisivik Mines Ltd. in 1986. It would be appropriate to mention this in section 1.3 - Licenses and Mineral Title (page 1-2), in the 6th paragraph that mentions the "Master Agreement."

Finally, in section 2.7.3 - Phase 2 Environmental Site Assessment and Ecological and Human Health Risk Assessment, the plan mentions that the two reports will be submitted to the NWB for review. They should be submitted to and approved by all regulatory agencies, not just the NWB, as these reports will deal with areas under their respective jurisdictions as well as with water issues.

i - Open Pits

Relevant sections in *Closure and Reclamation Plan*: 6.3.2

Background

- **West Open Pit:** The West Open Pit is adjacent to the north bank of Twin Lake Creek, about 500 metres east of the industrial plant. The south side of the pit is along the bank of Twin Lakes Creek adjacent to the West Adit of the main underground mine. The West

Open Pit is located on a Commissioner lease.

- **East Open Pit:** The East Open Pit is at the east end of the underground workings adjacent to the East Adit. The north and east limits of the pit are defined by the surface contours where mining intersected the moderately sloping topography. The south and west sides are vertical walls containing some sulphide. The west pit wall connects to the primary underground workings. Runoff from the surrounding topography drains to the East Adit Treatment Facility (EATF). The East Open Pit is located on a Crown lease.

- **Ocean View Pit:** The Ocean View Pit is a flat lying sulphide zone about 5 kilometers east of the industrial plant. The site slopes gently north and solar heating effects are considered moderate. The Ocean View area in general contains high metal concentrations in the overburden. The Ocean View pit is located on a Crown lease.

Proposed Activity

- **West Pit:** The proponent plans to backfill this pit with material obtained up-slope of the pit. The pit is to be filled and contoured to prevent pooling of water. The proponent also states that nonhazardous demolition debris is to be placed in this pit.

- **East Open Pit:** The pit will be backfilled with waste rock and capped and graded with a suitable material to allow for both permafrost aggradation and to prevent ponding of water.

- **Ocean View Pit:** This open pit is to be backfilled with overburden and/or clean surface rock and capped and graded with a suitable material both to allow for permafrost aggradation and to prevent ponding of water. The Proponent notes that the overburden rock in the area contains high metal levels.

Departmental Position and Rationale

From the departmental perspective, the manner in which the open pits are reclaimed is a matter for both the Land Leases and Water Licence. DIAND is concerned about stability, the elimination of water infiltration and metal loading of that water through any acid rock drainage (ARD) interaction and the return of permafrost into the pit areas.

Recommendations and/or Questions

In all cases, backfill material must be of sufficient size to allow for the minimization of voids into which water can infiltrate and cause frost heaving. The Proponent mentions that both waste rock and local overburden will be used to fill the pits. DIAND would like the Proponent to demonstrate that such material is appropriate material to be used to fill the open pits.

The pits must be filled in order to ensure that any exposed sulfides in the walls of the pits are

covered with a sufficiently deep layer of fill material to allow permafrost to migrate back into the area. The cap on the pits should be slightly above the surrounding land and graded such that no ponding can take place. Runoff water should be diverted away from these areas. Thermistors should be installed within the pits and monitored until equilibrium is reached.

Any nonhazardous materials to be placed in the West Open Pit should be free of contaminants and placed in the pit in a manner to minimize voids. Also, the proponent should provide an inventory list of the quantity/volumes of materials placed in the pits (and underground). This master disposal inventory list should include a photographic record of the disposed materials. Finally, the pits should be covered with enough material to ensure that all buried materials will remain below the active layer.

SNP stations should be established below the pits in order to monitor any runoff. The current licence conditions pertaining to parameters and limits would be appropriate in addition to a sulphate parameter. Samples should be collected at the initial spring freshette and in the fall after maximum thaw.

DIAND requests final drawings and plans to be provided for approval for each pit with the final contours indicated. These plans should include local topography and indicate if there are drainage courses or seeps into the pits. Lastly, DIAND would like to know if any studies have been done on the potential erosion of the proposed cover materials of the open pits?

ii - All Abandoned and Active Solid Waste Disposal Sites

Relevant sections in *Closure and Reclamation Plan*: 6.2

Background

There are three specific areas that have been used as waste disposal areas. The first was a "bone-yard" area used for scrap metal and other pieces of equipment with no immediate use. This was located west of the tank farm and east of Twin Lakes Creek. The second is the bone-yard located at the Maintenance shop. The final area is the current waste disposal site used for both municipal and industrial waste over the life of the site.

The bone-yard area located between the fuel storage and Twin Lakes Creek was cleaned up several years ago and apart from some soil sampling in that area to ensure that no residual hydrocarbon contamination remains, the company has largely addressed this area.

The current waste disposal site was also used as a waste oil disposal area. Waste oil produced by heavy equipment was placed in drums and buried in the landfill. It is unknown when this practice was initiated, but it ceased in the early 1990's (ca. 1992) when the company started stockpiling the waste oil and either shipped it out or using it in waste oil furnaces. Breakwater Resources was not responsible for this practice, but nonetheless assumed the liability when they

purchased Nanisivik Mine.

Proposed Activity

- **Maintenance Shop Bone-yard:** All remaining equipment is to be decontaminated, if required, and placed underground.

- **Present Landfill:** The proponent proposes to cover the entire area with a 1.25-metres layer of shale. The purpose of the shale is to allow permafrost to migrate back into the area and freeze any and all materials in place. The shale cover would also be graded to shed water.

Departmental Position and Rationale

In their description of the solid waste disposal site, the Proponent has failed to mention the well-known fact that a large number of drums of waste oil are buried in the present landfill. Likewise, no engineered designs of the landfill area were provided by the proponent.

While there are trace hydrocarbons in the dump leachate (always below licence limits), there is no evidence at this time that drums are ruptured and leaking. However, the condition of the drums as well as the nature of the ground on which the landfill is located are not assessed by the Proponent within their A&R plan. Depending on a variety of circumstances, free-phase hydrocarbons have the potential to migrate though permafrost. Therefore, there is the potential for long-term migration of hydrocarbons off-site.

With respect to the reclamation of the landfill area, DIAND believes that there are two options available. The first option is to excavate the site and deal with the various materials. The second involves permafrost encapsulation. However, in order allow for this long term disposal, a decision can only be reasonably achieved after completion of a data collection program. This data collection program would consist of the following:

1. Conducting a geophysical survey. This is necessary in order to improve the knowledge of the extent of the landfill and determine the locations of buried barrels.

2. Conducting an assessment program utilizing an excavator or backhoe to determine the condition of the barrels and potential soil contamination levels. The use of a drill rig to assess the landfill is not recommended as the drill stem could potentially puncture the barrels.

3. A reevaluation of the proposed amount of cover material based on the results of this environmental sampling (i.e., increasing the amount of cover material over what is proposed).

4. Conducting a risk assessment incorporating the results of the thermal modeling and information obtained from the geophysical and site exploration programs at the landfill.

The purpose of this assessment would be to determine the level of risk associated with the long term disposal and burial of hydrocarbon products and other potentially hazardous materials at the landfill.

Excavating the landfill will require that the Proponent be able to analyze all the excavated materials, segregate them according to acceptable methods of disposal, then dispose of the materials accordingly.

The landfill is located on Commissioner's Land and as such may represent an area of overlapping responsibility between the water licence and Commissioner. If the required assessment indicates that permafrost encapsulation is acceptable, then final approval of this option should rest with the Commissioner.

Recommendations and/or Questions

With respect to the landfill, DIAND recommends the following:

Should a cover be deemed acceptable for the landfill area, we recommend that the landfill closure design of a 1.25-metres cover be re-evaluated after the environmental sampling is carried out.

The overall concept of capping and grading to minimize infiltration of water in conjunction with the diversion of water away from the area.

With respect to the maintenance shop bone-yard, the area should be assessed for any residual contamination in the Phase II ESA. Depending on the results, any contaminated material should be placed underground. As with all underground disposal, the volume and location of contaminated soil should also be recorded in the underground disposal inventory list. Photographic records should be included with the inventory list as appropriate.

iii - Underground Workings

Relevant sections in *Closure and Reclamation Plan*: 6.3.1

Background

In addition to the main underground mine, several satellite areas have operated during the mine life. There are eight opening to the main underground workings. In addition, there are portals at the Ocean View, K-Baseline and Area 14 sites. These portals have not been utilized since mining activities ceased in those areas. There is also a ventilation raise to the surface at Ocean View. All underground workings are in a dolostone host rock.

Proposed Activity

The proponent plans on removing the support culverts at three portals (09 South, 17 North, and K-Baseline) before the portals are buried. All other portals will be buried with inert cover to prevent access and contoured to conform with the local topography.

Departmental Position and Rationale

With respect to conditions to be included in a water licence, we interpret this section as relating to disposal of materials underground as opposed to the stability of underground area as a result of the types of mining activities that have been employed. The method of sealing the underground and capping of the portals are issues to be addressed by the various land leases.

Recommendations and/or Questions

DIAND believes that the following list of materials are acceptable for underground disposal within a permafrost environment:

- **Soils:** Contaminated soils (with metals or hydrocarbons) may be disposed of underground as long as that there are no free phase hydrocarbons present and that the areas to be used for disposal are first sprayed with water to seal any fissures.

- **Scrap Metal and Vehicles:** Scrap metal and vehicles may be disposed of underground as long as all tires, batteries, brake, hydraulic, lubricants and radiator fluids are removed from the equipment prior to disposal.

Finally, all underground and pit disposal should be recorded in a master underground disposal inventory list. This master inventory list should include the quantities/volumes of materials placed underground, the exact locations and method of placement, and a photographic record of the materials.

iv - West Twin Disposal Area and Associated Piping Facilities

Relevant sections in *Closure and Reclamation Plan*: 6.1

Background

The West Twin Disposal Area (WTDA) consists of the following features: Surface Cell, Reservoir, Test Cell Area, West Twin Dyke, the polishing pond, and the decant structure. Associated with the WTDA are the tailings and water return pipelines.

Mill tailings were deposited sub-aqueously for the first 14 years of operation, and sub-aerial since 1990. Construction of the West Twin Dyke divided West Twin Lake into two cells: the

sub-aerial (Surface Cell) in the western portion of the original lake, and the subaqueous cell (Reservoir) in the eastern portion of the lake. The Reservoir receives and stores water decanted from the Surface Cell and runoff water from the watershed and the Test Cell areas.

- **West Twin Dyke:** The West Twin Dyke is currently 18 metres high at a nominal elevation of 388 m.a.s.l. Resurfacing of the dyke's downstream face, construction of the Test Cell Dyke, and pouring of tailings along the toe of the dyke to "push" standing water away from the dyke have been carried out to address some of the anticipated closure requirements within the WTDA.

Proposed Activity

- **Surface Cell:** The Proponent suggests that a 1-metre layer of shale material topped with a 0.25 metre layer of quartzite gravel and sand placed atop the exposed tailings will be sufficient to ensure that the tailings remain frozen, thus minimizing the infiltration of water and air and therefore reducing the production of ARD and the resulting metal mobilization issues. The long-term stability of the tailings and West Twin Dyke rely on the material being maintained in a frozen state.

  The proponent states that tailings will be frozen when the shale and quartzite gravel cap will be applied.

- **Spillway:** As a result of the way in which tailings have been deposited in the Surface Cell, there is a natural gradient which will be maintained once capped and surface runoff water will be directed to a proposed spillway into the reservoir side of the tailings disposal area.

- **Reservoir:** The Proponent plans to leave a 1-metre cover of water over this area. Sediments will be excavated and hauled to the Surface Cell.

- **Test Cell Area:** The Proponent proposes to place the same cover atop this area as on the Surface Cell; a 1-metre layer of shale material topped with a 0.25-metres layer of quartzite gravel and sand. The Test Cell area dyke will be breached

- **West Twin Dyke:** The Proponent planned on contouring the dyke with shale and then covering it with Twin Lakes sand and gravel to prevent erosion.

- **Polishing Pond:** This area will be restored as a natural watercourse for surface runoff to Twin Lakes Creek. The treatment sediments will be excavated and placed in the Surface Cell. The culvert and stop logs that separate the Reservoir from the polishing pond will be removed.

- **Water Control Structures Decant Station:** There is a concrete structure located at the discharge outlet. It will be removed and water in the WTDA will return to its natural elevation.

- **Tailings and Water Return Pipelines:** It is proposed that all pipelines and associated equipment will either be sold or placed underground. The built-up portions of the pipeline right-of-way will be scarified and contoured, or breached to return natural drainage.

Departmental Position and Rationale

- **Surface Cell:** Although it is acknowledged that the tailings are indeed a matter for the water licence, there is still need for coordination with the GN as they have issued a lease along the north shore of the WTDA. Also, DIAND Land Administration has issued the lease for the balance of the WTDA, and should also be consulted for any decision regarding the tailings pond.

  DIAND's primary concern with the surface cell relates to the final thickness of cover material. It is the opinion of DIAND that the 1.25-metres design does not provide sufficient conservativeness in being able to handle naturally occurring temperature variations.

  According to *Volume 2, supporting document B - Reclamation Cover Design for Nanisivik Mine West Twin Disposal Area Surface Cell*, section 7.1 - Summary of Design Considerations and Selected Cover Configuration (page 34, item 11), an additional 0.32 metres of cover material would be required to maintain frozen conditions in the tailings for a high-end global warming scenario. Is 0.32 metres the amount of extra shale that will be added? Has it already been included in the 1 metre of shale cover, or is the armoured cap considered part of this amount? This 0.32 metres value contradicts the proposed 0.25 metres of the armoured cap.

  Within the surface cell a deep water area has been maintained in order to provide reclaim water for recycling purposes and mill feed. This deep area is currently being filled with tailings from the mill in order to produce a consistent surface gradient. As this deep spot is several metres deep, it may not be frozen at the time that it is covered with shale.

  We are also concerned about ponded water on the surface cell. Portions of the facility appear to be very flat, and the ponding of water is therefore possible. How will this ponded water affect the active layer?

- **Spillway:** The Proponent plans on creating a spillway from the surface cell down to the reservoir portion of the WTDA. DIAND believes this to be a major structure, yet no definitive drawings have been presented by the proponent. Also, limited geotechnical information is available, which makes it impossible to adequately comment on the

potential erosional problems such a spillway might have both on the surface tailings and on the spillway itself.

DIAND believes that the spillway will require a period of up to five years for stabilization and to determine potential issues such as snow infilling. Also, the proponent's plan does not appear to recognize the importance of minimizing maintenance. Until all the issues are determined, it is impossible to predict the maintenance that might be required for such a major structure.

- **Reservoir:** DIAND has several concerns with the closure plans for the reservoir portions of WTDA. Primarily, we wonder if 1 metre of water is sufficient to prevent ARD from the tailings below. The proponent has not done any studies related to wave-induced resuspension of tailings caused by wind. Also, will the flow created by the spillway cause any resuspension of the tailings located at the toe of the spillway?

  Even if 1 meter of water is deemed sufficient, we have questions concerning the ability to maintain that 1 meter of water. The proponent has not provided any engineered drawings showing the relative elevations of the reservoir shorelines. Likewise, the proponent has not provided any water balance data, nor is there mention of the potential effects of climate change and/or unusually dry and warm years. Finally, if the decant structure is removed, how does the proponent plan on leaving an initial 1 meter of water over the reservoir? The Proponent mentions that they will allow the water in the Reservoir to return to its natural level. Is the natural level of the Reservoir the same level that represents 1 metre of water over the tailings?

  DIAND also has a major concern with leaving standing water against the toe of the dyke. Since the stability of the dyke is dependent on it remaining frozen, this could create a significant problem.

  Noting the concerns listed above, DIAND believes that the most practical long-term approach for the Reservoir is to extend the armored cover of the Surface Cell over the subaqueous tailings in the Reservoir section. The use of a complete cover over the subaqueous tailings would eliminate the likelihood of any harmful runoff, assist permafrost development throughout the tailings, and allow for an effective aqueous cover.

  Finally, DIAND is not clear on how much of the tailings in the reservoir portion are to be excavated. Is it just materials that will become exposed once the water level has been dropped?

- **Test Cell Area:** Although the Proponent plans on breaching the test cell dyke, there is no mention of the planned gradient of the final cover. DIAND therefore still has concerns about the potential ponding of water on the surface of the Test Cell area.

- **West Twin Dyke:** As discussed above in relation to the Reservoir, the stability of the dyke has the potential to be compromised as a result of water in direct contact with the toe of the dyke.

  The *Nanisivik Mine Closure and Reclamation* plan states that Twin Lakes sand and gravel will be used to cover the contoured shale dike in order to prevent erosion. How appropriate is it to use sand on a sloped surface over the long term if it is to protect the shale? It has already been stated that the shale will weather rapidly. What are the annual and long term maintenance requirements of the dike expected to be?

  Figures 6-1 and 6-2 (6-2 in particular) do not show enough detail of the step-like arrangement of the dyke, the location of tailings, and permafrost aggradation estimates. With respect to Figure 6-2, how valid is this figure if it is not to scale? Is it merely a conceptual figure? Also, why is the final hill profile different? How were the permafrost aggradation lines determined?

- **Water Control Structures Decant Station:** DIAND's primary concern with the removal of the decant structure relates to the ability to maintain a 1 metre water cover over the Reservoir.

- **Tailings and Water Return Pipelines:** Lines should be flushed and dismantled for underground disposal.

<u>Recommendations and/or Questions</u>

DIAND recommends that the Proponent provides assessments reports regarding the following:

1. The appropriateness of 1.25 metres of cover over the tailings, taking into account climate change and unusually warm years.
2. The appropriateness of a 1-metre cover of water over the reservoir, taking into account resuspension of tailings, and the ability to maintain that 1 meter of cover.
3. The appropriateness of allowing reservoir water to remain standing against the toe of the dyke with respect to dyke stability.
4. As there are no definitive drawings, it is not possible to determine the initial starting point of the spillway and therefore assess the potential impacts on the thermal regime in the area.

Also, DIAND believes that it is essential for the Proponent to provide final engineered drawings for the proposed spillway, along with the appropriate geotechnical reviews relating to the potential for erosion caused by the spill on both the surface cell and within the spillway itself.

With respect to the pipeline right-of-way, a Phase III ESA should be required to ensure that all tailing contaminated soils have been dealt with to an acceptable degree. A historic record of all

tailings spills could be assembled in order to guide this assessment process. Any tailings contaminated soils should be disposed of underground or in the tailings pond.

As with all underground disposal, the location of the disposal of the pipeline materials should be recorded, along with a photographic record. Also, the volume and location of contaminated soil or tailings should also be recorded in the underground disposal inventory list.

v - Waste Rock Storage Areas

Relevant sections in *Closure and Reclamation Plan*: 6.4

Background

Mining activity at Nanisivik resulted in large quantities of sulphide bearing waste rock being generated and placed around the site. Waste rock dumps are associated with portal and open pit development. In some cases, waste rock was used in the construction of roads. Historic waste piles are located at: 02 South Dump, 09 South Dump, 39 North Dump (East Adit), K-Baseline, Ocean View, and Area-14.

Proposed Activity

The Proponent currently utilizes waste rock stockpiles underground in order to support pillar recovery and general backfilling operations underground. It is also proposed that waste rock material will be used to backfill the open pits. In those areas where complete waste rock removal is not practical, the area will be covered and capped to prevent ARD by ensuring that permafrost is able to move back into the area.

- **02 South Dump:** Remaining material is to be placed in the West Open pit as backfill. Remaining waste rock that has the potential to be acid generating will be covered and capped to enhance permafrost aggradation. This dump forms part of the bank of Twin Lakes Creek.

- **09 South Dump:** Recovery operations over the past few years have resulted in this material being placed underground. This continues to be the ultimate destination of this material. Apart from being used as base material for road construction, this dump also forms part of the bank of Twin Lakes Creek.

- **39 North Dumps - East Adit Area:** This area consists of 2 dumps - of which most of the waste rock material was processed through the mill. Further, material is also being placed underground. It is proposed that some of the waste rock will be used to backfill the East Open pit and nearby underground mine entrances.

Departmental Position and Rationale

DIAND supports the placement of waste rock back underground. We are a bit more concerned about using the waste rock to backfill open pits and to seal portals. These locations are more likely to be susceptible to water infiltration, and hence to sulphide oxidation and ARD in the waste rock.

Recommendations and/or Questions

While it has been reported that there will sufficient space underground, DIAND recommends that a priority rating, in terms of ARD and/or metal loading potentials, be given to the various stockpiles of waste rock still on the surface. This would allow those materials with no or limited acid rock generation potential to remain and be dealt with on the surface. In order to consider such an approach, a geochemical profile of the various waste rock piles should be undertaken in order to develop a priority scale in the instance that there is not sufficient space underground.

DIAND would like the Proponent to identify those areas that they have deemed impractical for the removal of waste rock. What are the criteria they have used to make this assessment? Also, how much cover material will be used for these areas? A Phase III ESA should be required to ensure that all contaminated soils have been dealt with to an acceptable degree.

Also, DIAND would like the Proponent to demonstrate if waste rock is a suitable material to be used as backfill for open pits. The conditions of an open pit are not necessarily the same as underground, and this should be taken into consideration.

The proponent should describe what preventive actions are being undertaken to ensure that sediment and metal loading is not increased because of waste rock reclamation work taking place along Twin Lakes Creek.

Finally, DIAND desires to know the fate of the waste rock material that now resides in Twin Lakes Creek. If removed, this should be done during a time that minimizes impacts to the Twin Lakes Creek. Also, the water quality of Twin Lakes Creek should be monitored during the clean up. DIAND has little doubt that the natural presence and surface showings of this mineral deposit contributed to metal loading of Twin Lakes Creek and other creeks in the Nanisivik area. As a basic premise for A&R work, undisturbed, natural outcrops may be beyond the responsibility of the Proponent to reclaim. However, any area that was disturbed as a result of mining activity must be reclaimed to an acceptable standard regardless of pre-development metal loading levels that would have otherwise existed.

vi - Water Management Structures (dams, diversion channels, intake and delivery system)

Relevant sections in *Closure and Reclamation Plan*: East Adit Treatment Facility is briefly mentioned in 6.3.2

Background

The East Adit Treatment Facility (EATF) is a combination of liming and retention ponds used to capture the runoff from the East Adit waste rock disposal and East Open Pit area.

Although the proposed Spillway is technically a water management structure, it has been dealt with the comment on the West Twin Disposal Area.

Proposed Activity

The Proponent does not mention any specific plans for the remediation of the EATF.

Departmental Position and Rationale

DIAND has a few concerns which require addressing related to the dismantling of the EATF. Are there not liners associated with the retention pond that will have to be removed? What will happen to water within the EATF or retention pond if it does not meet discharge limits? What happens to the EATF if water quality from the area remains poor because of surface disturbances associated with removal of waste rock?

Although the water issues and contaminated soils are a matter for a water licence, the recontouring of the EATF area is also a matter for the land lease.

Recommendations and/or Questions

The Proponent should provide the plans for the reclamation of the EATF, taking into account the concerns listed in our departmental position and rationale.

Given the nature of the EATF, DIAND recommends that a Phase III ESA should be defined to ensure that all contaminated soils surrounding the EATF are removed and placed underground in an appropriate location.

Assuming that the liners and other materials of the EATF will be disposed of underground, the location of the disposal of the liners should be recorded, along with a photographic record of the liners. Also, the volume and location of contaminated soil, if any, should also be recorded in the underground disposal inventory list.

vii - Dump Ponds

Relevant sections in *Closure and Reclamation Plan*: 6.1.3

Background

The WTDA system includes two dump ponds, one below the mill near Twin Lakes Creek, and another east of the town site, along the pipeline right of way. Dump ponds are utilized to drain sections of the tailings line during emergency shutdowns and maintenance operations. The dump ponds are located on Commissioner's land.

Proposed Activity

The Proponent will dispose of the dump pond liners underground. The gravel berms will then be graded and contoured to prevent water accumulation.

Departmental Position and Rationale

Any tailings found within the dump ponds, as well as any contaminated soils in the area, are a potential source of water contamination, and thus a matter for consideration within the water licence.

DIAND notes that the Proponent makes no mention of the fate of the tailings and/or water that may possibly reside in the dump ponds at the time of reclamation. Also, it is not specified whether the Phase II ESA will be sampling around the dump ponds to determine the presence of contaminated soils.

Since the dump ponds are located on Commissioner's land, this represents an area of overlapping responsibility. Although the water licence should deal with possible contaminate soils and tailings, the GN must be involved in the approval of the activities.

Recommendations and/or Questions

All tailings and contaminated soils found within and/or around the dump ponds should be disposed of in the WTDA and/or underground. Also, a Phase III ESA should be required to ensure that all tailing contaminated soils have been dealt with to an acceptable degree.

As with all underground disposal, the volume and location of contaminated soil placed underground should also be recorded in the underground disposal inventory list.

viii - Borrow pits, Ore storage stockpiles, and other disturbed areas

Relevant sections in *Closure and Reclamation Plan*: 6.5

Background

- **Borrow Pits:** The Proponent has a number of borrow pits located on both Crown and Commissioners lands. The method of recovery of the borrow material is to push up the thawed surface material by dozer into a pile that can be subsequently loaded and hauled to its destination.

- **Ore Stockpile Pads:** Stockpile pads were constructed adjacent to the portals at Area 14, K-Baseline, and Ocean View for temporary broken ore storage. During mining operations in these areas, the ore was stored on the pads until it was hauled by truck to the underground crushing facility. These stockpiles are situated on Crown land.

- **Roadbeds:** The section of road servicing the airport, dock, East Twin Lake and the town site of Nanisivik belong to the Government of Nunavut. The roads that service the mine, including the roads to the EATF, WTDA, Ocean View, K-Baseline and Area 14, are the property of the Proponent. Portions of the mine service roads were constructed with mine waste.

- **Other Areas:** This includes storage areas, vehicle parking spaces, and building foundations.

Proposed Activity

- **Borrow Pits:** The Proponent states that the dozer tends to leave a smooth contoured surface so minimal reclamation is required. Where areas exhibit evidence of thermokarsting, they will be recontoured during reclamation.

- **Ore Stockpile Pads:** The Proponent plans on removing any sulphide material remaining on the pads and hauling them underground.

- **Roadbeds:** The Proponent plans on sampling the roads during a Phase II ESA. Areas identified as contaminated or as potentially acid generating will be excavated and disposed of underground. Elsewhere, the roadbeds will be breeched and contoured, and all culverts will be removed to allow for natural water drainage.

- **Other Areas:** These areas will be assessed during the Phase II ESA. Areas found to be contaminated will either be removed to the underground or covered to allow permafrost aggradation.

Departmental Position and Rationale

It is DIAND's position that the borrow pits are a matter of land use, and thus are primarily the responsibility of the appropriate land leases. Properly contoured borrow pits should prevent any pooling of water. However, although the quarried shale is non-acid generating, it is possible that

sulphide bearing rocks are unearthed in the quarries. A sampling or inspection program may be warranted to determine the potential sulphide oxidation on the final surfaces of the quarries.

Ore stockpile pads must be addressed by the landowner and the water licence. DIAND has concerns that trace sulphide or ore may still remain in these pads, creating localized seeps of ARD or metal loading.

Service roads must be addressed by both the land owners and the water licence. DIAND's water-related concerns are with the stream crossings and with the portions of the roads that were created with waste rock. The Proponent mentions that these road sections will be sampled to determine acid generating potential. However, there is no mention of metal loading potential; Zinc in particular can remain mobile even at near neutral pH conditions.

Although the roads in the town site and from the mill to the concentrate shed on the dock is the property of the GN, the Proponent should still assess and clean the roads for contaminants which may have been spilled along those routes as part of the operation of the mine.

Recommendations and/or Questions

DIAND recommends that a Phase III ESA should be defined to ensure that all contaminated soils within the stockpile pads, roadbeds and other areas are removed and placed underground in an appropriate area. The site-specific criteria should consider both the potential for acid generation and metal loading, which can still occur in near neutral pH conditions.

Plans should be provided for the borrow quarries, depicting the existing surface grade and highlighting the final configuration after the borrow material has been removed. Also, the volume of quarry material required should be indicated, along with the quarry location each portion of that volume will be taken from. An inspection program should also be initiated to confirm that there is no sulphide oxidation potential on the final surfaces of the quarries.

With respect to the roads, no road should be dismantled or breeched until the Phase III ESA has confirmed that all contaminants on the opposite side of the breech have been dealt with to the satisfaction of both the NWB and the appropriate land leases.

Finally, as with all underground disposal, the volumes and location of contaminated soil placed underground should be recorded in the underground disposal inventory list.

ix - Surface Structures (process plant, camps, concentrate storage building and associated structures)

Relevant sections in *Closure and Reclamation Plan*: 6.6.1, 6.6.2, and 6.6.3

Background

- **Industrial Building Complex:** The industrial complex contains the concentrator, DMS circuit, power plant, maintenance shops, warehouse, administration and technical offices. It was built on bedrock and reinforced with a concrete foundation. The industrial building complex is located on a Commissioner's lease.

- **Concentrate Storage Building:** The concentrate storage building in the dock area includes a truck weight scale, several conveyors and the ship loader which was used to transfer concentrates from the storage building to the ships. The concentrate storage building and other structures are located on land under administrative control of DFO.

- **Town Site:** Features which make up the town site are the houses, bunkhouse, Pamo building, ice rink, church, Dome, carpenter shop/food storage building, town site generating station, NorthwestTel equipment trailers, government garage, and central government buildings/recreation centre. Several of the buildings in the town site are the property of the GN.

Proposed Activity

Assuming no alternative uses are found for the various surface structures, the Proponent will dismantle and demolish the various buildings. Useful equipment within the buildings will be salvaged and either sold or shipped to other CanZinco projects Material safe to burn will be burned, while the rest will be decontaminated and stored underground. Finally, the concrete foundations of the buildings will be covered with shale to eliminate hazards and make the area aesthetically similar to the surroundings.

Departmental Position and Rationale

All the surface structures, with the exception of the concentrate storage shed, are located on Commissioner's land, thus are the primary responsibility of the GN land leases. The concentrate storage shed is located on the dock, which is land under administrative control of DFO and thus their responsibility. The remaining issues to be considered relate to the remediation of any contaminated areas found in and around the surface structures, which will be identified in the Phase II ESA.

From a water perspective, DIAND finds the proposed approach to be a reasonable and acceptable concept. However, DIAND is concerned that the space required for demolition materials might be underestimated by the Proponent.

DIAND is also concerned with the disposal of possible hazardous materials found within the buildings such as lead paint or asbestos. The Proponent has made no mention of any such hazardous materials, or if any sampling was to be done to test for them. Nor did the Proponent mention how the hazardous materials, if any, were to be disposed of.

Recommendations and/or Questions

DIAND would like confirmation that sufficient storage volume exists underground for the storage of all the demolition waste, waste rock, contaminated soils, and other items scheduled for underground disposal.

Should hazardous materials be encountered, how will the Proponent deal with them? Will they be segregated for underground storage, or will they be transported off site?

Will the concrete foundations be examined for contamination? If contaminated, how will they be "cleaned?" Finally, how much overburden will be placed on the building foundations.

Finally, as with all underground disposal, the underground disposal inventory list should note the volumes and locations of all material placed underground. A photographic record of the material should be included with the list.

x - Petroleum and Chemical Storage Areas

Relevant sections in *Closure and Reclamation Plan*: 6.6.2 (ANFO), 6.6.4, 6.6.5, 6.6.6, 6.7, and 6.8.3 (Dock)

Background

- **Dock Area:** Many chemicals are stored in the dock area until needed. This includes numerous mill reagents such as hydrated lime is used to control the process pH, copper sulphate and xanthate control the flotation grade and recovery of final concentrates. Also, bulk ammonium nitrate is supplied in 750 kg tote bags and is mixed with diesel fuel at the ANFO facility to make the explosive used for most blasting operations in the mine. The dock area also stored bulk calcium chloride salt delivered in 1000 kg tote bags. Calcium chloride brine is required for diamond drilling as drill flushing water. The dock area is on Crown land, with the dock itself under the administrative control of DFO.

- **Tank Farm:** The tank farm comprises 19 steel tanks of various sizes located in a line and dyked enclosure, which is adjacent to the concentrate storage shed. There is sufficient storage for 13.9 million litres of P60 diesel, 1.1 million litres of Jet A1, 0.6 million litres of gasoline and a waste products tank for motor oil, glycol, etc. The tank farm is on Crown land.

- **Intermediate Day Tanks and Fueling Station:** The intermediate day tanks consist of two 105,000-litres diesel tanks and one 47,000-litres gasoline tank. They are located in a dyked and lined enclosure adjacent to the industrial building. These are located on Commissioner's land.

- **End User Tankage:** Numerous end user tanks are located around the mine site for a variety of purposes. All satellite tanks of more than 1,000-litres capacity have secondary containment. The various tanks are located on both Crown and Commissioner's land.

- **ANFO Facility:** Two concrete buildings associated with the ANFO explosive facility. A 1,000 L fuel tank is also part of the infrastructure. The ANFO facility is located on Crown land.

- **Mill:** The mill concentrator requires a number of bulk chemicals for efficient recovery of metals from the ore fed to the mill. The mill is located on a Commissioner's lease.

- **Other Petroleum Products:** Other petroleum products include lubricants, solvents and minor specialty products. They can be stored in large containers outside or in small indoor containers. Access to these container areas is restricted to warehouse personnel and qualified equipment operators. These are located on Commissioner's land.

- **Other Chemicals:** Paints are kept and mixed in the carpenter shop. Janitorial supplies and kitchen cleaning agents are kept in the warehouse or near the point of use. Specialty chemicals used in the assay and metallurgical laboratories are stored in the work areas. These are located on Commissioner's land.

Proposed Activity

The dock area will be assessed as part of the Phase 2 ESA and will be appropriately remediated based on these findings.

The Proponent hopes to divest ownership of the tank farm to the federal or territorial government. Failing that, the tanks will be emptied, decontaminated and discarded underground. The intermediate date tanks, fueling station and end user tanks will be emptied, removed, then sold or decontaminated and disposed of underground. Any secondary containment structures that are equipped with liners will have the liner removed and disposed of underground, then contoured to prevent accumulation of water.

For the chemical storage areas, excess reagents will be returned to the supplier or sent to other operations. The areas will be assessed as part of the Phase 2 ESA and will be appropriately remediated based on these findings.

No specific reference is made to the assessment required at the ANFO facility to determine the extent of fuel oil and ammonium nitrate contamination.

Departmental Position and Rationale

The various petroleum tanks and chemical storage areas are scattered across both Crown and Commissioner lands. The removal of the facilities themselves is thus a concern to the Land owners. Chemical and hydrocarbon contaminated soils do have the potential to impact water, and thus should be dealt within the water licence.

In general, DIAND believes that the proposed approach of dismantling and decontamination of the facilities before underground storage is acceptable with regards to disposing nonhazardous materials underground. However, the Proponent has not provided specific details regarding the remedial and decontamination approaches.

DIAND has some concerns regarding insufficient details in the ESA plan. First, the Proponent failed to mention whether any site assessments were to take place around the numerous end user tanks located throughout the site. Also, DIAND believes that the tank farm and dock areas should go through a more detailed assessment as this would assist in visualizing and identifying the extent of any potential impact associated with these structures. Finally, we believe a more detailed assessment should be provided for the area around the industrial building complex; the potential for a hydrocarbon buildup under the floor slab must be included in this assessment.

Recommendations and/or Questions

DIAND would like the Proponent to identify what are the planned decontamination procedures for addressing residual hydrocarbons present on material to be disposed of underground.

The stolport and the areas around the locations of all the end user petroleum tanks should also receive assessments to determine if there is the presence of hydrocarbon contamination.

A detailed assessment plan for the tank farm and dock area should be provided by the Proponent. The Proponent should also provide details on how they plan to assess for the possible buildup of hydrocarbons under the floor slab of the industrial building complex.

DIAND would also like the Proponent to provide a table detailing all hydrocarbon-impacted areas and associated volumes of soil requiring mitigation, along with average hydrocarbon concentrations.

Finally, as with all underground disposal, the volumes and location of contaminated soil placed underground should be recorded in the underground disposal inventory list. Likewise, a photographic record of materials placed underground should be included with the inventory list.

xi - Any Other Potentially Contaminated Areas

Relevant sections in *Closure and Reclamation Plan*: 6.8

Background

- **Stolport:** The stolport is a small airstrip that was used during the exploration and construction phases of Nanisivik. Little remains of the original installations other than the runway strip and a number of runway light posts. The strip is an area where the ground has been smoothed out and somewhat flattened, requiring little reclamation. The stolport is located on a Commissioner's lease.

- **Telecommunication Equipment:** NorthwesTel has satellite dish antennas, small electrical equipment buildings, and radio antennas adjacent to the stolport. The telecommunication equipment is located on Commissioner's land.

- **Landfarm:** A landfarm was created to remediate the fuel spill at the carpenter shop in 2000. Due to the time constraints imposed by the announced early closure of Nanisivik Mine, there will no longer be sufficient time to bio-remediate the stockpiled material. The landfarm is located on Commissioner land.

- **Wind Blown Tailings:** Some tailings from the surface cell have become airborne during severe windstorms. The area most affected is the north side of the surface cell and the lee-side of the hill north of the WTDA due to the direction of prevailing winds. The wind blown tailings are mostly located on Commissioner's land, but must also be addressed in the water licence as there is a potential for ARD.

Proposed Activity

- **Stolport:** The runway light posts will be removed.

- **Telecommunication Equipment:** The Proponent states that this is the responsibility of NorthwesTel.

- **Landfarm:** Soils containing residual hydrocarbons, and not exhibiting signs of free phase products, will be disposed of underground.

- **Wind Blown Tailings:** The area will be assessed as part of the Phase 2 ESA and will be appropriately remediated based on these findings.

Departmental Position and Rationale

In general, the stolport and telecommunication equipment are a matter of the land lease and thus the responsibility of the GN. However, a former petroleum storage tank was located at the stolport. The Phase II ESA should be expanded to sample near the stolport to determine if there is any hydrocarbon contamination in the area. If present, the removal of the contaminated soils is a matter of consideration for inclusion in the water licence.

Likewise, the landfarm is on Commissioner's land and the hydrocarbons have the potential to contaminate water. The remediation of the landfarm is thus the joint responsibility of the GN and the water licence. In general, DIAND agrees with the Proponent's plan to store the hydrocarbons below ground.

As to the wind-blown tailings, there does not appear to be any closure measures or remediation plan beyond the Phase 2 ESA. Although the ESA will help in determining the extent of contamination, DIAND believes that this is only part of the solution. A proper risk assessment of the effects of the wind-blown tailings and the effects of remediation of those tailings is therefore also required for a proper evaluation of the situation.

Recommendations and/or Questions

The Phase II ESA should be expanded to include the stolport area.

DIAND would like the Proponent to indicate what they plan on doing if free phase hydrocarbons are found within the landfarm.

We recommend that the Proponent provide an ecological risk assessment report relating to the clean up of wind blown tailings.

Security

The current licence was issued on July 1, 1997. Part B, Item (2) of the licence required that security be posted according to the following schedule: $1 million was required within 30 days of licence issuance and $1 million annual thereafter for the term of the licence. The licence was to expire on June 30, 2002, but has been extended to the end of September. The Minister currently holds $5 million in security under the water licence, the amount posted having last been increased on October 1, 2001. The last installment of $1 million is due July 30, 2002. At present, the security is in the form of a surety bond.

At the time of licence issuance, 1997, the Licensee estimated that A&R costs would approximate $9 million. It was anticipated that the water licence would be renewed for an additional term, at which time the remaining A&R costs (estimated at $12 million in the Licensee's 2000 Annual Report) would be reflected in a security requirement under the licence. Subsequently, the Licensee has announced that the mine will be closing permanently. On May 21, 2002, the NWB advised the Licensee that the issue of security would be dealt with at the hearing and asked that Breakwater Resources prepare a closure estimate using the RECLAIM model or similar application, and based on third-party contractor rates.

Section 76 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* authorizes the NWB to require a licensee to furnish and maintain security with the Minister in accordance with the regulations, or in a manner satisfactory to the Minister. In addition to the Act and regulations,

DIAND's Mine Reclamation Policy for Nunavut provides further guidance on the need for a licensed mining company to provide the Crown with financial assurance adequate to ensure that the site is reclaimed at the expense of the mining company. DIAND's position on mine site reclamation is that mining companies must have sufficient financial assurances in place so that costs for mine site clean-up do not become the responsibility of the Crown. With respect to older mining operations, a case-by-case assessment must be made.

DIAND retained the services of Brodie Consulting Ltd. to develop a third-party cost estimate using the RECLAIM model. The obtained cost estimate for third-party reclamation work was $27.5 million. The report is attached as an appendix, and DIAND recommends that the NWB use it as the basis for setting the security amount.

DIAND acknowledges that it is difficult to separate water-related components of the site, or of the reclamation activities, from land-related components, and that any apportionment of A&R costs as water-related components and land-related components will not be exact. Nevertheless, DIAND submits that the NWB must do its best to identify those costs which may reasonably be allocated to water-related components; and the NWB must do its best to fix the security amount by reference to those water-related costs only. This constraint flows from the fact that the NWB's mandate pertains to water-related matters only, and from the fact that a water licence properly addresses water-related matters only.

Components of New Licence

Term of Licence

The proponent proposes that post-closure monitoring take place until the fall of 2008. It is DIAND's position that this duration may not be sufficient.

Because of the nature of some infrastructure at the site, the net effect of reclamation activities will not be readily determinable within the time frame proposed by the Licensee. It is DIAND's position that post-closure monitoring is required until definitive or steady state conditions are shown to exist and should allow for an assessment of remediation activities.

DIAND recommends that the renewed water licence be issued for a period of 10 years. This will allow for the 2 years of reclamation work followed by 8 years of post-closure monitoring. At the end of the 8 years of monitoring, an assessment of the monitoring results should be done to determine if an equilibrium has been reached or if more monitoring shall be required.

Post-Closure Monitoring Program

The Proponent's suggested post-closure monitoring plan is described in two time periods: reclamation and closure.

The reclamation period refers to the time when reclamation work will be underway and is anticipated to be of approximately two years duration. Because the Proponent will still have manpower available at the site, the monitoring and reporting will remain frequent, as required by the water licence.

The closure period refers to the period following the completion of active reclamation work. This monitoring will be carried out for a period of approximately five years. Since continuous manpower presence at the mine site is not planned during the closure period, monitoring will be carried out during site visits.

DIAND believes that the proponent has provided a good start for a final monitoring plan. However, we would like to note to following areas which we believe can be improved.

- **Duration:** DIAND does not believe that 5 years for the closure period is sufficient time to adequately assess the effectiveness of the reclamation activities. Instead of giving a specific time frame, the closure period should last until there is adequate proof that the various systems have reached equilibrium. A further consideration of carrying out a monitoring plan is to identify those areas where additional or supplemental reclamation is required. The Proponent must also address this component within their reclamation plan.

  Additionally, post-closure monitoring schedules, parameters and locations will be reviewed by the regulatory stakeholders through the provision of regular reports. Post-closure monitoring will not be determined solely by the Proponent.

- **Sampling Frequency:** The proponent plans on sampling both water quality and thermistor data monthly for the first three years of the closure period, than twice a year during the fourth and fifth year. We believe that the sampling frequency should remain constant throughout the closure period until there are sufficient signs to indicate that the systems are reaching equilibrium (taking into account seasonal variations). Water sampling should also continue until the samples are consistently below the effluent standards permitted by the water licence.

- **Samples No Longer Collected During Closure Period:** The Proponent states that some sample areas will only be sampled during the reclamation period, but not during the closure period. DIAND does not necessarily agree with this. We would appreciate seeing a rationale for each of the sampling stations as to why samples will no longer be collected during the closure period.

- **Water Quality Parameters:** On top of the usual metal parameters (lead, cadmium and zinc), DIAND suggests that sulphate be included in the list of parameters to be analyzed. The presence of sulphate can often serve as an early indicator of ARD. The analysis of sulphate need only be included in locations where ARD might be expected, notably the WTDA, open pits, and former waste rock areas.

- **Additional Thermistors:** According to Table 8-2, only two thermistors are planned for the entire WTDA. Since the WTDA is such a large structure, DIAND recommends that several more be installed.

Coordination Between Regulators

A recurring theme throughout this intervention has been that the different and sometimes overlapping jurisdictions of the several regulatory authorities must be taken into consideration. Where this overlap exists, there is a need for common agreement between the regulatory agencies (primarily the NWB and the appropriate land administrators) on what will constitute an acceptable level of remedial activity.

The following matters still need to be addressed by all the regulators:

- common agreement on specific soils remediation objectives (SQRO's) and residual metal levels.

- common agreement on acceptable underground disposal practices.

Conclusion

The proponent has provided a draft A&R Plan that, while constituting a sound starting-point, is still somewhat conceptual in nature and must be supported by additional assessment activities, information and engineered drawings. Some of the information requested will be provided by Breakwater shortly before or even during the public hearing. It is therefore likely that all of the regulatory agencies will then require more time to evaluate the additional information.

In conjunction with the review of the supplemental information, we would also advocate that the proponent and regulatory agencies engage in discussions, as many of the issues relating to the A&R Plan fall under multiple regulatory jurisdictions. Afterward, we will be able to finalize our comments and provide them to the proponent, the public, and other regulatory agencies. If this approach is adopted, we feel that it will be possible to address any outstanding issues in a timely manner, and to approve a revised A&R Plan.