

October 21, 2010

Chuck Hubert
Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
Via E-mail: chubert@reviewboard.ca

Re: Canadian Zinc EA – Use of Initial Dilution Zones (IDZs)

This letter is being submitted on behalf of Dehcho First Nations (DFN).

Canadian Zinc Corporation (CZN) had originally proposed the use of a diffuser for the discharge of wastewater into Prairie Creek. CZN is now proposing a simple pipe for discharge of mine wastewater into Prairie Creek with the use of downstream mixing to meet receiving water quality objectives.

As was explained at the recent technical session, the basis for this change in CZN's water treatment plan is a document released on April 29, 2010 by the Land and Water Boards (LWBs). The document, titled *Water & Effluent Quality Management Policy – FINAL DRAFT*, has already been posted to the public registry for this EA.

The impetus for the LWBs document was a 2006 Indian and Northern Affairs Canada (INAC) document titled *Towards the Development of Northern Water Standards: Review and Evaluation of Approaches for Managing Water Use in Northern Canada*. That document is attached for posting to the public registry for the CZN environmental assessment.

With regards to the use of effluent mixing zones, the INAC paper in turn relies on a publication titled *Surface Water Quality Objectives* dated 1997 by Saskatchewan Environment. That 1997 publication was updated in 2006 with the updated version attached for posting to the public registry.

With regards to the use of IDZs, the LWB document states the following:

“Note that the establishment of an *initial dilution zone (IDZ)* will be considered by the *Boards* on a case-by-case basis such that the water quality standards for the *receiving environment* will need to be met outside of the *IDZ*. Guidelines respecting *IDZs* will be developed as noted in Appendix A.”

The document provides no guidance however as to the criteria that would be used when deciding whether or not to approve the use of an IDZ. The INAC document also does not provide any criteria but does state the following:

“*Guidelines for initial dilution zones* - As IDZs are likely to be integrated into the framework for managing water quality in the north, development of guidelines for IDZs

represents an important near-term priority. Such guidelines already exist in certain other Canadian jurisdictions (e.g., SEPS 1997) and can be used as a basis for developing such guidelines for the Mackenzie Valley. The guidelines should specify the procedures for determining the extent of IDZs and the general provisions that need to met within the IDZs;"

Going then to the Saskatchewan Environment document does provide some guidance on this issue. That document states:

"The effluent mixing zone guidelines are intended for application to larger surface waterbodies. However, they also have limited application to some intermittent streams and small lakes that have sufficient flow or volume of water, at least seasonally, to adequately assimilate periodic discharges of treated wastewater effluent."

Assuming that the LWBs intend to follow the Saskatchewan lead, which appears to be the case so far, it is our view that CZN would be denied permission by the MVLWB for the use of IDZs at Prairie Creek as it certainly cannot be considered to be a larger surface water body.

If in the unlikely event that approval for IDZs were given to CZN, that approval would likely be restricted to periodic discharges during high flow events. Approval for the use of continuous year-round discharge using an IDZ into Prairie Creek even during low flow periods appears unlikely.

However, assuming that we are incorrect in our conclusion that IDZs would not be permitted at Prairie Creek, the IDZs would still need to meet specific design criteria such as the extent of the IDZs in terms of the length, width and volume of the IDZ in relation to Prairie Creek as whole. Following are some examples of these criteria from Saskatchewan.

1. At the outer edge of the mixing zone the water quality should not be appreciably different from the water quality prior to the discharge of the effluent.
2. The size of the mixing zone will be influenced by the difference in water quality between the effluent and the receiving waterbody and the volume of effluent relative to the receiving waterbody.
3. The mixing zone should be as small as practicable and should not be of such size or shape as to cause or contribute to the impairment of existing or likely water uses;
4. The existing General Objectives for Effluent Discharges (Section 3.1) should be achieved at all sites within the limited use zone;
5. The limited use zone in streams and rivers should be apportioned no more than 25 percent of the cross-sectional area or volume of flow, nor more than one-third of the river width at any transect in the receiving water during all flow regimes which equal or exceed the 7Q10 flow for the area.
6. Surface water quality objectives **applicable to the area** must be achieved at all points along a transect at a distance downstream of the effluent outfall to be determined on a case-by-case basis.
7. The mixing zone should be designed to allow an adequate zone of passage for the movement or drift of all stages of aquatic life; specific portions of a cross-section of flow or volume may be arbitrarily allocated for this purpose;

8. Mixing zones should not interfere with the migratory routes, natural movements, survival, reproduction, growth, or increase the vulnerability to predation, of any representative aquatic species, or endangered species;
9. Mixing zones should not interfere with fish spawning and nursery areas.
10. Mixing zones should not cause an irreversible organism response or attract fish or other organisms and thereby increase their exposure period within the zone;
11. The 96 hr LC50 toxicity criteria, for indigenous fish species and other important aquatic species should not be exceeded at any point in the mixing zones;
12. Mixing zones should not result in contamination of natural sediments so as to cause or contribute to excursions of the water quality objectives outside the mixing zone.

If CZN continues to advance the use of IDZs at Prairie Creek then it needs to demonstrate how its proposal satisfies all of these criteria and perhaps others.

CZN provided an initial mixing plume analysis in an Oct. 6th memo from Northwest Hydraulics Consultants (NHC). With the extremely long IDZs of up to 1380 m depending upon the constituent and flow rates, it is our view that CZN likely will not be able to satisfy Criteria #5 and #7 as listed above. It is likely that most or all of the cross-sectional flow area of Prairie Creek will be part of the mixing plume with no adequate zone of passage for the movement or drift of all stages of aquatic life.

We also do not think that CZN would meet Criteria #3, which requires that the IDZs be as small of practicable, given that the use of a diffuser rather than a simple pipe would likely reduce the length of the IDZs.

In particular we noted the following statements from the last paragraph of the NHC memo.

“However, it should be noted that the available results show that mixing occurs more quickly at low flows than at high flows because of the relatively narrow width of channel. At the 7Q10 low winter discharge, there will be no release of process water, and mixing of the mine drainage water will likely occur more rapidly than in the ice cover mean flow scenario because of the reduced channel width.”

While NHC and CZN are solely focused on the hydraulics of the mixing process and ignoring the environmental impacts, we are of the view that the low flow conditions and reduced channel width would make it even less likely that CZN could satisfy Criteria #5 and #7 and so CZN would not be approved for the use of an IDZ.

If CZN persists on this course and is allowed to do so by the Review Board, our concern is that a substantial portion of this EA will need to be repeated. The water treatment process and the associated environmental impacts is a major component of this EA. If we are correct and the MVLWB refuses CZN permission to use IDZs in Prairie Creek, then CZN will need to come up with an alternative water treatment plan. That alternative water treatment plan will not have been subjected to the EA process and so will not be

eligible for licensing by the MVLWB until an EA on that alternative water treatment plan has been concluded.

If you have any questions, please contact me.

Sincerely,



Joe Acorn

c.c Zabey Nevitt
 Mackenzie Valley Land and Water Board