

**Canadian Zinc Corporation  
Prairie Creek Mine**

**Fisheries and Oceans Information Request**

**IR Number:** DFO\_01  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Nutrient Loading  
**DAR Section:** 4.7.4 – 2006-2008 Aquatic Studies (p. 106)  
**ToR Section:** 3.2.4 item 6  
3.3.2 item 1 (b-c) and 4 (e);  
3.3.3 item 3b;  
3.3.5 item 2(b-c);

**Preamble:**

As stated in section 4.7.4 of the DAR, Prairie Creek is considered to be a naturally oligotrophic stream (having low productivity) and could be sensitive to any additional loading of nutrient into the system. It was also discovered that “*more species of algae were found at high-exposure sites as compared to low-exposure and reference sites*” (Spencer et al., 2007) which may indicate that a mild nutrient enrichment has already occurred due to historic mine site discharge and phosphate residue in camp sewage.

Algae communities may vary considerably within river reaches in relation to current velocity, depth, light intensity, and water chemistry factors. Mild nutrient enrichment could cause an increase in algae growth and could affect the levels of available dissolved oxygen, in part of the creek, for aquatic organism and fish.

**Request:**

- 1) Based on existing data, provide a map of the locations where increases in nutrient levels have been observed downstream from the mine site within Prairie Creek. This data could be used to determine sensitive areas as part of a monitoring program.
- 2) Assess the potential impacts on aquatic organisms, including fish and fish habitat, due to potential increases in nutrient loading into the system and provide mitigation measures, where appropriate.

**IR Number:** DFO\_02  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Source of Aggregate for road construction and maintenance  
**DAR Section:** 6.13 – Aggregates (p. 200)  
**ToR Section:** 3.2.5, item 13 and 21;  
3.3.5 item 2 (a and d)

**Preamble:**

The Terms of Reference require the proponent to provide a description of the development which includes:

- 13) Locations (s) and proposed activities of aggregate production and storage, with an estimate of the amount of aggregate that will be produced per year over the life of the mine, by locations; and*
- 21) All existing or proposed access roads required for the Prairie Creek Mine, with particular emphasis on the winter road, including analysis of necessary one-time improvements, initial and annual construction techniques, proposed water crossing types by location and amount of water and other materials required.*

In Section 6.13 of the DAR, it states that aggregate materials will be required in order to build and maintain the Mine site and access roads, but specific locations have not yet been provided. The proponent also states that “*possible sources of gravel may exist outside of the stream and riparian zone*”.

**Request:**

- 1) Provide the exact locations of aggregate sources required for the construction and maintenance of Mine site and access roads.
- 2) Confirm that these sources of aggregate will not be situated in river beds or within the high water mark of the alluvial fans.

**IR Number:** DFO\_03  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Diffuser  
**DAR Section:** 6.16 – Water Management System (p. 208 and p. 216-217)  
**ToR Section:** 3.2.5, items 15-16;  
3.3.2 item 3c and 4b

**Preamble:**

The Catchment pond is the last control point in the water management system for the mine site and collects water from the site runoff ditches, mine water and the water treatment plant prior to release to the environment. Canadian Zinc Corporation is proposing to discharge the water from the Catchment pond via diffuser into Prairie Creek.

**Request:**

- 1) Provide the location and conceptual design, including details on the anchoring and footprint of the diffuser in Prairie Creek.
- 2) Specifics on fish use and type of habitat within the area of influence from the construction and operation of the diffuser.
- 3) Describe the methods for the installation, maintenance and subsequent decommissioning of the diffuser and any mitigation measures necessary to reduce disturbances to substrate and mobilization of sediment.
- 4) Assess the potential impacts downstream, including changes to the flow regime in the river, any potential disturbance of the sediment and any degradation of downstream habitat as a result of velocities (i.e. creation of scour holes, etc).

**IR Number:** DFO\_04  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Construction of Winter Road - Water withdrawal  
**DAR Section:** 6.22 – Access Road Water Management (p. 230)  
**ToR Section:** 3.2.5, item 21

**Preamble:**

Canadian Zinc Corporation will require water in order to construct even road beds and to build snow and ice fills at stream crossings. The road will be constructed on seasonal basis and will require maintenance throughout the operational period. Water withdrawals from nearby sources will be required. CZN has not identified the locations and volumes of the water needed for the construction and maintenance of road, and have only stated that they will be using local sources, “*such as lakes*”.

**Request:**

- 1) Identify the exact locations and volumes of water required for the construction and maintenance of the access road. It should be noted that details regarding the proposed water sources, bathymetric survey results as well as the calculation of the total available water volume under ice of each source will be required. Please refer to DFO’s updated water withdrawal protocol for waterbodies (June 2010).

**IR Number:** DFO\_05  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Access road – Erosion, Runoff and Extreme Events  
**DAR Section:** 4.4.1 – Watershed Surface Water (p. 81)  
9.3.2 – Access Road (p. 292)  
10.1.2 - Potential Impacts and Mitigation (p. 300-301)  
10.2.5 – Best Management Practices (p. 307)  
**ToR Section:** 3.3.2 item 8a and 9b  
3.3.4 item 1 (a)  
3.3.5 item 4 and 5

**Preamble:**

Based on the data from the hydrometric stations located on Prairie Creek, the highest monthly flows occur during May to September, with the peak flow being in June at the same time as freshet. The annual low flow month is typically in March when flows are approximately 50 times less than in June. Despite these seasonal fluctuations, extreme events such as intense summer rainfalls can also create peaks in flow. The Developer's Assessment Report (DAR) mentions that two such events occurred in July 2006 and August 2007, where a considerable amount of erosion was observed on the stream banks and along the access road. Although these extreme events may not be common, erosion of stream banks or washouts of the access road could increase the amount of sediment entering waterways adjacent to the access road. Since Nahanni Formation is already naturally susceptible to erosion and/or dissolution by surface and ground waters, additional measures should be taken to avoid additional erosion and runoff due to extreme events.

CZN has also concluded that the risk of significant erosion and sedimentation is low along the access road based on their proposed crossing methods and the minimal amount of disturbances to the terrain. However access roads require maintenance, such as grading, gravelling or sanding to provide traction on inclines, crossings, etc. Few specifics have been given on mitigation measures to ensure that these activities will not increase deposition of sediment within the watercourses.

**Request:**

- 1) During extreme events
  - a. Please describe how the new proposed alignments of the road will be constructed to ensure that it can withstand extreme events, including reduce the likelihood of washouts, slumping and erosion.
  - b. Identify vulnerable sections of the existing road, and describe measures necessary to prevent further erosion.
- 2) Describe monitoring activities for the access road to ensure effective sediment and erosion control measures are employed and that the road will not be a

- sediment source to the adjacent watercourses during the construction, operation, temporary closure in the summer and during extreme events.
- 3) Section 10.2.5 under Best Management Practices suggests that there is “little to no opportunity to mitigate [possible unknown impacts to incubating Bull Trout eggs in Funeral Creek]”. CZN should be aware that Funeral Creek is the only known location of spawning Bull Trout in the NWT, and that the species is listed as *May be at Risk* under the Government of the Northwest Territories listing. Special care must be taken along this creek to ensure that all impacts are fully mitigated. Please provide specifics on how CZN will ensure that Bull Trout are not affected by activities along the access road, with special focus on the stretches along Funeral creek.

**IR Number:** DFO\_06  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Groundwater Discharge to Prairie Creek  
**DAR Section:** 8.3 – Discharges during Operations (p.267);  
Appendix 1  
**ToR Section:** 3.2.4 item 4 and 7  
3.3.5 item 2a

**Preamble:**

CZN has identified that a cone of groundwater level depression around the Mine will occur as a result mining operations. Bull Trout have a strong association with groundwater discharge, often locating spawning redds in areas of groundwater upwellings. These areas are important for incubation of eggs, emergence and survival of juveniles. Over-wintering habitat is also associated with areas of groundwater upwellings.

**Request:**

- 1) Identify areas within Prairie Creek, near the mine site, where groundwater discharges to the surface.
- 2) Provide predicted impacts to the Bull Trout, during their various life stages, as a result of potentially removal of groundwater upwellings within Prairie Creek.
- 3) Provide mitigation measures to reduce or eliminate impacts to Bull Trout.

**IR Number:** DFO\_07  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Waste Rock Pile – Land Fill area  
**DAR Section:** 6.12.1 - Waste Rock and DMS Rock;  
**ToR Section:** 3.2.4 item 4

**Preamble:**

Canadian Zinc Corporation is proposing to locate their WRP in a valley that drains into Harrison Creek. Drainage ditches will be constructed around the WRP to divert clean upslope runoff around the WRP. Seepage from the WRP will be collected in the seepage collection pond and transported by pipeline or borehole into the water management system.

**Request:**

- 1) How is CZN intending to prevent mobilization of sediment carried by the drainage channels during construction, operations and closure?
- 2) At closure, how will seepage from the waste rock pile be managed, so that impacts to Harrison or Prairie Creek do not occur?



**IR Number:** DFO\_08  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Access Road - Fish Habitat Assessment  
**DAR Section:** 9.3.2 – Access Road, p. 292  
Appendix 14 - Winter Road Re-Alignment Stream  
Crossing Fish Habitat Assessments  
**ToR Section:** 3.2.4 item 7  
3.2.5 item 21 and 22  
3.3.5 item 4

**Preamble:**

The existing access road and the four proposed alternative routes cross a number of creeks and rivers, but specifics on crossing structures or types have not been provided. DFO routinely reviews these types of activities to determine if *Fisheries Act* Authorizations may be required, especially if there is a potential for impacts to fish and fish habitat. It should be noted that for certain crossing methods and structures, such as fording and the installation of culverts, can result in harmful alterations, disruptions or destruction of fish habitat, and will need to be reviewed individually. It should be noted that CZN indicated in the DAR that DFO's Operational Statement for culvert installation will be followed but no such operational statement exists.

DFO noticed a discrepancy in CZN's findings in Appendix 14, where a large number of streams were deemed to support fish and provide fish habitat, while the DAR indicated that only Polje and Fish Trap Creeks provide fish habitat. DFO also noticed that several crossings have not been assessed for fish and fish habitat and of those assessed, most were done aerially.

**Request:**

- 1) Please provided additional details on each water crossings as per DFO's *Proponent's Guide to Information Requirements for Review Under the Fish Habitat Protection Provisions of the Fisheries Act* (<http://www.dfo-mpo.gc.ca/habitat/role/141/1415/14155/requirements-exigences/pdf/index-eng.pdf> )
- 2) On page 303 of the DAR, CZN indicated that they intend on fording some of the crossings along the access road. DFO strongly recommends that CZN consider proper crossing structures, such as a clear span bridge. Fording of watercourses can release sediments downstream, destabilize the channel, bed and banks of the stream, and is detrimental to various life stages of fish, particularly the fall spawners whose eggs will be incubating throughout the winter. Please provide the following details:
  - a. Fording locations;

- b. fish and fish habitat assessment, mitigation measures and predicted impacts at those locations;
  - c. prediction of the number of trucks crossing at those locations per day; and
  - d. assessment of other alternatives, if fording has been selected as the preferred option.
- 3) In order to better predict impacts on fish and fish habitat along the access road, please provide a table containing the following:
  - a. each crossing location with latitude and longitudes,
  - b. proposed crossing structure and size;
  - c. where DFO Operational Statements will be used (i.e., snow fills and ice bridges).
  - d. methods for installation and mitigation measures taken to reduce or eliminate impacts to fish and fish habitat.
- 4) CZN has identified that snow fills and ice bridges will be used to cross many of the smaller streams. Integrity of the banks will be dependent upon the climatic conditions, (i.e. if the banks are frozen or not). If the banks are not frozen and cannot support the weight of trucks and other heavy equipment, the stability of the banks may be compromised and result in sedimentation of the creeks. Annually what criteria will CZN use to determine when the environmental conditions are suitable and will be in compliance with DFO's Operational Statements, especially timing for building snow fill and ice bridges?

**IR Number:** DFO\_09  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Closure and Reclamation Plan  
**DAR Section:** Appendix 27 - Preliminary Closure and Reclamation Plan  
**ToR Section:** 3.5

**Preamble:**

Appendix 27 provides initial considerations for closure and reclamation of the CZN mine site including closure objectives and activities. DFO noted that some of the activities described may impact fish and fish habitat, particularly those associated with reclamation of the Funeral Creek portion of the access road.

CZN should be aware of the draft document *Approach to Closure and Reclamation for Mines within the Mackenzie Valley* found at ([http://www.mvlwb.ca/WGDocs/DRAFT\\_Closure\\_and\\_Reclamation\\_Guidelines-Jun15-09.pdf](http://www.mvlwb.ca/WGDocs/DRAFT_Closure_and_Reclamation_Guidelines-Jun15-09.pdf)). Particular attention should be paid to Appendix 3. This document is a work in progress between INAC and the Land and Water Boards, however contains the current expectations of all stakeholders in the North for Closure and Reclamation.

**Requests:**

- 1) Under section 3.9, Off-Site Infrastructure of Appendix 27, it states that one of the objectives is to “*Modify Funeral Creek road bed to promote stable long-term runoff.*”
  - a. It is indicated that the road will be “*given a gentle slope towards the creek*” to prevent channel formation and erosion on the road bed. What measures will CZN take to prevent sediment from entering the creek?
  - b. How will the road bed and culverts be removed, so that Funeral creek and the residing Bull Trout population are not impacted?
  - c. It is indicated that “*Coarse material or organic material will be placed along the bed adjacent to the creek to prevent sediment discharge until vegetation has established.*” Please confirm that materials will be placed on the road bed and not the bed of Funeral creek. No material should be placed below the normal high water mark of any watercourse and that organic material must be stabilized (i.e. use of fibrous matting) while vegetation is establishing.
  - d. How will CZN ensure that Bull Trout and their habitat are not impacted by the proposed closure activities?

**IR Number:** DFO\_10  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Monitoring and Management Systems  
**DAR Section:** 10.7 – Monitoring and Management Plans  
**ToR Section:** 3.2.5 item 21

**Preamble:**

In mining projects there is typically a number of monitoring programs that are required to verify the predictions of the environmental assessment, to determine the effectiveness of mitigation measures and to provide early warning signs should impacts that were not predicted or were greater than predicted become apparent. When developing these programs, CZN should be aware of the AEMP guidelines that have been developed by INAC.

**Requests:**

- 1) Please provide an outline of the Environmental Effects Monitoring (EEM) program and describe how it will be integrated with the Aquatic Effects Monitoring Program (AEMP).
- 2) As stated in previous IRs, provide an outline of a monitoring program designed to ensure the effectiveness of sediment and erosion control methods for the access road.

**IR Number:** DFO\_11  
**Source:** Fisheries and Oceans Canada  
**To:** Canadian Zinc Corporation  
**Subject:** Impact Assessment - Fish and fish habitat  
**DAR Section:** 10.2 – Fish and Aquatic Habitat (p.302);  
Section 7.0 of the Addendum  
**ToR Section:** 3.3.1

**Preamble:**

A number of terms were used to assess and characterize impacts to fish and fish habitat but in some cases they are too vague and need further elaboration.

**Request:**

- 1) Please provide more details on the “thresholds” used to assess the magnitude of impacts on fish and fish habitat in order to better understand the difference between low, moderate and high ranking.
- 2) Please provide more details around how rankings were given in Table 5 in the Addendum, page 13 under Section 7.2.
- 3) Accidents and malfunctions listed in Table 5 of the addendum (page 13) should be broken into two pieces: the mine site and the access road. Time for response along the access road may be quite different than around the mine site. Factors such as this will likely affect the classification within the categories of geographic extent, duration, frequency, variance and reversibility and should be reflected and adequately described.