

October 25, 2016

Canadian Zinc Corporation
Suite 1710, 650 West Georgia Street
Vancouver, BC V6B 4N9

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FILE: ENG.YARC03070-01
Via Email: david@canadianzinc.com

Attention: David Harpley
VP Environmental & Permitting Affairs

Subject: 2nd Round Information Requests – Undertaking #7
Replies to DFN #'s 2 & 3, Parks #'s 6 & 11
Sundog Creek Realignment Reach, KP 35-38
Proposed Prairie Creek All Season Road, NT

1.0 INTRODUCTION

As part of its review of Canadian Zinc's (CZN) Prairie Creek Mine All-Season Road Project, the Mackenzie Valley Review Board (MVRB) has received additional information requests (IR's). Some relate to the proposed re-alignment of Sundog Creek in the vicinity of Kilometer Post (KP) markers 35 to 38. Additional information was provided in the form of undertakings resulting from a Technical Session held in Yellowknife in June 2016. This letter has been prepared to respond to second round IR's (IR2) related to Undertaking #7 regarding fish and fish habitat and Sundog Creek.

Some of the information presently requested has been addressed in our prior letters to CZN as follows:

- (1) March 17, 2016 letter report; Sundog Creek Hydrotechnical Assessment
(Pages 4 to 20 of Public Registry ([PR#178](#));
- (2) June 6, 2016 letter report; Stream Crossing Design Water Levels; ([PR#318](#))
- (3) July 5, 2016 letter report; Undertaking 26 Sundog Creek Supplemental Assessment
(Pages 58 to 62 of [PR#282](#)); and
- (4) August 10, 2016 Sundog Creek Realignment Preliminary Design (Pages 63 to 82 of [PR#282](#)).

Where applicable, responses to the present IR2's refer back to the above prior assessments.

2.0 DEHCHO FIRST NATIONS INFORMATION REQUESTS #2 AND #3

Dehcho First Nations (DFN) IR #2 requested additional information regarding our July 5 letter report where we stated, *"The realigned channel is expected to be generally stable, and not require dredging or other recurring maintenance. There is, however, a risk of future avulsions at the upstream and downstream extents of the realigned reach at its connections to the existing channel(s), and of lateral shifting along the main segment."* DFN requests and our responses are summarized below:

- (1) What evidence does Tetra Tech have that the realigned channel will be stable and not require dredging or recurring maintenance?

Response: Channel stability of the realignment reach was initially assessed in our March 17, 2016 letter report. The reach between KPs 35 and 37 is quasi-stable and the existing main channel is incised with sufficient capacity to convey a 100-year flow without overtopping into the broader historic floodplain. The limited channel shifting that has occurred since 1949 (earliest available airphotos) is believed to have resulted from channel blockages resulting from landslides. The realigned channel is expected to be as or more stable than the existing natural channel because it will have comparable hydraulic capacity at an alternative location that is less vulnerable to landslide blockages.

- (2) How will CanZinc monitor the Sundog Creek realignment and what aspects of the monitoring would trigger maintenance on the realignment?

Response: The channel position should be inspected each fall and after any major flood to document any significant avulsions or lateral shifting channel shifting relative to the initial realignment. Maintenance would be triggered if there is a perceived threat to the integrity of the upstream diversion berm or unexpected lateral shifting which, if left unchecked, would eventually threaten the road.

DFN IR # 3 requested additional information regarding our August 10, 2016, letter report where we discussed the design characteristics for the realigned channel, including capacity to convey 100-year flows and desired variability in substrate and velocities. The DFN request on this topic and our response are summarized below.

- (1) CanZinc notes that similar variability is desirable in terms of substrate and velocity, how will CanZinc achieve similar substrate and velocity?

Response: The re-aligned channel is located in the central portion of the historic floodplain and will involve excavation into native Sundog Creek alluvial deposits. Substrate materials encountered along the realignment reach are expected to be fundamentally similar to those in the existing channel, especially after the excavation work selectively retains the larger size materials that are encountered. Target range and variability of channel velocities will be accomplished by variation in engineered slope-width combinations as illustrated in the preliminary design drawings appended to our August 10 letter report.

3.0 PARKS CANADA AGENCY INFORMATION REQUESTS #6 AND #11

Government of Canada Parks Canada Agency (PCA) IR #6 expressed a fundamental disagreement with the statement presented in our July 5 letter report, that "*the realigned channel is expected to be in balance with its hydrology and sediment inputs.*" PCA continued with a discussion of first flush conditions that will occur when water is first introduced into the excavated channel. PCA requests and our responses are summarized below.

PCA requests that the proponent:

- (1) (i) define "in balance with its hydrology and sediment inputs" and the assumptions that were made to support this statement; ii) identify the expert hydrologist and their credentials who made the assertion that "the realigned channel is expected to be in balance with its hydrology and sediment inputs" iii) present a comprehensive argument supporting the statement that "the realigned channel will be in balance with its hydrology and sediment inputs".

Response: (i) Our discussion of "in balance" is in the context of the long-term ability of the existing and realigned channels to convey water and sediment through the reach in a sustainable manner as reiterated below. Note that "in balance" does not mean static. Sediment and bedforms will continue to move through the reach, particularly during major floods which mobilize the bed materials.

(ii) Our assessments have been provided by the two senior specialists who have signed and sealed the referenced reports. We are registered professional engineers in multiple jurisdictions including but not limited to NU/NWT and Yukon and have more than 50 years' combined relevant experience in hydrotechnical engineering.

(iii) The existing natural channel in the reach from KP 35 to 37, where re-alignment is proposed, is quasi-stable as indicated by a persistent incised position within the historic floodplain. The hydraulic capacity of the existing channel, defined by its geometry and slope, reflects a natural regime condition that is in balance with the long-term hydrology and sediment inputs to the reach. The engineered geometry and slope of the realigned channel, will provide hydraulic capacity comparable to the natural channel and will therefore also be "in balance" with its hydrology and sediment inputs. "In balance" means that realigned channel will convey both water and sediment through the reach in a manner that is similar to the natural process in the existing channel, and to have positional horizontal and vertical stability that is comparable to the existing channel, without accelerated erosion, degradation or aggradation.

PCA IR #11 noted that peak flows for Sundog Creek are based on a regional analysis approach. PCA notes that "there are several methods of hydraulic modelling" and requests the following:

- (1) at least one more hydraulic model for Sundog Creek through alternate modelling methods should be provided to increase confidence in the hydraulic modelling for Sundog Creek.

Response: Alternative hydrologic modelling methods would typically involve developing a basin model with representative soil storage and runoff characteristics, and then impose meteorological inputs including precipitation, temperature, snow pack, solar radiation, etc., depending on the model. For the present study, necessary climate data are not available to represent the mountain headwater areas of Sundog Creek. The adopted regional analysis approach, which incorporates a peak flow frequency analysis for Prairie Creek at the project mine site, in close proximity to Sundog Creek, is the most reliable method, especially considering the physical similarities of the Prairie Creek and Sundog Creek basins, and we consider this to be an appropriate and suitable approach.

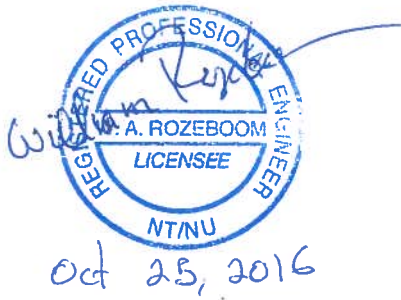
4.0 LIMITATIONS

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5.0 CLOSURE

We trust this report meets your present requirements. If you have any questions, please contact the undersigned.

Respectfully submitted,
Tetra Tech EBA Inc.



Prepared by:
W.A. (Bill) Rozeboom, MBA, P.Eng.
Principal Specialist - Water Resources
Direct Line: 780.451.2130 x263
Bill.Rozeboom@tetrattech.com

A handwritten signature in blue ink, appearing to read "Doug Johnston".

Reviewed by:
Doug Johnston, P.Eng. (Yukon)
Senior Hydrotechnical Engineer
Direct Line: 778.945.5808
Doug.Johnston@tetrattech.com

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TETRA TECH EBA INC.	
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