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March 2, 2020

MV2014L8-0006
MV2019L8-0002

Mr. David Harpley
Canadian Zinc Corporation
SUITE 1710-650 West Georgia Street
Vancouver BC V6B 4N9

Sent via Email

Dear Mr. Harpley:

Water Monitoring Plan – Not Approved
Canadian Zinc Corporation – Prairie Creek All Season Road Project

The Mackenzie Valley Land and Water Board (MVLWB or the Board) met on February 27, 2020 to review your Water Monitoring Plan, which was submitted under Part F, condition 15 of Water Licence (Licence) MV2014L8-0006, and Part E, condition 16 of Licence MV2019L8-0002.

At this time the Board is unable to approve the Water Monitoring Plan as submitted for the following reason:

- The Water Monitoring Plan should be re-organized into two sections, with one focused on Phase 1 information, including relevant data, action levels, etc., and the other focused on Phase 2 information, including relevant data, action levels, etc. This will allow reviewers to comment and recommend appropriate future baseline data collection that will occur prior to commencement of Phase 2, and on action levels based on available data, for Phase 1. Further, it will allow reviewers to make more informed recommendations as the Project progresses from Phase 1 to Phase 2.
- The Water Monitoring Plan should be updated in accordance with comments made during this review, as summarized in Table 1 (attached).

The Board directs CZN to submit the revised Water Monitoring Plan by **March 30, 2020**.

If you have any questions or concerns, please contact Kimberley Murray at (867) 766 7458 or email kmurray@mvlwb.com.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "Mavis Cli-Michaud".

Mavis Cli-Michaud
MVLWB, Chair

Copied to: Distribution List

Attached: Table 1: Board Directives on Water Monitoring Plan

Table 1: Canadian Zinc Corporation – Prairie Creek All Season Road Project – Board Directives from review of the Water Monitoring Plan

Item	Outstanding items requiring updating	Review comment reference
1.	Update to include reference to the Sediment and Erosion Control Plan section where “intense precipitation event” is found.	ECCC-1
2.	<p>Add additional clarity throughout the Plan to indicate the frequency at which monitoring will occur, including but not limited to:</p> <ul style="list-style-type: none"> • Clarify what is meant by “less frequently” regarding samples that will be collected for laboratory analysis (Section 2.1); • Clarify the frequency of site visits that will occur during the spring thaw and early summer and outline any factors that may determine the number of visits; and • Clarify how determinations will be made when classifying which watercourses require more frequent inspections, and how these watercourse classifications regarding sensitivity to erosion will relate to monitoring frequency (Section 4.0). 	ENR-1; ENR-3; ENR-4; ENR-5; ENR-9
3.	Update the Plan to include the details about crossing streams that have water flow in the winter (either under ice or as open beads), including proposed water sampling downstream, after installation of temporary spans or with the use of steel pipes to maintain flow, to confirm the absence of on-going sedimentation, subject to sampling feasibility in terms of ice/snow cover and safety.	ENR-2
4.	Present the 2019 baseline data in the next version of the Water Monitoring Plan.	ENR-6
5.	Include the TSS-Turbidity relationships and representative factors used to predict TSS from turbidity in the next version of the Plan, and any other pertinent information related to the TSS/turbidity curves. Provide a description of what the “representative” number and location of selected TSS-turbidity measurements means.	ENR-7; MVLWB-19; PC-5
6.	Consider updating to clarify what is meant by “suspicious water” (Section 8.2).	ENR-10
7.	Update low and high action levels considering recommendations from reviewers.	ENR-12; Racher-2; Racher-3
8.	Update Figure 9.1 and 9.2 to clarify that a change in turbidity not associated with the Winter Road may be related to obvious erosion of a natural feature downstream of the road.	ENR-14
9.	Consider updating the adaptive management section to include real-time contingencies and mitigations to prevent ongoing release of contaminants into the environment for both sediment and erosion control and overall long-term monitoring.	ENR-15
10.	Update to clarify which Plans the action levels in the Water Monitoring Plan apply to (e.g. high action level in the Water Monitoring Plan also corresponds to high action level in the Geochemical Verification Program; Section 9.0).	ENR-16
11.	<p>Update to fix the typographic errors or inconsistencies, or clarify the following:</p> <ul style="list-style-type: none"> • Acronym of GNWT (List of Acronyms); 	MVLWB-2; MVLWB-3; MVLWB-4;

	<ul style="list-style-type: none"> • Acronym kilometre post (List of Acronyms); • Acronym CMP (List of Acronyms); • Clarify acronym MOT (List of Acronyms); • Add Sediment and Erosion Control Plan to List of Acronyms; • Spelling of Mackenzie for MVLWB (List of Acronyms); • TSS from total suspended sediments to total suspended solids (List of Acronyms); • Correct wording in Section 1.0, p.1 (paragraph 2, 1st sentence); • Clarify Section 1.0, p. 1 (paragraph 2, 2nd sentence) so it does not imply that SNP sample locations will be the only sample locations; • Spelling errors in Section 4.0, Sapling Locations, Figure 2-1, Figure 4-1 (Grainger, Tetcela, Fish Trap); • Define PCA on p. 10; • Correct the acronym PVR; • Correct the error on p. 15 (“Borrow pits are quarries”); and • Clarify what “BMP” means in Section 12.0. 	MVLWB-5; MVLWB-9; MVLWB-10; MVLWB-16; MVLWB-27; MVLWB-30; PC-4; PC-14; PC-22
12.	Update Section 1.0 of the Plan to indicate the updated Project schedule.	MVLWB-7
13.	Consider clarifying that the “hydrometric station that has been operating on Prairie Creek for several years” has been operating for >10 years (as indicated in Section 5.2.1) (Section 3.0).	MVLWB-11
14.	Update to include a table summarizing the proposed sampling stations and clearly indicate what aspect(s) (SNP, long-term monitoring, construction-related monitoring) each location satisfies, what parameters will be sampled/analyzed, and when.	MVLWB-13; PC-8
15.	Update the Plan to provide further information on when in 2020 additional baseline water quality information will be collected, its relevance to the Winter Road and/or the All Season Road, and any additional details as necessary.	MVLWB-14
16.	Update the Plan to verify that hydrometric data are available from three stations (10EC002 discontinuous from 1974-2016; 10EC003 from 2013-present; a new station from 2018-present) as well as clarify the proximity of these stations to one another and identify them on a map, and provide an updated Figure 5.1.	MVLWB-17
17.	Update the Plan to clarify the location of the third hydrometric station established in 2018 for Prairie Creek, and update Figure 5.2.	MVLWB-18
18.	Update text associated with action levels related to TSS/turbidity, if required, once the Sediment and Erosion Control Plan is approved.	MVLWB-20; MVLWB-32
19.	Update the Plan regarding the post-Winter Road sampling at Mosquito Lake crossing.	MVLWB-21
20.	Revise the field parameter list to include temperature.	MVLWB-22
21.	Remove the reference to the Liard River Ice Bridge specifications to avoid confusion.	MVLWB-23
22.	Update the Plan to provide clarification on assessment criteria related to on-going hydrometric monitoring. If this is for Phase 2, as indicated in CZN’s response, please provide a placeholder for the information in the Phase 2 section of the Plan.	MVLWB-24
23.	Update the Plan to reference the Water Licences once and then subsequently make it clear if a reference is to one or all 3 licences.	MVLWB-25; PC-3

24.	Update the Plan to include dissolved oxygen in the field parameter list (Section 8.2).	MVLWB-26
25.	Update to clarify that by “baseline concentrations” CZN actually mean “downstream of the blasting site” (Section 8.3).	MVLWB-29; PC-16
26.	Update to provide clarification on sampling in Sundog Creek if appropriate conditions (e.g. signs of erosion or potential for blasting residue from avalanche hazard management) are present.	MVLWB-31
27.	Add a moderate action level (Section 9.0).	MVLWB-33
28.	Update to indicate that the long-term CCME water quality guidelines will be used to define the low action level, where available, but will only trigger if concentrations downstream of Winter Road influence are $\geq 10\%$ upstream concentrations (Section 9.0).	MVLWB-34
29.	Update action level trigger for parameters that lack long-term CCME water quality guidelines to indicate that an increase of $\geq 10\%$ downstream will constitute a low-level trigger.	MVLWB-36
30.	Re-consider the high action level or provide further rationale supporting how the high action level (50% difference between upstream and downstream concentrations for parameters that lack short-term (acute) CCME water quality guidelines) has been defined, given there is no baseline data.	MVLWB-38
31.	Update Figure 9.2 to indicate that the initial step will be to assess if the downstream concentration is larger than the upstream concentration, and once this has been determined, the downstream value will be compared against the applicable guidelines.	MVLWB-40
32.	Update Figure 9.2 to indicate that monitoring will occur every 48 hours/2 days following a high action level exceedance.	MVLWB-41
33.	Update the Plan to clarify the “iterative loop” statement at the bottom of Figure 9.2.	MVLWB-42
34.	Update to provide further information related to quality assurance and data validation.	MVLWB-43
35.	Update to indicate that travel blanks will be included (Section 10).	MVLWB-44
36.	Update to include further details related to water quality analytical methods, including analytical methods and detection levels (Section 11).	MVLWB-45
37.	Update Appendix A1, Figure 2-2 with the correct community name (Nahanni Butte).	MVLWB-46
38.	Remove Appendix A2: Liard River Barge Crossing Hydrotechnical Assessment for Phase 1 to avoid confusion.	MVLWB-47
39.	Update any relevant information from the Geochemical Verification Program (e.g. Appendix A3) following the next update of the Geochemical Verification Program, if required.	MVLWB-48
40.	Update to provide the CCME concentrations for each parameter, and detection limits, used for the adaptive management triggers.	PC-6
41.	Explain why the long-term monitoring program does not sample water quality throughout the months of September, October and potentially November, as indicated in response to PC-8.	PC-8
42.	Update Section 6.1.1 as appropriate, depending on Board Directive item 5.	PC-10

43.	Update to include GPS coordinates and road KP that will be subject to water quality monitoring for, at a minimum, the major watercourses at the non-typical Winter Road sections.	PC-11
44.	Update with consistent terms (that are used in the Sediment Erosion and Control Plan) for relevant action levels.	PC-12
45.	Update to describe situations in which dissolved oxygen, conductivity, and pH measurements might need to be reinstated if they are ceased at any location after three monitoring events where initial downstream measurements are within 10% of upstream measurements (Section 6.1.2).	PC-13
46.	Update to clarify the paragraph at the bottom of p. 7 that indicates that water quality sampling will be done along Sundog Creek and at winter water withdrawal locations (Section 8.1).	PC-15
47.	Remove Sundog Creek basin from Figure 5.1 to reduce confusion.	PC-17
48.	Update to include a link to the WSC hydrometric station data website (Section 5.2.2).	PC-18
49.	Update to reword the sentence that describes the downstream-upstream parameter difference to make it clearer (Section 9.0).	PC-20
50.	Update the final paragraph in the fourth paragraph of Section 9.0 to “high action level triggers”, instead of “low action level triggers”.	PC-21
51.	Amend Section 9.2 for details on water sampling, including QA/QC.	MVLWB-11*

*Note that this proposed Board Directive is from the public review of the Geochemical Verification Program (Proponent Response January 20, 2020; review comment: MVLWB-11)