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September 7, 2021

File: MV2021L2-0004
MV2021D0005

David Harpley, Vice President
Environment and Permitting Affairs
Canadian Zinc Corporation
Unit 1710 - 650 West Georgia Street
Vancouver BC V6B 4N9

Sent by Email

Dear David Harpley:

Re: Prairie Creek Mine – Mining and Milling – Type A Water Licence Renewal and Type A Land Use Permit Applications – Technical Session Information Requests – Responses Required

Information Requests from the Technical Sessions held August 31 to September 2, 2021 via Zoom and in Yellowknife, NT, have now been complied (Table 1), and are also available on our website.¹

Your responses should be submitted to the Mackenzie Valley Land and Water Board (MVLWB/the Board) by **September 17, 2021**. The Board and reviewers will use this information in the evaluation of the Applications. If Canadian Zinc Corporation (CZN) cannot meet the due date, please contact Board staff for an extension request. Please note that any extension requests may result in change of work plan schedule.

If you have any questions or concerns regarding this request, please contact Kim Murray at kmurray@mvlwb.com or Andrew Wheeler at awheeler@mvlwb.com.

Yours sincerely,

A handwritten signature in cursive script that reads "Kim Murray".

Kimberley Murray

¹ See MVLWB Online Registry for [MV2021L2-0004](#), [MV2021D0005](#).

Regulatory Specialist

Copied to: Distribution List

Attached: Information Requests

INFORMATION REQUESTS

From the August 31 to September 2, 2021 Mackenzie Valley Land and Water Board Technical Sessions

Canadian Zinc Corporation (CZN) – Type A Water Licence Renewal and Type A Land Use Permit Applications

MV2021L2-0004 MV2021D0005

Table 1: Information Requests

#	Subject	Information Request
1	Water Storage Pond Cell B Residency Time	CZN to provide monthly Cell B residency time (time for the water contained therein to be replaced with new influent)/time to reach maximum capacity under operating conditions corresponding to the monthly modelling results presented in the Effluent Quality Criteria Report. The intent of this request is to increase reviewer certainty that CZN can avoid the discharge of non-compliant water from the catchment pond by pumping it back to Cell B and to inform water quality and water quantity triggers for Cell B as input into a detailed adaptive management plan to manage project contact water.
2	Discharge – Pipe Length/Size vs. Mixing Zone	CZN to provide a discussion on the feasibility of reducing the width of the exfiltration trench while still meeting Water Quality Objectives at the edge of the mixing zone. CZN to specifically provide a cost-benefit analysis between increasing lime treatment throughput (and the management of associated treatment by-products), and reducing Effluent Quality Criteria to better align with the <i>MVLWB/GNWT Guidelines for Effluent Mixing Zones</i> (e.g., width of the mixing zone not exceeding 25% of the width of Prairie Creek). CZN to further provide rationale as to why the current proposed exfiltration trench is considered necessary for the project to proceed and indicate the smallest practically achievable exfiltration trench width in consideration of the cost-benefit analysis.
3	Waste Rock Pile Pond – Dam	CZN to determine and provide supporting rationale (e.g., height of dam, storage volume of water) and inclusive of an evaluation of the consequence of failure, whether the pond associated with the Waste Rock Pile is classified as a dam under the <i>Canadian Dam Safety Guidelines</i> (2007, revised 2013) and its associated Technical Bulletin “Application of Dam Safety Guidelines to Mining Dams” (2014). If the structure meets the definition of a dam, determine what the dam class is with supporting rationale.
4	Mill Flotation Circuit Examples	CZN to provide details of the world-wide examples of mill flotation circuits that receive recycled process water having short residency times in associated water storage facilities (see response to MVLWB, comment ID-85).
6	Surveillance Network Program station 18 Action Levels	<p>During the technical session on Day 2, the following Information Request (IR) was directed at CZN from Board Staff (IR #6): <i>In response to MVLWB comment ID-17, CZN has indicated that for Surveillance Network Program (SNP) station 18, perhaps the Aquatic Effects Monitoring Program (AEMP) benchmarks should apply as an action level. CZN to propose an action level trigger for SNP station 18 for construction and operations.</i></p> <p>On Day 3 of the Technical Session, CZN committed to forming an AEMP Working Group. Board staff believe the AEMP benchmark for construction and operations that could apply as an action level for SNP station 18 could be discussed through the AEMP Working Group and have retracted the previous wording of IR #6. Instead, Board staff have issued the following IR to CZN to gain clarity about action levels associated with the period prior to dewatering but during early-works construction, when CZN proposes the Effluent Quality Criteria (EQC) associated with mineral exploration would apply:</p>

		CZN to provide any action levels that would apply prior to dewatering. If CZN does not believe action levels are applicable for this project phase, explain why.
7	Cell A Water Quality Action Level	CZN to describe if there is an action level trigger above which Cell A water must be treated and discharged to preserve Cell A water suitability for the Mill process.
8	Failure Modes and Effects Analysis	CZN to provide a numerical water quality and water quantity sensitivity analysis addressing the following Failure Modes and Effects Analysis (FMEA) scenarios including a discussion on the implications to site water management, CZN's capacity to meet Effluent Quality Criteria in the exfiltration trench, and the Water Quality Objectives at the edge of the receiving environment: <ol style="list-style-type: none"> 1. There is more non-contact water than expected; 2. Not all non-contact water is intercepted, leading to more contact water; and 3. There is more contact water.
9	Groundwater Monitoring – Waste Rock Pile	CZN to confirm if monitoring is proposed of the shallow groundwater downgradient of the Waste Rock Pile facility.
10	Waste Streams	To fully understand the water management process or to be able to evaluate whether the proponent intends to dilute effluents, CZN to provide the following: <ol style="list-style-type: none"> 1. Schematics/diagrams showing the flow paths of the influent to the inlet works of the Catchment Pond from Cell A, Cell B, the Water Treatment Plant, and the Mill ditch, and the sources of wastewater going into Cell A and Cell B. Acknowledging there will be a range of volumes from each source, provide an estimate of relative volumes. 2. A description of the process, including rationale, to control the volumes and concentration of parameters collecting in the inlet works before discharge. This should include identifying points where effluent would be pumped to the Water Treatment Plant, or back to the Water Storage Pond in a spill/non-compliance situation. 3. A clearly defined final discharge point which is the final point of control of effluent and where sampling of effluent would be done at or immediately upstream of this point.
11	Definition of Dewatering	CZN to provide a definition of dewatering for the draft Water Licence MV2021L2-0004.
12	Parameters of Potential Concern, Water Quality Objectives, Effluent Quality Criteria	CZN to provide information to verify that no additional Parameters of Potential Concern (POPC) would be identified as a result of the proposed changes to water management according to the screening process outlined in Appendix 2 of the <i>MVLWB/GNWT Guidelines for Effluent Mixing Zones</i> . CZN to provide a table summarizing the fixed flow ratio Effluent Quality Criteria (EQC) and water quality objectives (WQOs) that CZN is proposing for Water Licence MV2021L2-0004.
13	Effluent Discharge	Part F, Condition 21 b) of Water Licence MV2020L2-0003 requires the flow rate ratio for upstream flow to effluent to be >43, while in the Effluent Quality Criteria Report CZN proposes a dilution ratio of 16. In the Water Licence MV2020L2-0003 there is also a requirement that the Effluent Discharge flow be <247 L/s. CZN to discuss and provide rational/evidence if proposing this number be updated as well.
14	Suitability of rip rap on Flood Protection Berm	At defined intervals along the length of the Flood Protection Berm, CZN to provide the following: <ol style="list-style-type: none"> 1. The crest elevation; 2. The maximum elevation where rip rap material is currently placed. If this is considered to be the same response as in 1., please provide evidence that supports this; 3. The water level elevations for the design flood event; 4. The difference between 1. and 3.; and

		<p>5. The intervals along the length of the Flood Protection Berm where this information is available. Please confirm and provide a map where these locations exist.</p> <p>Provide a map that depicts the locations that correlate with the elevation locations for items 1. to 3.</p> <p>Provide evidence to confirm that the current rip rap material placement location and material size is sufficient to protect the embankment against the design flood event.</p>
15	Dense Media Separation	<p>One of the proposed project changes since the Environmental Assessment is that paste backfill no longer requires dense media separation (DMS) rock for strength, and therefore all DMS will be stored in the Waste Rock Pile. This means there will be more room underground for tailings, and none will be disposed on land. To provide more assurance that DMS is not needed in paste backfill and that tailings will not be stored permanently on land, please provide further conclusive evidence that paste backfill with no DMS meets strength requirements.</p>
16	Updated Surveillance Network Program	<p>CZN to propose the Surveillance Network Program for the draft Water Licence MV2021L2-0004 for after dewatering, including description, location, sampling frequency, sampling parameters, rationale, and status.</p>
17	Annual Water Limit for Domestic/Potable Water	<p>In the current mining and milling Water Licence MV2020L2-0003 Part F, Condition 2 requires no more than 14,600 m³ annually to be used from the Prairie Creek Alluvial Aquifer. The daily withdrawal rates CZN has applied for during construction (82 m³/day) and operations (50 m³/day) would result in an annual water use of over 14,600 m³ considering 365 days.</p> <p>Discuss if CZN no longer believes that the 14,600 m³ annual water use for domestic/potable water to be appropriate, and to propose an annual limit for the domestic/potable water from the Prairie Creek Alluvial Aquifer for exploration, construction, and operations.</p>
18	Water Use Volume	<p>CZN has proposed a water management strategy that involves diversion of groundwater away from the underground workings into Cell B of the Water Storage Pond and ultimately discharged to Prairie Creek. CZN to provide the total volume of groundwater to be diverted annually for each project phase for inclusion in the draft Water Licence MV2021L2-0004.</p>
19	Dense Media Separation Geochemical Data	<p>CZN to provide all geochemical data on the dense media separation (DMS) rock, and report whether CZN has any whole rock ICP-MS analytical results for mercury concentrations in DMS rock.</p>
20	Dam Classification – Consequence of Failure	<p>CZN to provide a dam classification of the Water Storage Pond based on the consequences of dam failure as per the <i>Canadian Dam Safety Guidelines</i> (2007, revised 2013) and its associated Technical Bulletin “Application of Dam Safety Guidelines to Mining Dams” (2014).</p>
21	Engineered Structures	<p>CZN to identify structures that will be constructed or refurbished as part of the Project that require design and approval by a Professional Engineer to include in the definition of Engineered Structures for the draft Water Licence MV2021L2-0004, and comment on appropriate details for inclusion in Design and Construction Plans for such structures.</p>
22	Air quality	<p>CZN proposes to perform passive sampling of NO₂ and SO₂ which will provide average concentrations over a 30-day period. Weather patterns at the site in colder months include stagnation episodes which limit vertical mixing of NO₂ and SO₂ emissions, and the site’s complex terrain would act to inhibit horizontal dispersion. Therefore, concentrations of SO₂ and NO₂ would be expected to be higher during these stagnant weather conditions.</p>

		By how much would CZN expect the 30-day average concentrations for NO ₂ and SO ₂ , derived from passive sampling, to underestimate the maximum 1-hour concentrations expected to occur during stagnation episodes (which inhibit vertical mixing, in addition to local terrain inhibiting horizontal dispersion)?
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