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ECCC File: 5100 000 014/020 & 5100 000 014/021
MVLWB File: MV2021L2-0004 & MV2021D0005

May 20, 2022

via email at: awheeler@mvlwb.com

Andy Wheeler
Regulatory Specialist
Mackenzie Valley Land and Water Board
7th Floor, 4922 48th Street
P.O. Box 2130
Yellowknife, NT X1A 2P6

Dear Andy Wheeler:

RE: MV2021D0005 & MV2021L2-0004 – CanZinc Corporation – Prairie Creek Mine Expansion Type A Water Licence Renewal and New Land Use Permit Applications – Closing Argument

Environment and Climate Change Canada (ECCC) is providing its closing argument to the Mackenzie Valley Land and Water Board (MVLWB) for the review of the above-mentioned Prairie Creek Mine Expansion (the project). ECCC would like to thank MVLWB for the opportunity to participate in this review process, and to thank Canadian Zinc Corporation (the Proponent) and the other intervening parties for their participation.

ECCC is providing technical, science-based information and knowledge based on our mandate pursuant to the *Canadian Environmental Protection Act*, the pollution prevention provisions of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act.* These comments are intended to inform the assessment of this project's potential effects in the receiving environment and on valued ecosystem components. Any comments received from ECCC in this context does not relieve the proponent of its obligations to respect all applicable federal legislation.

This closing argument outlines our department's position on the technical comments ECCC presented as outstanding or partially resolved at the Public Hearing on December 13-16, 2021. The status of our technical comments takes into consideration discussions that occurred during the hearing as well as responses to undertakings and information requests. ECCC is also providing a final statement on the dilution prohibition of the *Metal and Diamond Mining Effluent Regulations* (MDMER) as it pertains to this project.

ECCC-1 Climate Change and Project Design

ECCC recommended that the Proponent refer to the Canadian Standards Association guidance[1] document for more detailed technical information on the methods to estimate possible changes in future extreme precipitation for use in long-lived design elements. ECCC also recommended the Proponent describe how climate change projections will inform the detailed design of the waste rock pile (WRP) and ore storage stockpile covers and other aspects of design, basing their analysis on projections from an ensemble of climate models for a range of plausible future emission scenarios until the end of the century.

At the public hearing, the Proponent clarified with ECCC that the recommendation applies only to the WRP cover and other long-lived design elements of the project and does not apply to the ore stockpile covers.

Also during the public hearing, ECCC asked the Proponent to describe how climate change projections will inform the detailed project design. The Proponent's response was insufficient to evaluate how future climate change will be incorporated in the detailed design phase. This is because details on the climate change information that will be considered and how they will inform the detailed design, were not provided. The information requested continues to remain outstanding, however ECCC acknowledges that Schedule 4 of the draft water licence does include a condition to address this recommendation.

ECCC-2 and 3 Post-Closure Acid Rock Drainage/Metal Leaching Potential

ECCC-2 recommended the Proponent provide a rationale for why metals from rust will likely precipitate or sorb onto rock/soil before reaching the toe of the pile, and provide the volume of potentially leachable metal from solid waste that will be placed within the Waste Rock Pile (WRP).

ECCC-3 recommended the Proponent describe how seepage from the WRP will be managed (collection and monitoring) post-closure after the collection pond is decommissioned.

During the public hearing, ECCC asked the Proponent to provide the requested information regarding the amount of scrap metal that would be placed within the WRP and details on long-term management of seepage post-closure. Undertaking #1 was issued to the Proponent requesting an explanation of what the long-term contribution scrap metal will have on leachate chemistry coming from the WRP. The Proponent's response indicated that scrap metal is not expected to have any significant contribution to long term WRP leachate discharge due to the limited availability of oxygen and limited flushing/infiltration, as well as precipitation of the iron leachate.

Provided that the Proponent will develop a monitoring program at closure to verify the leachate quality seeping out of the WRP before the collection pond is decommissioned, ECCC's outstanding concerns would be addressed. It is acknowledged that the iron oxide may have limited bioavailability, but ECCC notes there are potential concerns with other components (chromium, nickel, and aluminum) that may leach out of the WRP. By monitoring the quality of

[1] Canadian Standards Association. (2019). *TECHNICAL GUIDE: Development, interpretation, and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners.* (CSA PLUS 4013-12). CSA Group. ISBN 978-1-4883-2625-7

any leachate while there is still collection capacity, the Proponent would be able to mitigate effects to the environment on a proactive basis.

ECCC-4 Validation of Effluent Quality

ECCC recommended that methods for field measurement of zinc be tested and validated in advance of effluent discharge and that the zinc-arsenic correlation be defined if the Proponent proposes to use zinc concentrations as an indicator for arsenic concentrations.

As stated in ECCC's presentation, the Proponent indicated that information related to field testing would be provided in the updated Water Management Plan. ECCC continues to recommend that both field testing methods are validated and that the correlation between zinc and arsenic is demonstrated in advance of discharge in order to provide increased certainty and accuracy so that discharges above effluent quality criteria do not occur.

ECCC-6 Cell B Water Quality Predictions

ECCC recommended the Proponent provide predictions for comparison to guidelines and regulatory limits, and that measurement of both total and dissolved zinc in Cell B water be completed.

As stated in ECCC's presentation, ECCC acknowledges that Cell B will undergo some treatment that will reduce zinc concentrations, but there is uncertainty with respect to overall discharge concentrations of total zinc. Although total and dissolved metal concentrations are not expected to be different, ECCC continues to recommend that both total and dissolved zinc concentrations are measured in both Cell B and in effluent to confirm this assumption.

ECCC-8 Action Levels at SNP 13 and SNP 18

ECCC recommended that:

- End of pipe (SNP 13) action levels be set to avoid exceedances of discharge criteria
- Receiving environment (e.g. SNP 18) action levels be set to maintain water quality below site-specific water quality objectives; and
- Collection of samples be completed at all turbidity levels, using upstream sample data to evaluate contributions from naturally occurring sediments.

As stated during the public hearing, ECCC continues to recommend lower criteria for action levels to increase parties' confidence that there are appropriate steps in place to investigate increasing effluent quality criteria and to implement responses such that effluent quality criteria are not exceeded. Receiving environment action levels should be included within the Aquatic Effects Monitoring Program and presented as clearly defined action levels as part of a response framework. ECCC also continues to recommend that samples are collected at all turbidity levels. An upstream monitoring station would provide a comparison of naturally occurring metals associated with fine particulates and assist in determining whether the condition is mine-related.

ECCC-10 Uncertainties in Peak 1-Hour NO_2 Concentrations Given Plan for 30-Day Passive Sampling

ECCC recommended the Proponent undertake active NO_2 monitoring and when active monitoring is unavailable and that the Proponent arrange analysis for passive NO_2 samples shortly after collection to obtain near-real time 30-day averages of NO_2 concentrations. ECCC also recommended the Proponent calculate the ratio of measured 1-hour maximum $PM_{2.5}$ concentration to the corresponding 30-day average measured $PM_{2.5}$ concentration and apply this ratio to estimate the maximum 1-hour NO_2 concentration for comparison to the Canadian Ambient Air Quality Standards (CAAQS). The CAAQS are health and environmental-based air quality objectives to further protect human health and the environment, and are the drivers for air quality improvement across Canada. In addition, ECCC recommended that equipment with Tier 4 engines be adopted where possible.

In response to ECCC's intervention, the Proponent responded that there were no issues with the $PM_{2.5}$ ratio recommendation or the Tier 4 recommendation; therefore, ECCC considers these comments resolved.

Undertaking #2 was issued to the Proponent requesting an explanation of expected emissions of nitrogen oxides (NO_x) from equipment during operations and to provide an estimate for how increased mine production will contribute to additional NO_x emissions from the mine site. The Proponent provided maximum expected operations phase NO_x emission rates for both the original project as well as the expansion. Table 2 of the Technical Memorandum: Response to Mackenzie Valley Land and Water Board Undertaking 2 From the December 2021 Public Hearing shows that total project emissions rates of NO_x almost doubled relative to what was expected from the original project design. This increase is partly due to the use of equipment with Tier 2 engines for ore transport. The original project design assumed Tier 3 engines, which have significantly lower NO_x emissions. ECCC acknowledges the revised NO_x emissions given in Undertaking #2 are a better representation of expected emissions and may be conservative.

This increase in NO_x emissions is contrary to what was stated in the Proponent's response to interventions: *"The sources of NO2, primarily genset emissions and equipment emissions, will be much less than expected because of the adoption of LNG as the primary fuel for power generation, and the use of a mostly new equipment fleet which is likely to have Tier 4 engines.*"

The original recommendation for active NO_2 monitoring was, in part, due to predicted exceedances of the NO_2 CAAQS beyond the project's buffer zone in the 2010 Developer's Assessment Report (DAR). Since project design changes have resulted in a nearly doubling of expected NO_x emissions relative to the 2010 DAR, NO_2 concentrations will be greater than originally predicted. In addition, NO_2 is a non-threshold pollutant, meaning that health effects may occur at any level of exposure. As a result, ECCC continues to recommend active NO_2 monitoring to support adaptive management for minimizing NO_x emissions and potential effects of NO_2.

ECCC also recommends the Proponent choose engines that meet the most stringent emission standards, which are Tier 4 for the compression-ignition engines, during the operation of the mine as it will reduce the NO_x emissions significantly.

Draft Water Licence Comments

Following ECCC's review of the draft water licence, ECCC commented on the Proponent's plans to discharge effluent passively, by means of pumping effluent back to Cell B without using a control structure or other means to halt discharge from the Catchment Pond should parameters exceed criteria.

While it may be feasible to manage the quality of effluent going into the exfiltration trench by managing inputs to the Pond and/or pumping back to Cell, there is no way to halt effluent discharge to Prairie Creek in the event of unforeseen circumstances resulting in the potential for poor-quality effluent. Including a control structure in the Catchment Pond design during the lining construction would be a proactive approach to avoid effects to water quality in the receiving environment due to unexpectedly poor quality effluent.

MDMER

Throughout this review process, ECCC has provided advice around the Project's effects to water quality including the implementation of the water management system. Legal counsel for the MVLWB requested that ECCC comment in its closing argument on the dilution prohibition consideration described in Section 6 of MDMER.

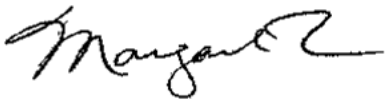
In its capacity as a federal department under section 22 of the *Mackenzie Valley Resource Management Act,* ECCC provides expert information and knowledge to the authority responsible for the decision on the assessment on subjects within the department's mandate, including water quality. This work includes reviewing the Proponent's characterization of environmental effects and mitigation measures, and providing advice on activities needed to mitigate these environmental effects.

As ECCC mentioned during the public hearing, Section 6 of the MDMER prohibits combining effluents and water for the purpose of dilution. The collection of effluent for water management is not considered dilution. If the water management system is used to combine effluents for the purpose of dilution prior to deposit to the receiving environment, a Proponent would be in violation of Section 6 of the MDMER.

ECCC does not review proposed projects for regulatory compliance, and ECCC cannot predetermine the outcome of any activity or action before it occurs. Therefore, ECCC is unable to estimate the likelihood of the Proponent not complying with the MDMER, and cannot comment on any potential future enforcement action the department may take. The Proponent is responsible for ensuring that they understand and are in compliance with the *Fisheries Act* and its regulations, including the MDMER.

If you need more information, please contact Melissa Pinto at (867) 445-5384 or Melissa.Pinto@ec.gc.ca.

Sincerely,



Margaret Fairbairn
A/Regional Director, EPOD-PNR

cc: Jody Small, Acting Head, Environmental Assessment North (NT and NU)