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Staff Report

Applicant: Canadian Zinc Corporation	
Location: Prairie Creek Mine, NT	File Number: MV2019L2-0006
Date Prepared: July 7, 2021	Date of Board Meeting: July 15, 2021
Subject: Water Licence – 2020 Annual Reports	

1. Purpose

The purpose of this Report is to present to the Mackenzie Valley Land and Water Board (MVLWB/the Board) an Annual Water Licence Report submitted by Canadian Zinc Corporation (CZN) to satisfy Part B, condition 19 of Water Licence MV2019L2-0006.

2. Background

- September 9, 2019 – Issuance of Licence MV2019L2-0006;
- April 25, 2021 – Submission of Annual Water Licence Report in conformity with Water Licence;
- May 31, 2021 – Annual Report distributed for review;
- June 22, 2021 – Reviewer comments and recommendations due and received;
- June 29, 2021 – Responses due;
- **July 15, 2021 – Annual Report presented to the Board for information update;** and
- September 8, 2026 – Expiration of and Licence MV2019L2-0006.

3. Discussion

Project History

The Prairie Creek Mine has a long history dating back to the 1960s. From 1966 to the mid-eighties, Cadillac Resources did significant exploration work at the site, and developed mine infrastructure, but shut down prior to mining and operating the mill. CZN has owned and operated the site since 1991. Since that time, the site has been in a state of care and maintenance. CZN has held various Permits and Licences for Prairie Creek Mine. The activities authorized at Prairie Creek Mine include construction and

maintenance of a temporary winter road followed by an All-Season Road that would connect the Liard Highway to Prairie Creek Mine (not yet constructed); mineral exploration (CZN is currently undertaking mineral exploration); and mining and milling (CZN has not yet started mining and milling).

Since the enactment of the *Mackenzie Valley Resource Management Act* (MVRMA) in 1999, CZN has held several authorizations for surface and underground mineral exploration. Historically, CZN has held separate authorizations for surface and underground exploration. In 2020, they amalgamated both activities into one Water Licence (MV2019L2-0006) and one Land Use Permit (Permit, MV2020C0008). Licence MV2019L2-0006 was amended on September 2, 2020 to include surface exploration (attached). The amendment to Licence MV2019L2-0006 was accompanied by the issuance of a new Permit MV2020C0008 that authorized both surface and underground exploration. The current authorizations enable the following:

- development of an additional underground decline;
- surface exploration at 60 sites via diamond drilling; and
- treatment of mine water emanating from the 870-m portal, which includes water from mine development conducted prior to CZN's acquisition of the Prairie Creek Mine, and water from the decline developed in 2006 and 2007.

In 2006 and 2007, CZN completed a development program that involved the rehabilitation of underground workings that were developed prior to CZN acquiring the Prairie Creek Mine, and the development of a new 600-meter-long decline tunnel from the existing 870-meter (m) portal (870-m above sea level). Following construction of the new decline, CZN also conducted underground mineral exploration by drilling within the decline. Most recently, CZN conducted surface exploration activities in the fall and winter of 2020. The Board approved an amendment to Licence MV2019L2-0006 on April 15, 2021 to change the Effluent Quality Criteria (EQC) from dissolved zinc to total zinc (attached).

Description of Annual Report

On April 25, 2021, CZN submitted an Annual Report for Licence MV2019L2-0006 to describe the activities conducted in 2020, including Excel spreadsheets with tabulated Surveillance Network Program (SNP) results (attached).

Authorization Requirements

The submission of an Annual Water Licence Report is required to fulfill Part B, condition 19 and Schedule 1, Condition 1 of Water Licence MV2019L2-0006. In general, annual reports are not for approval since their purpose is to report information collected on activities conducted, including the results of monitoring activities.

Board staff reviewed CZN's Annual Report and noted that it conformed with the requirements listed in the schedule for MV2019L2-0006. Detail on the adequacy of the submission for the Annual Report is provided in Appendix 1, Table 1. Overall, Board staff concluded that the reporting requirements for CZN's Annual Report were either adequate or not applicable.

4. Public Review

The 2020 Annual Reports for mineral exploration at Prairie Creek Mine was distributed for public review. By June 22, 2021, comments and recommendations on the submissions were received from three reviewers:

- Environment and Climate Change Canada (ECCC);
- Department of Fisheries and Oceans (DFO); and
- The Government of the Northwest Territories Department of Environment and Natural Resources (GNWT-ENR).

ECCC and DFO both indicated that they had no comments on the 2020 Annual Report. GNWT-ENR noted several non-compliant zinc levels at site in 2020, and that discussions remain ongoing regarding a long-term solution to the water management issues at the site (GNWT-ENR, comment 1). GNWT-ENR further noted CZN's commitment that they are "confident that the proposed dissolved zinc [Effluent Quality Criteria] can be consistently met in 2021 with the existing water treatment system". ENR indicated that they would continue to monitor the water treatment results through the 2021 open-water season.

CZN did not respond to comments as no response was required. The Review Summary and Attachments (attached) presents the concern identified by GNWT-ENR.

5. Comments

On June 12, 2021 CZN sent correspondence to the GNWT-ENR Waters Inspector that an ice plug at the entrance of the 870 m portal gave out suddenly. The ice plug forms in the portal over winter, preventing outflow. It normally degrades early June, allowing for mine water to flow. However, this year flow was not observed by staff at Prairie Creek Mine and the plug seemed more extensive. CZN attempted to thaw a pipe and draw off some mine water behind the ice plug to relieve pressure, but was unsuccessful, and the ice plug gave way, causing a rapid discharge of the water accumulated behind it. Most water flowed across the site via a ditch to the Catchment Pond, while some flowed into the Polishing Pond. The exact quantity of water that flooded the Catchment Pond and eventually discharged to Prairie Creek is unknown.

A Spill Report (attached) submitted by CZN indicated that the dissolved zinc of water from the Polishing Pond (where the Surveillance Network Program (SNP) compliance point is located, station 3-4) measured using colorimetry onsite was 1.4 mg/L. The Licence has a maximum grab sample EQC concentration of 0.8 mg/L. Following the June 11, 2021 Spill Report being submitted by CZN, they submitted another Spill Report for June 17, 2021 (attached). The second Spill Report indicated that the laboratory result for the dissolved zinc concentration from SNP 3-4 on June 17, 2021 was 0.85 mg/L. CZN did note in the June 17, 2021 Spill Report that colourimetric data results taken onsite since June 17 indicate that water treatment has been "consistently good with low dissolved zinc concentrations".

6. Conclusion

Board staff conclude there are no outstanding issues or concerns with the Annual Report.

7. Recommendation

Board staff recommend **the Board acknowledge the Annual Water Licence Report**, as submitted by Canadian Zinc Corporation to fulfill Part B, condition 19 of Water Licence MV2019L2-0006.

8. Attachments

- Licence [MV2019L2-0006](#)
- [Licence MV2019L2-0006 Amendment \(total Zinc to dissolved Zinc\)](#)
- [CZN's 2020 Annual Water Licence Report](#)
- [CZN's Tabulated 2020 SNP Results](#)
- [CZN's Tabulated 2020 SNP Results Station 3-4](#)
- [June 11, 2021 Spill Report](#)
- [June 17, 2021 Spill Report](#)
- Review Summary and Attachments
- Draft Acknowledgement Letter from the Board

Respectfully submitted,



Kim Murray
Regulatory Specialist



Andrew Wheeler
Regulatory Specialist

Table 1: Board staff review of Licence MV2019L2-0006 Annual Report

	Licence MV2019L2-0006 Schedule 1, Condition 1	Board staff Review
a)	A brief summary of Project activities;	Adequate. CZN reported a small surface exploration drilling program that occurred from October 14 to November 19; no underground activities were undertaken in 2020. Treating minewater on site that originates from the 870 m portal was delayed due to COVID-19 and began July 10, 2020.
b)	An updated Project schedule;	Adequate. CZN reported that they plan to proceed with a project enhancement at Prairie Creek Mine that would include processing 2,400 tonnes per day of ore. CZN indicated that in 2021 a decline and drill program would be started to complete the 2 nd underground decline. Board staff notes that a Type A Water Licence proceeding is currently ongoing for CZN's expanded mine plan Application.
c)	The monthly and annual quantities in cubic metres of fresh Water obtained from all sources, as required in Part D of this Licence;	Adequate. CZN reported that the only source of fresh water is a supply well, and estimated the total quantity of fresh water used in 2020 to be 316.9 m ³ based on the average daily water use for the period August 14-31 (when a flow meter for the fresh water supply was installed).
d)	A summary of the calibration and status of the meters and devices referred to in Part B, condition 18 of this Licence;	Adequate. CZN reported that a flow meter for the fresh water supply well was installed on August 14 but was inadvertently not calibrated after installation, and that this will be completed in 2021. Flow of water from the mine (after water leaves the Polishing Pond) is checked via a calibrated weir at Surveillance Network Program (SNP) station 3-4.
e)	A summary of engagement activities conducted in accordance with the approved Engagement Plan , referred to in Part B of this Licence;	Adequate. CZN reported that they hold monthly calls with representatives of Nahᓂᓴ Dehé Dene Band (NDDDB) and Łı́ıdlı́ Kúé First Nation (LKFN) to discuss project progress, along with future plans and issues. The company met with the Band leadership of NDDDB once, and twice with LKFN, in 2020. CZN held business meetings with Acho Dene Koe First Nation (ADKFN) representatives four times in 2020 and hosted a technical workshop and follow-up meeting in November. The NorZinc Regional Committee (NRC) formed in 2019 met three times in 2020. Communities served by the NRC include Fort Simpson, Fort Liard, Trout Lake, Nahanni Butte, Wrigley, and Jean Marie.
f)	A summary of how Traditional Knowledge influenced decision making;	Adequate. CZN indicated the activities that took place in 2020 were limited to surface exploration and water treatment, which were subject to prior regulatory reviews, including with Indigenous groups.
g)	A summary of major maintenance activities	Adequate. CZN reported that major maintenance activities

	conducted in accordance with this Licence;	related to the Licence consisted of adjustments to the water treatment plant (explained under requirement i. below)
h)	The monthly and annual quantities, in cubic metres, of each and all Waste Discharges, and deposits to Waste Disposal Facilities, identified by location, including all Minewater and Tailings discharge;	<p>Adequate. CZN reported the following:</p> <ul style="list-style-type: none"> • An estimate of sewage volume based on water use reported in condition c) above (approximately 223.0 m³ in 2020); • Minewater discharge volume increase occurred in June when high temperatures caused spring thaw. Discharge between January to December totaled approximately 239,992 m³ in 2020. CZN indicated water volumes were approximately 25% higher than 2019, potentially attributed to two periods of increased rainfall in the middle of August; • No tailings or associated liquid had been generated in 2020; and • No changes or additions were made to the waste rock pile (stores waste rock removed from the 1st Decline) in 2020.
i)	A summary of activities conducted in accordance with the approved Effluent Treatment Plan , required in Part E of this Licence, including:	Adequate.
i) i.	Any treatment improvements made during the year;	<p>Adequate. CZN reported they made the following improvements in 2020:</p> <ol style="list-style-type: none"> 1) The original baffles in the Polishing Pond were removed and replaced with new ones re-oriented to be parallel with the long dimension of the pond; 2) A new flocculent was used from the start of water treatment, however it was replaced with another new flocculent in September; and 3) Following two intense rainfall events from August 13-20 the water treatment system capacity was increased – on August 13 a large pipe to collect mine water at the 870 portal was installed and on August 20 sump pumps were added to the 1st reactor.
i) ii.	The efficacy of treatment; and	Adequate. CZN provided SNP results and summarized that settling performance in the Polishing Pond was better from the middle of September onwards. Board staff note that CZN exceeded the effluent quality criteria (EQC) in the Licence six times over the 2020 water treatment season based on the Spill Reports submitted to the Board.
i) iii.	Any planned treatment improvements for the coming year;	Adequate. CZN indicated that additional redundancy will be added before 2021 start-up to permanently increase water treatment capacity with a suitable buffer over the flow peaks experienced in 2020.

j)	A summary of activities conducted in accordance with the approved Geochemical Verification Program , required in Part E of this Licence, including:	Adequate. CZN indicated there was no underground decline development in 2020, and therefore no sampling for geochemistry.
j) i.	A summary and interpretation of results from sampling performed under the Geochemical Verification Program; and	Not applicable as there was no underground decline development in 2020.
j) ii.	Any actions carried out as per the contingency plan in the event of increasing trends in Metal Leaching or acid generation potential.	Not applicable as there was no underground decline development in 2020.
k)	A summary of activities conducted in accordance with the approved Spill Contingency Plan , required in Part F of this Licence, including	Adequate.
k) i.	A list and description for all Unauthorized Discharges, including the date, NWT spill number, volume, location, summary of the circumstances and follow-up actions taken, and status (i.e. open or closed), in accordance with the reporting requirements in Part F of this Licence; and	Adequate. CZN reported that six Unauthorized Discharges occurred at SNP station 3-4 in 2020 associated with mine water treatment effluent total zinc concentrations exceeding maximum grab EQC. CZN described each exceedance, including measures implemented to avoid recurrence.
k) ii.	An outline of any spill training carried out;	Adequate. CZN reported the following training was carried out: orientation, spill control practices, emergency response training and general cleaning exercises.
l)	A summary of activities conducted in accordance with the Closure and Reclamation Plan , required in Part G of this Licence, including:	Adequate.
l) i.	Details of any Remediation and/or Progressive Reclamation undertaken;	Adequate. CZN reported no reclamation occurred in 2020. CZN described that the waste rock pile from the first decline development will be used as the base for waste rock storage from development of the second decline.
l) ii.	A discussion on whether planning and implementation remains on schedule, and a summary of any new scheduling setbacks;	Adequate. CZN reported that no plans or scheduling for reclamation have been made as they intend to use the disturbed waste rock pile from the 1 st Decline to store waste rock from a 2 nd Decline and/or for mine
l) iii.	A summary of Reclamation Research completed;	Adequate. CZN reported that no Reclamation Research has been completed.
l) iv.	A summary of engagement conducted regarding Closure and Reclamation;	Adequate. CZN reported that no engagement has been conducted with respect to Closure and Reclamation of the 1 st Decline. CZN noted that engagement has been conducted regarding the development of the second decline and proceeding to mine operations.
l)	A list of any factors that would increase or	Adequate. CZN reported that the completion of a second

v.	decrease the Closure Cost Estimate the next time the Estimate is updated;	decline, storage of additional waste rock and inflation as factors.
m)	Tabular summaries of all data and information generated under the SNP annexed to this Licence and graphical summaries of parameters with EQC referred to in Part E at the points of compliance (SNP Stations 3-4), in Excel format;	Adequate. CZN provided tabular summaries and graphical representations.
n)	A list of any non-compliance(s) with the conditions of this Licence or any directive from the Board pursuant to the conditions of this Licence;	Adequate. CZN reported that non-compliance with EQC was reported through the six Spill Reports submitted to the Board over the 2020 water treatment season. CZN indicated that the Board directed CZN on June 30 to update the Effluent Treatment Plan and Minewater Treatment Contingency Plan by October 25 to reflect the 2020 water treatment results. CZN indicated that they had requested an extension and were granted one until January 11, 2021.
o)	A summary of actions taken to address concerns, non-conformances, or deficiencies in any reports filed by an Inspector;	<p>Adequate.</p> <ul style="list-style-type: none"> • CZN noted a letter they had received from the GNWT-ENR Inspector on January 23, 2020 which noted non-compliance in 2019 and an outstanding security payment. CZN replied that they were completing engagement to apply for an extension for payment of security and that they would update the Effluent Treatment Plan and Minewater Treatment Contingency Plan. • CZN noted a letter received from the ENR Regional Superintendent on May 4, 2020 regarding outstanding security and concerns regarding CZN's advised late opening of the site due to COVID-19. CZN replied agreeing to pay the security and with details of continued efforts to engage with Indigenous groups and develop an agreeable plan to safely open the mine site. • CZN noted that the matter of unauthorized discharge and possible contravention of the Fisheries Act was the subject of an investigation by Environment and Climate Change Canada, which resulted in a warning issued October 28, 2020 regarding future actions, monitoring and reporting. • CZN also noted that the Unauthorized Discharges were the subject of revisions to the Effluent Treatment Plan and Minewater Treatment Contingency Plan and an application to the Board on January 12, 2021 to amend the Licence zinc EQC from the total form to the dissolved form.

p)	A table detailing all commitments related to Water use and the deposit of Waste made during the Environmental Assessment, with descriptions of how each commitment is being or has been met; and	Adequate. CZN included a table which describes how commitments from the EA were accomplished.
q)	Any other details requested by the Board by November 1 of the year being reported.	Adequate. CZN indicated that no other details were requested by the Board in 2020.

Review Comment Table

Board:	MVLWB
Review Item:	Prairie Creek - Mineral Exploration - 2020 Annual Report (MV2019L2-0006)
File(s):	MV2019L2-0006
Proponent:	CanZinc Corporation
Document(s):	CZN - Mineral Exploration - 2020 Water Licence Annual Report (5.64 MB) CZN - Mineral Exploration - Tabulated 2020 SNP Results (33.17 KB) CZN - Mineral Exploration - Tabulated 2020 SNP Results 3-4 (45.71 KB) CZN - Mineral Exploration - Tabulated 2020 SNP Results 3-4 with charts (74.06 KB)
Item For Review Distributed On:	May 31 at 16:29 Distribution List
Reviewer Comments Due By:	June 22, 2021
Proponent Responses Due By:	June 29, 2021
Item Description:	<p>The Canadian Zinc Corporation (CZN) has submitted its 2020 Annual Water Licence Report and SNP Results to fulfill Part B, Condition 19 and Schedule A, Condition 1 of Water Licence MV2019L2-0006. Although formal approval of annual reports is not required under the Licence, the Board must be satisfied that CZN has met the requirements of their Licence.</p> <p>Using the Online Review System (ORS), reviewers are invited to submit comments and recommendations on the 2020 Annual Report and SNP Results by the review comment deadline specified. If reviewers seek clarification on the submission, they are encouraged to correspond directly with the Licensee prior to submitting comments and recommendations.</p> <p>All documents that have been uploaded to this review are also available on our Public Registry. If you have any questions or comments about the ORS or this review, please contact Board staff identified below.</p>
Contact Information:	Jen Potten 867-766-7468 Kim Murray (867) 766-7458 Sean Joseph

Comment Summary

Environment and Climate Change Canada: Melissa Pinto				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Decision
1	ECCC - No Comments	Comment ECCC has reviewed the information provided and has no comments at this time. Recommendation N/A		Noted.
Fisheries and Oceans Canada: Gabriel Bernard-Lacaille				

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Decision
1	DFO - No Comments	Comment DFO has reviewed the aforementioned 2020 Annual Report as it pertains to its mandate, and has no comments. Recommendation N/A		Noted.
GNWT - ENR - EAM (Environmental Assessment and Monitoring): Central Email GNWT				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Decision
2	General File	Comment (doc) ENR Letter with Comments and Recommendations Recommendation		
1	Topic: Zinc Exceedances	Comment ENR notes that there were several non-compliant zinc levels at site in 2020. ENR is aware that zinc exceedances have been reported to the Board and Inspector previously and that discussions remain ongoing regarding a long-term solution to the water management issues at the site. ENR notes that recently the zinc EQC has been amended from total to dissolved, and also notes the CZN commitment that they are "confident that the proposed Dissolved Zinc EQC can be consistently met in 2021 with the existing water treatment system." Recommendation 1) ENR will continue to monitor the results of these water treatment results through the 2021 open-water season.		Noted.



June 22, 2021

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

Dear Ms. Ho,

**Re: Canadian Zinc Corp. (CZN)
Water Licence – MV2019L2-0006
2020 Annual Water Licence Report
Request for Comment**

The Department of Environment and Natural Resources (ENR), Government of the Northwest Territories has reviewed the report at reference based on its mandated responsibilities under the *Waters Act* and provides the following comments and recommendations for the consideration of the Board.

Topic: Zinc Exceedances

Comment(s):

ENR notes that there were several non-compliant zinc levels at site in 2020. ENR is aware that zinc exceedances have been reported to the Board and Inspector previously and that discussions remain ongoing regarding a long-term solution to the water management issues at the site.

ENR notes that recently the zinc EQC has been amended from total to dissolved, and also notes the CZN commitment that they are “confident that the proposed Dissolved Zinc EQC can be consistently met in 2021 with the existing water treatment system.”

Recommendation(s):

- 1) ENR will continue to monitor the results of these water treatment results through the 2021 open-water season.

Comments and recommendations were provided by ENR technical experts in the Water Management and Monitoring Division and were coordinated and collated by the Environmental Assessment and Monitoring Section (EAM), Environmental Stewardship and Climate Change Division.

Should you have any questions or concerns, please do not hesitate to contact Patrick Clancy, Environmental Regulatory Analyst at (867) 767-9233 Ext: 53096 or email patrick.clancy@gov.nt.ca.

Sincerely,



Patrick Clancy
Environmental Regulatory Analyst
Environmental Assessment and Monitoring Section
Environmental Stewardship and Climate Change Division
Department of Environment and Natural Resources
Government of the Northwest Territories