EPEA File No. 4101-00149968-01-013-00149968-0102
***Water Act* File No. 4020-00201931-01-026-00201931-0102**

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February 5, 2019

By e-mail only

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Canadian Natural Resources Limited (CNRL) – Horizon Oil Sands Processing Plant and Mine
***Environmental Protection and Enhancement Act* (EPEA) Approval No.: 00149968-01-00, as amended**
***Water Act* Approval No.: 00201931-01-00, as amended**
Joint Application (EPEA and *Water Act*) for the Basal Water Release Pilot
EPEA Application: 013-00149968
***Water Act* Application: 026-00201931**

Dear Mr. Gareau,

The Alberta Energy Regulator (AER) has reviewed Canadian Natural Resources Limited's (CNRL's) joint application under the EPEA (Application No. 013-00149968) and the *Water Act* (Application No. 026-00201931) for the Basal Water Release Pilot at the CNRL Horizon Oil Sands Processing Plant and Mine. This letter amends a previous letter dated February 4, 2019.

The AER has reviewed the application materials from CNRL, the responses to Supplemental Information Requests (SIRs) and the material provided in support of the registered Statements of Concern (SOCs). Based on the information provided, EPEA Application No. 013-00149968 and *Water Act* Application No. 026-00201931 are rejected. The basis for this decision is summarized below.

Background:

The AER understands that:

- The EPEA and *Water Act* applications were submitted to the AER on May 4, 2018;
- A joint Public Notice of Application (PNoA) was issued on May 10, 2018;

- The first round of SIRs (SIR1s) were issued to CNRL on July 9, 2018;
- CNRL provided Supplemental Information Request Responses (SIRR1) on July 27, 2018;
- Additional questions – SIR2s – were issued to CNRL on August 24, 2018;
- CNRL provided responses to the additional questions (SIRR2s) on September 13, 2018;
- Four SOCs were registered by the AER for the applications; the SOCs were filed by the:
  - Fort McKay Métis Community Association;
  - McMurray Métis;
  - Athabasca Chipewyan First Nation; and
  - Fort McKay First Nation
- A SOC was filed by the Métis Nation of Alberta Association Region 1, however this SOC was not registered as it was filed after the deadline provided for in the PNoA;
- The application from CNRL proposed a ten (10) day release of basal groundwater to the Athabasca River; and
- The basal groundwater could contain up to 12,000 mg/L of chlorides.

Issues:

1. Basal Water Quality and Potential Aquatic Environment Impacts:

- The proposed concentration of chlorides in the basal water proposed to be released (from the CNRL application) ranges between 11,100 mg/L to 12,000 mg/L:
  - CNRL indicated the proposed chloride concentrations for release were non-acutely toxic to rainbow trout based on bioassays as defined by 50% survival in 100% effluent. However, rainbow trout are a salmonid species generally less sensitive to chlorides, and CNRL did not propose to use a more sensitive test species for the chloride ion to inform the limit for release at the end-of-pipe;
  - CNRL proposed to use an acute mixing zone to meet short-term (acute) limits for chloride concentrations 30 m downstream of the outfall, which is inconsistent with the Water Quality Based Effluent Limit (WQBEL) Procedures Manual requires 50% survival in 100% effluent at end of pipe (using rainbow trout and/or *Daphnia magna*) in most cases. The expectation to meet acute toxicity limits at the end-of-pipe is consistent with AEP policy interpretation for the WQBEL, and has been used consistently in Alberta as a benchmark for setting water quality release limits;
  - The meeting of acute toxicity limits at the end-of-pipe is consistent with Federal requirements for the release of deleterious substances under the *Fisheries Act* (discussed later in this document);

- CNRL indicated, in SIRR2, that there was the potential to use sedimentation pond water to dilute the chloride concentration from 11,100 mg/L to approximately 6,900 mg/L, which is also in excess of the provincial and federal guidelines for chloride at 640 mg/L for the protection of aquatic life under the *Environmental Quality Guidelines for Alberta Surface Waters* and *Canadian Water Quality Guideline (1999)*;
- Over the 10 day test period, a total release volume of approximately 7,000 m^3 of basal groundwater was proposed that would result in a chloride load of 86,400 kg into the Athabasca River; this represents a significant chloride load when compared to the chloride load from natural saline groundwater seepage into the Athabasca River each year;
- The proposed release concentration in the application is significantly higher than for other approved basal groundwater releases in the Athabasca Oil Sands Region which follows the provincial and federal water quality guidelines for the protection of aquatic life. As chloride is a persistent substance that will not degrade in the environment over time, there is potential for elevated concentrations well beyond existing guidelines and cumulative loadings exceeding ambient conditions to result in adverse effects to the aquatic environment. Therefore, the application has not provided sufficient evidence to assure the release would not result in impacts to the aquatic environment; and
- Given that species sensitivity to the chloride ion may vary depending upon lab strains, weight and age of the organisms, etc., the ability to account for variation in species sensitivity to chlorides without causing acute effects becomes more limited with higher exceedances of guidelines.

2. Technology Assessment:

- CNRL's primary strategy to mitigate toxicity is dilution of basal water in the Athabasca River through the use of mixing zones, which is inconsistent with the WQBEL which indicates mixing zones are not to be used as an alternative to reasonable and practical treatment. Further, the *Industrial Release Limits Policy* (AEP 2000) requires the consideration of the more stringent of technology based and water-quality based limits to be considered any time a substance has the potential to exceed instream guidelines; and
- CNRL suggested there is no best available technology economically achievable for chloride treatment based on a study commissioned by the Mining Association of Canada titled *Study to Identify BATEA for the Management and Control of Effluent Quality from Mines*. CNRL did not provide details regarding the comparability of the study's results from the diamond mining sector to the proposed basal water release in the oil sands region to support the position that there is an absence of economical chloride treatment technologies.

Therefore, no comparable assessment for the best available technology economically achievable for chloride treatment was evaluated as part of this application, as required by the *Industrial Release Limits Policy*.

3. Other:

CNRL discusses the connectivity of basal groundwater from the Horizon mine area to the Athabasca River.

- Limited connectivity of the naturally occurring basal groundwater to the Athabasca River:
  - Although the AER agrees that the basal water is a naturally occurring substance, the AER does not agree with CNRL's statement that the basal water in question is "*naturally occurring groundwater that already discharges from the Basal McMurray Aquifer to the Athabasca River through natural seepage*". The proposed releases to the river are occurring through **non-natural processes** – depressurization and dewatering; and
  - These releases would not have occurred at the same rate under natural processes. In other words, but for the mining activity and the release proposed by CNRL, the basal water would not be present in the waters of the Athabasca River in the concentrations projected.

The basal water volumes in question would not be released to the river at the rates and concentrations proposed in the CNRL application if these releases were occurring naturally and not through mining operations.

4. Provincial Regulatory Considerations

Government of Alberta regulatory and policy considerations concerning water quality were considered in the review of this application.

- CNRL's application is based on the assumption that release of water with substances above guidelines is acceptable with the use of mixing zones. However, the AER must apply current Government of Alberta Policy and Guidelines, which means that the AER is bound by the following regulatory requirements and principles which have not been fully met in this application:
  - Water Quality Based Effluents Limits (WQBEL) Procedures Manual:
    - The receiving stream is protected and that effluent at the end-of-pipe is non-acutely toxic;
    - Limits should involve "*restricting the toxicity of an entire effluent to the extent that no toxicity will occur instream*"; and
    - Mixing zone restrictions in WQBELs include the provision that "*mixing zones are not used as an alternative to reasonable and practical treatment*".

- Environmental Quality Guidelines for Alberta Surface Waters (Protection of Aquatic Life):
  - Science-based guidelines that provide benchmarks for aquatic environmental protection based on lethality for short term (acute) and long term (chronic) exposure at various concentrations to aquatic organisms.
- Industrial Release Limits Policy:
  - Two parallel assessments to protect the receiving environment are required; one to determine the limits to maintain water quality and the second of the limit of the "*most effective demonstrated pollution prevention and control technologies*" and that the more stringent result is applied as the release limit.
- Surface Water Quality Management Framework for the Lower Athabasca Region:
  - Cumulative environmental risks of future departures in water quality from historical conditions need to be comprehensively assessed and mitigated before they will be allowed.

5. Federal Regulatory Considerations:

Federal *Fisheries Act* considerations concerning water quality were considered in the review of this application.

- The potential for release of substances considered to be deleterious under the Federal *Fisheries Act* and acute toxicity impacts on fish:
  - Section 36(3) of the *Fisheries Act*, the general prohibition regarding the deposit of a deleterious substance, would apply to the proposed release;
  - Environment and Climate Change Canada (ECCC) has indicated that they may, if the application was approved, conduct testing during the release period and use the testing results to determine if the release was of a deleterious substance. ECCC has indicated that their plan may be to test releases at the end-of-pipe; and
  - AER's understanding is ECCC end-of-pipe testing is expected to be the basis for any potential enforcement measures against CNRL under the *Fisheries Act*.

Conclusions

The proposed release concentrations in the CNRL application, even if the basal water is reduced using fluid from the sedimentation pond, are significantly above the Alberta Environmental Quality Guidelines for Alberta Surface Waters (2018) for the chloride ion to ensure the protection of aquatic life (short-term exposure) of 640 mg/L. Therefore, the AER is not satisfied that there will not be an adverse effect on the aquatic environment. The AER is not satisfied that the risks presented with the short-term basal water release can be fully mitigated to result in no adverse effects on the aquatic environment.

It remains CNRL's obligation to ensure compliance with the requirements of the EPEA, the *Water Act*, and the terms and conditions of its approvals. If there are any questions, contact Doug Koroluk at (403) 297-6306 or by e-mail at doug.koroluk@aer.ca.

Sincerely,

< *Original signed by* >

Rob Borth
Director
Authorizations (Mining)

RB/dk

cc: Doug Koroluk, AER
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