BRITISH COLUMBIA ENERGY REGULATOR

March 26, 2025 6400-4100-32640-02

Rick Fehr
Production Specialist – BC North
Canadian Natural Resources Limited
2500, 855 – 2nd St SW
Calgary, AB T2P 4J8

Dear Mr. Fehr:

RE: EXTENDED INJECTIVITY TEST SPECIAL PROJECT APPROVAL
CNRL ET AL HZ NIG a-A48-D/94-H-3 (WA #29012)
NIG CREEK FIELD – BALDONNEL FORMATION

The BC Energy Regulator has reviewed the application submitted by Canadian Natural Resources Limited (CNRL) received July 25, 2024, requesting approval for an extended injectivity test of 25,000m^3 into the Baldonnel formation via the subject well.

The subject well was drilled in 2013 and completed in the Montney formation targeting gas production. However, wellbore complications resulted in abandonment of the Montney, and in 2015, the Halfway formation was completed for disposal purposes. From July 2015 to May 2017, 35,000 m^3 of produced water were injected into the Halfway formation. Disposal operations ended when the reservoir pressure reached the maximum formation pressure specified in the approval. The well was approved for use as an observation well for the Halfway formation in October 2017. CNRL has analyzed the Baldonnel formation for disposal operations and has applied to test the injectivity potential. Formation completion operations have not yet occurred.

Attached please find **Order 25-02-06**, designating an area in the Nig Creek field, Baldonnel formation, as a Special Project under section 75 of the Energy Resource Activities Act, for the temporary operation and use of a storage reservoir for the injection of produced water. This authorization does not warrant that a future disposal approval will be issued.

The Regulator has approved a maximum test volume of 5,000m^3. Additional injection volume requires further review of wellbore integrity and data gathered from the extended injectivity test. A post-injection fall-off pressure transient analysis is recommended as it may allow for further reservoir characterization and disposal viability. As well, an initial Baldonnel reservoir pressure is required prior to injection.

For this temporary injection test, the maximum wellhead injection pressure has been set to a conservative value based on other Baldonnel fracture gradients in the province and a 20% safety factor. The Regulator requires a valid fracture pressure test result from the subject well to establish long-term injection pressure limit. A step-rate test (SRT), executed as advised in SPE 16798, is necessary. The maximum injection pressure in condition 2b) may be exceeded for the SRT, but must remain below the MWHIP for the 5,000 m3 extended injection period.

A hydraulic isolation log is required to confirm injected water remains in the intended zone. The most recent casing and cement logs were in 2015. New well integrity logs are required before long-term injection operations are approved.

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BCER hydrogeology requirements are in place to protect area groundwater. Should this extended injection prove successful disposal opportunity in the Baldonnel formation, additional requirements may be imposed for future use.

Should you have any questions, please contact Michelle Gaucher at (250)419-4482.

Sincerely,

Michelle Gaucher, P.Eng.
Supervisor, Reservoir Engineering
BC Energy Regulator

Attachment

IN THE MATTER of the application from Canadian Natural Resources Limited to the BC Energy Regulator dated July 25th, 2024, requesting extended injectivity test approval:

ORDER 25-02-006

1. Under Section 75(1)(c.1) of the *Energy Resource Activities Act*, the Regulator designates the temporary operation and use of a storage reservoir for produced water, including flowback from fracturing operations, near the Nig Creek field – Baldonnel formation as a special project in the following area:

   NTS 94-H-3 Block D Unit 48

2. Under section 75(2) of the *Energy Resource Activities Act*, the special project designation in this Order is subject to the following conditions. The Permit Holder shall:

   a) Inject water into the well CNRL et al HZ Nig a-A48-D/94-H-03; WA# 29012 Baldonnel formation from 1274.0 – 1292.0 mKB MD.

   b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 6,300 kPag or the pressure required to fracture the formation, whichever is lesser.

   c) If the fluid injected in not fresh water, inject only through tubing with a packer set as near as is practical above the injection interval.

   d) A wellbore pressure integrity test must be passed prior to injection operations.

   e) The total volume of injected water must not exceed 5,000m^3.

   f) Measure and report the reservoir pressure both prior and following the injection test.

   g) Conduct a hydraulic isolation log at the conclusion of the injection test and eSubmit the results to the regulator within 30 days of completions.

Michelle Gaucher, P.Eng.
Supervisor, Reservoir Engineering
BC Energy Regulator

DATED AT the City of Victoria, in the Province of British Columbia, this 26th day of March 2025.