

April 2, 2024

1260-2600-32640-02

Quang-Hoa Hong, P.Eng.  
Exploitation Engineer  
Canadian Natural Resources Limited  
2100, 855 – 2<sup>nd</sup> St SW  
Calgary, AB T2P 4J8

Dear Mr. Hong:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL – AMENDMENT #1  
CNRL BIRCH A-85-H/94-A-13 (WA #7392)  
BIRCH FIELD – BLUESKY ‘A’ POOL**

The Regulator has reviewed the application submitted by Canadian Natural Resources Limited dated March 6<sup>th</sup>, 2024, requesting amendment to disposal approval Order 16-02-006 to elevate the maximum reservoir storage pressure.

The subject well was drilled and completed in the single well Birch Bluesky ‘A’ gas pool in 1991. The well produced 137 e<sup>6</sup>m<sup>3</sup> of gas from 1991 to 2011 when it was suspended. The well was approved for disposal on November 17<sup>th</sup>, 2016, and began disposal in February of 2017. To date, the well has disposed of 388 e<sup>3</sup>m<sup>3</sup> of produced water. The well was shut-in in May of 2023 due to a reservoir pressure measurement exceeding the approved maximum storage value, however a reservoir pressure test in March of 2024 demonstrated the reservoir pressure had fallen below that limit.

The Regulator concurs that the Birch Bluesky ‘A’ pool is in pressure communication with surrounding Bluesky pools, via a common bottom aquifer reservoir, and that the 5 MPa pressure utilized to calculate the maximum storage pressure was not the true virgin pressure due to offsetting depletion effects. The Bluesky formation in this area had an initial pressure of approximately 9.2 MPa, measured at several wells. Considering the disposal well is part of interconnected depleted pools with several legacy well completions, the maximum reservoir storage pressure shall be equal to the initial reservoir pressure.

Attached please find **Order 16-02-006 Amendment #1**, designating an area in the Birch field, Bluesky ‘A’ pool, as a Special Project under section 75 of the Energy Resource Activities Act, for the operation and use of a storage reservoir for the injection of produced water.

As noted in the original approval, the 2016 casing inspection log indicated significant penetration at 1,103mKB and the resulting requirement to submit an annual report of daily tubing and casing pressures remains, as per condition 2e). The 2023 report showed casing pressures building up to approximately 3.5 MPa when injection was ceased, possibly due to thermal effects. The operator should consider periodically bleeding off the pressure casing and should continue to closely monitor the casing pressure for signs of communication with the tubing. The Regulator notes that these reports were not received for previous calendar years. Further contravention of a condition of this Order may be subject to enforcement under section 62 of ERAA, or suspension or cancellation of the Order under section 75(2)(b).

Should you have any questions, please contact Logan Gray at (250) 419-4465 or the undersigned at (250) 419-4430.

Sincerely,



Ron Stefik, P.L.Eng.  
Supervisor, Reservoir Engineering  
Energy Regulator

Attachments



IN THE MATTER of the application from Canadian Natural Resources Limited to the Energy Regulator dated March 6<sup>th</sup>, 2024, requesting amendment to disposal approval:

**ORDER 16-02-006 Amendment #1**

1. Under Section 75(1)(d) of the *Energy Resources Activities Act*, the Regulator designates the operation and use of a storage reservoir for produced water, including flowback from fracturing operations, in the Birch Field – Bluesky 'A' pool as a special project in the following area:

NTS            94-A-13            Block H Unit 85

2. Under section 75(2) of the *Energy Resources 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 Birch a-85-H/94-A-13; WA# 7392 Bluesky from 1,128.0 – 1,139.0 mKB MD.
  - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 8,100 kPag or the pressure required to fracture the formation, whichever is lesser.
  - c) Inject only through tubing with a packer set as near as is practical above the injection interval.
  - d) Continually measure and record the wellhead casing and tubing pressures electronically.
  - e) By January 30<sup>th</sup> of each year, submit an annual report to Reservoir@bc-er.ca indicating daily average casing and tubing pressure of the previous calendar year.
  - f) Alarm the casing-tubing annulus pressure monitoring system to indicate when casing pressure varies outside the normal operating range.
  - g) Include the disposal operating hours and the maximum injection pressure value on the monthly Petrinex disposal report.
  - h) Cease injection and notify the Regulator at Reservoir@bc-er.ca immediately if there are any indications that hydraulic isolation is lost in the wellbore or formation.
  - i) Conduct and submit an annual Surface Casing Vent Flow test to the Regulator within 30 days of the completion of the test.
  - j) Conduct an annual reservoir pressure test on the formation in the subject well, with a shut-in period of sufficient length to provide data for calculation of the reservoir pressure, and submit a report of the test within 60 days of the end of the test.
  - k) Cease injection upon reaching a maximum formation pressure of 9,175 kPaa, measured at 1,133 mKB TVD.
  - l)
    - i) Perform a casing inspection log on the subject well and submit results to the Regulator within 30 days of the completion of logging, at an interval of not more than every 10 years, commencing from the date of initial disposal.
    - ii) Perform a hydraulic isolation temperature log on the subject well and submit results to the Regulator within 30 days of the completion of logging, at an interval of not more than every 5 years, commencing from the date of initial disposal.
  - m) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Regulator approval.

Ron Stefik, P.L.Eng.  
Supervisor, Reservoir Engineering  
Energy Regulator

DATED AT the City of Victoria, in the Province of British Columbia, this 2<sup>nd</sup> day of April 2024.



### **Advisory Guidance for Order 16-02-006 Amendment #1**

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion and frost inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required to be conducted and the associated report must be submitted to the Regulator within 30 days of test completion, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered and the injection pressure measured at the wellhead, as per section 74 of the Drilling and Production Regulation.
- IV. A monthly disposal statement must be submitted to the Regulator via Petrinex not later than the 20<sup>th</sup> day of the month following the reported month, as per section 75 of the Drilling and Production Regulation.
- V. Seismic events must be reported and disposal operations suspended as per section 21.1 of the Drilling and Production Regulation.