



August 24, 2017

0800-4100-32640-02

Lynn Wood, P.Eng.
Exploitation Engineer – BC South
Canadian Natural Resources Limited
2100, 855 – 2nd Street SW
Calgary AB, T2P 4J8

Dear Ms. Wood:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
CNRL BEG b-A79-I/94-B-16; WA# 10656
BEG FIELD – BALDONNEL FORMATION**

The Commission has reviewed the application from Canadian Natural Resources Limited, dated June 6, 2017, for produced water disposal into the subject well, Baldonnel formation.

The subject well was used for disposal into the Debolt formation between July 1999 and October 2016. A pressure test from October 2016 indicated that the Debolt formation had reached fill-up pressure, and disposal activity ceased. In January 2017, the Baldonnel formation was completed for disposal purpose. The well is in the water leg of the Beg Baldonnel 'A' gas pool, which has been producing gas since 1958. Since there is no gas pay, the subject well is not considered part of the pool. The initial pressure of the Baldonnel in the subject well is near the initial pressure of the Beg Baldonnel 'A' pool, indicating that pool is significantly compartmentalized. This may mean that there is limited capacity for disposal.

Attached please find **Order 17-02-013**, designating an area in the Beg field – Baldonnel formation as a Special Project under section 75 of the *Oil and Gas Activities Act*, for the operation and use of a storage reservoir for the disposal of produced water. This Order contains a number of detailed operational conditions including a maximum wellhead injection pressure, reservoir pressure fill-up limit, and continuous tubing and casing pressure monitoring. A maximum casing pressure limit is set as condition 2e), based on the reduced burst pressure at the most penetrated casing joint. **Order 98-02-004 for Debolt disposal is hereby terminated.** Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

For the inspection requirement of Order 17-02-013 condition 2m), please arrange via email to OGCPipelines.Facilities@bcogc.ca.

In certain circumstances, disposal well operation may induce seismicity of values that require modification of operations to mitigate.

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure

Should you have any questions, please contact Michelle Harding at (250) 419-4493 or the undersigned at (250) 419-4430.

Sincerely,


A handwritten signature in black ink, appearing to read 'R. Stefik', written over a horizontal line.

Ron Stefik, Eng.L.
Supervisor, Reservoir Engineering
Oil and Gas Commission

Attachment

ORDER 17-02-013

- 1 Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Commission designates the operation and use of a storage reservoir for the disposal of produced water, including flowback from fracturing operations, into the Baldonnel formation – Beg field as a special project in the following area:
NTS 94-B-16 Block I Unit 79
- 2 Under section 75(2) of the *Oil and Gas Activities Act*, the special project designation in this Order is subject to the following conditions. The Permit Holder shall:
 - a) Inject produced water only into the well CNRL Beg b-A79-I/94-B-16; WA# 10656 – Baldonnel formation (disposal perforations 1364.5 – 1392.4 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 9,180 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) Not allow the casing pressure to exceed 5,700 kPa.
 - f) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
 - g) Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test.
 - h) Include the disposal operating hours and the maximum injection pressure value on the monthly BC-S18 disposal statement.
 - i) 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.
 - j) Cease injection upon reaching a maximum formation pressure of 13,870 kPa, measured at 1378.5 mKB.
 - k)
 - i) Perform a casing inspection log on the subject well and submit results to the Commission within 30 days of the completion of logging, at an interval of not more than every 10 years.
 - ii) Perform a hydraulic isolation temperature log on the subject well and submit results to the Commission within 30 days of the completion of logging, at an interval of not more than every 5 years.
 - l) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.
 - m) Complete an inspection, satisfactory to the Commission, within 4 weeks of initial disposal operations under this Order.



Ron Stefik, Eng.L.
Supervisor, Reservoir Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 24th day of August, 2017.

Advisory Guidance for Order 17-02-013

- 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 submitted, 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 Commission not later than the 25th 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.