

December 7, 2017

7750-4800-32640-02

Christine Olivier P.Eng.
Exploitation Engineer BC South
Canadian Natural Resources Ltd.
2100, 855 – 2nd Street SW
Calgary, Alberta T2P 4J8

Dear Ms. Olivier,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
CNRL SEPTIMUS 15-34-81-19 W6M; WA# 19411
SEPTIMUS FIELD – HALFWAY “A” POOL**

The Commission has reviewed CNRL's application, dated October 27th, 2017, for produced water disposal into the subject well, Halfway formation. The well 15-34, rig released on September 9, 2005, was completed and tested in the Doig formation (now suspended) prior to completion for gas production from the Septimus field Halfway “A” pool. This gas pool has reached its economic limit with a total of 787,686 e³m³ of gas produced, 5 former producing wells, except the subject well, now all downhole suspended. On July 4, 2017, CNRL was approved for an extended injectivity test of 3,000 m³ into the Halfway zone of the subject well under Order 17-02-010, to determine disposal viability.

Attached please find **Order 17-02-010 Amendment #1**, designating an area in the Septimus field – Halfway “A” pool 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 continuous wellhead measurements, a maximum wellhead injection pressure, and an ultimate reservoir pressure limit. The maximum wellhead injection pressure is based on an average of Halfway fracture gradients for the area Halfway trend.

The well 15-34 is located in an area of elevated risk for induced seismicity. The Halfway has known faulting in the area. The maximum reservoir pressure is limited to the initial pool pressure of proven natural containment. Induced seismicity linked to disposal operation may require modification of operations or amendment to this Order.

For the inspection requirement of Order condition 2l), please arrange via email to OGCPipelines.Facilities@bcogc.ca.

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,



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

Attachment

ORDER 17-02-010 Amendment #1

- 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 Halfway 'A' pool – Septimus field as a special project in the following area:

DLS Twp 81 Rge 19 W6M Section 34 - Lsds 9, 10, 15 and 16

- 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:
- Inject produced water only into the well CNRL Septimus 15-34-81-19; WA# 19411 – Halfway 'A' pool (disposal perforations 1675.5 to 1678.5 mKB MD).
 - Not exceed an injection pressure, measured at the wellhead on the subject well, of 20,000 kPag or the pressure required to fracture the formation, whichever is lesser.
 - Inject only through tubing with a packer set as near as is practical above the injection interval.
 - Continually measure and record the wellhead casing and tubing pressures electronically.
 - Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
 - Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test.
 - Include the disposal operating hours and the maximum injection pressure value on the monthly BC-S18 disposal statement.
 - 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.
 - Cease injection upon reaching a maximum formation pressure of 15,900 kPaa, measured at 1673.9 mKB TVD.
 - 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, commencing from the date of initial disposal.
 - 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, commencing from the date of initial disposal.
 - Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.
 - Complete an inspection, satisfactory to the Commission, within 4 weeks of initial disposal operations.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 7th day of December, 2017.

Advisory Guidance for Order 17-02-010 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 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.