

March 28, 2018

7750-2800-32640-02

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

Dear Ms. Olivier,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL  
CNRL HZ SEPTIMUS H5-23-81-19 W6M; WA# 35457  
SEPTIMUS FIELD – CADOMIN FORMATION**

The Commission has reviewed CNRL's application, dated February 28<sup>th</sup>, 2018, for produced water disposal into the subject well, Cadomin formation. The subject well is a horizontal Cadomin well, drilled for disposal purpose in January 2018, and completed in February 2018. Wellbore integrity testing and resource evaluation shows that the well is suitable for disposal purpose.

Attached please find **Order 18-02-005**, designating an area near the Septimus field – in the Cadomin 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 continuous wellhead measurements, a maximum wellhead injection pressure, and an ultimate reservoir pressure limit. The MWHIP in condition 2b) is based on the highest fracture gradient the Commission deems suitable for the Cadomin formation, 28 kPa/m, calculated to the top of the open hole section using a fluid gradient of 11.2 kPa/m as provided in CNRL's application. Annual SCVF monitoring is required per condition 2g), to monitor the minor SCVF detected following the fracture stimulation of the well.

For the inspection requirement of Order condition 2m), please arrange via email to [OGCPipelines.Facilities@bcogc.ca](mailto:OGCPipelines.Facilities@bcogc.ca).

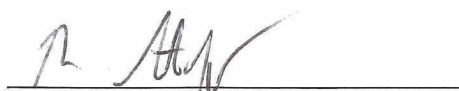
In certain circumstances, disposal well operation may induce seismicity of values that require modification of operations to mitigate.

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

This well is intended to replace disposal operations of wells CNRL Septimus A7-5-82-19 (WA 22061) and CNRL HZ Septimus B2-8-82-19 (WA 24196), which have been linked to induced seismicity. Please inform this office of the date these wells are shut-in.

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

Sincerely,



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

Attachment

ORDER 18-02-005

- 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 Cadomin formation – near the Septimus field as a special project in the following area:

DLS Twp 81 Rge 19 W6M Section 23 - Lsds 1, 2, 3, 4, 5, 6, 7 and 8

- 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 HZ Septimus H5-23-81-19; WA# 35457 – Cadomin formation (open hole from 1267.0 to 2539.0 mKB MD).
  - Not exceed an injection pressure, measured at the wellhead on the subject well, of 14,800 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.
  - Conduct and submit an annual Surface Casing Vent Flow test 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 12,320 kPaa, measured at 1066.6 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.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 28<sup>th</sup> day of March, 2018.

**Advisory Guidance for Order 18-02-005**

- 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 25<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.