



March 23, 2017

9045-7400-32640-02

Ramona Stoica
Encana Corporation
P.O. Box 2850, 500 Centre St SE
Calgary, AB, T2P 2S5

Dear Ms Stoica:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL, AMENDMENT #2
ECA KIWIGANA b-14-D/94-O-07; WA# 25862
HORN RIVER FIELD – DEBOLT FORMATION**

Approval for disposal of produced water, Order 11-02-005, was issued for the subject well, Debolt formation, on April 5, 2011. On March 9, 2012, Order 11-02-005 Amendment #2 was issued to raise maximum wellhead injection pressure based on the results of a step-rate test on a nearby Debolt well. The Commission is presently amending disposal well approvals to conform to current requirements.

The subject well has disposed 712,123 m³ of produced water into the Debolt formation since June 2012. A June 2016 reservoir pressure test indicates that the current pressure is at 113% of initial pressure.

Attached please find **Order 11-02-005 Amendment #2**, designating an area in the Horn River field – Debolt 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 tubing and casing pressure monitoring. The MWHIP has been decreased from the 2012 approval value based on a conservative calculation for prudent operation. The Debolt zone was initially over-pressured at a relatively shallow depth for disposal. Going forward, the well is to be used solely for the purpose of supporting continued declining production in the area, no new sources of disposal. The maximum reservoir pressure has been set to a conservative value based on the remaining disposal volumes forecasted to be required. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

In certain circumstances, disposal well operation may induce seismicity. The Commission advises that disposal well permit holders monitor seismic events in proximity to the well and be prepared to modify operations to mitigate induced seismicity. Permit holders may monitor seismic events through the Natural Resources Canada seismic monitoring network at <http://www.earthquakescanada.nrcan.gc.ca/recent/index-eng.php>

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 'Ron Stefik', written over a horizontal line.


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

Attachment



ORDER 11-02-005 Amendment #2

- 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 Debolt formation – Horn River field as a special project in the following area:
NTS 94-O-07 Block D Unit 14
- 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 ECA Kiwigana b-14-D/94-O-07; WA# 25862 – Debolt formation (perforations from 427.0 – 621.0 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 6,410 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) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
 - f) Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test.
 - g) Include the disposal operating hours and the maximum injection pressure value on the monthly BC-S18 disposal statement.
 - h) Conduct an annual reservoir pressure test on the formation in the subject well using bottom-hole recorders, 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.
 - i) Cease injection upon reaching a maximum formation pressure of 6,600 kPaa, measured at 524 mKB
 - j)
 - 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, commencing from the date of initial disposal.
 - 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.
 - k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 23rd day of March, 2017.



ORDER 11-02-005 Amendment #2

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Advisory Guidance for Order 11-02-005 Amendment #2

- 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.