

January 4, 2018

8157-2800-32640-02

Deb Gogol, P.Tech (Eng.)
Sr. Engineering Technologist
Encana Corporation
500 Centre Street SE, PO Box 2850
Calgary, Alberta T2P 2S5

Dear Ms. Gogol,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
ECA HZ TOWER A16-6-81-17 W6M; WA# 32483
TOWER LAKE FIELD – CADOMIN FORMATION**

Commission staff have reviewed the application from Encana Services Company Ltd, on behalf of Encana Corporation, dated November 24th, 2017, for produced water disposal into the subject well, Cadomin formation. Approval was previously granted on December 13, 2017 for an extended injectivity test of 5,000 m³ under Order 17-02-017.

The subject well was horizontally completed in the Cadomin formation for disposal purpose. The wellbore integrity testing and temperature logging show good quality casing and cement and no indication of fluid storage outside of the Cadomin zone.

Attached please find **Order 17-02-017 Amendment #1**, designating an area in the Tower Lake field, 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 a reservoir pressure fill-up limit, and continuous tubing and casing pressure monitoring. The maximum wellhead injection pressure specified in condition 2b) is based on a proposed disposal fluid gradient of 11.69 kPa/m, as corroborated by a fluid sample included in the application. A non-serious SCVF has been identified on the subject well, so annual SCVF testing is required under condition 2g) to monitor. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

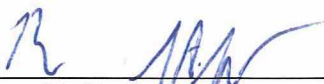
For the inspection requirement of Order 17-02-017 Amendment #1 condition 2m), please arrange via email to OGCPipelines.Facilities@bcogc.ca.

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 Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachment



ORDER 17-02-017 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 Cadomin formation – Tower Lake field as a special project in the following area:
DLS Twp 81 Rge 17 W6M Section 5 – Lsds 3, 4, 5, 6, 11, 12, 13 and 14
DLS Twp 81 Rge 17 W6M Section 6 – 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:
 - a) Inject produced water only into the well ECA HZ Tower A16-6-81-17; WA# 32483 – Cadomin formation (open hole from 1548.0 – 2548.0 mKB MD).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 17,870 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) Conduct and submit an annual Surface Casing Vent Flow test 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 13,510 kPaa, measured at 1317.4 mKB TVD.
 - 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 4th day of January, 2018.



ORDER 17-02-017 Amendment #1

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Advisory Guidance for Order 17-02-017 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.