



December 11, 2017

8157-2600-32640-02

Trevor Befus
Environment and Regulatory Planner
Catapult Environmental Inc.
Suite 1620, 700 – 9th Ave S.W.
Calgary, AB T2P 3V4

Dear Mr. Befus,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
CATAPULT TOWER 9-28-81-17; WA# 20897
TOWER LAKE FIELD – BLUESKY FORMATION**

The Commission has reviewed Catapult's application, dated October 12th, 2017, for produced water disposal into the subject well, Bluesky formation. The subject well was originally drilled down to Golata formation depth in 2006, and produced out of the Kiskatinaw and Halfway formations from 2007 to 2014. In July 2017, all other zones within the well were abandoned and the Bluesky formation was completed for disposal purpose. Cement and casing integrity logging, as well as temperature logging, show that disposal fluids will be isolated to the Bluesky formation and the proposed wellbore is suitable for disposal purpose.

Attached please find **Order 17-02-016**, designating an area in the Tower Lake field – Bluesky 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 (MWHIP), requirement for continuous tubing and casing pressure monitoring, and an ultimate reservoir pressure limit. The MWHIP set in condition 2b) is based on a conservative fracture gradient considering Bluesky step-rate and mini-frac gradients in the area, including the DFIT ISIP from an August 10th, 2017 DFIT on nearby well WA 20155 (Catapult Tower 13-26-81-17). The MWHIP calculation also utilizes a fluid gradient of 11 kPa/m, considered to be representative of disposal fluids based on the provided water sample.

For the inspection requirement of Order condition 2l), 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,

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 17-02-016

- 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 Bluesky formation – Tower Lake field as a special project in the following area:
DLS Twp 81 Rge 17 W6M Section 28 - 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 Catapult Tower 9-28-81-17; WA# 20897 – Bluesky formation (disposal perforations 1013.0 to 1022.0 mKB MD).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 10,885 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, 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 9,560 kPaa, measured at 1017.3 mKB TVD.
 - 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, commencing from the date of initial disposal.
 - k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.
 - l) 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 11th day of December, 2017.

Advisory Guidance for Order 17-02-016

- 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.