

June 7, 2019

0320-4100-32640-02

Hugo Martinez, P. Eng.  
Sr. Reservoir Engineer  
Canbriam Energy Inc.  
2100, 215 – 2<sup>nd</sup> Street SW  
Calgary AB T2P 1M4

Dear Mr. Martinez:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT  
CANBRIAM HZ ALTARES c-7-H/94-B-8 (WA #31016)  
ALTARES FIELD - BALDONNEL FORMATION**

Oil and Gas Commission staff have reviewed the application, dated May 2<sup>nd</sup>, 2019 requesting approval to dispose of produced water into the Baldonnel formation of the subject well. The horizontal well was purpose-drilled for disposal in January 2019.

Attached please find **Order 19-02-009**, designating an area in the Altares field – Baldonnel 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 includes a number of detailed operational conditions including: continuous tubing and casing pressure measurements, a maximum wellhead injection pressure, an ultimate reservoir pressure limit, as well as wellbore integrity monitoring and reporting requirements. Disposal wells are subject to regular field inspection and audit. Contravention of a condition of this Order may be subject to enforcement under section 62 of OGAA, or suspension or cancellation of the Order under section 75(2)(b).

Order condition 2i) sets the pressure testing frequency to twice every calendar year, with no less than four months between tests. This is based on the performance of the nearby Baldonnel water disposal wells Canbriam Altares B15-1-85-26 (WA# 27473) and Canbriam Altares d-76-H/94-B-8 (WA# 31916), where moderate injected volumes resulted in significant increases in reservoir pressure.

A portion of the open hole, horizontal section of the wellbore collapsed during completion operations. A drilling rig re-established some of the horizontal section of the wellbore and installed a slotted liner to a depth of 2747 mKB MD. The remaining portion of the horizontal section was left as is, and is assumed to be partially or fully collapsed.

Order condition 2a) permits injection in the entire lateral length of the wellbore, including the section that is presumed collapsed, as the actual length available for fluid flow is indeterminate.

As per Order conditions 2j) and k), continuous seismic monitoring is required; to monitor for potential reservoir pressure response, and provide information should seismic events occur. Seismic events of concern attributed to this well may result in an amendment to this Order to alter disposal operations, or cancellation of this Order.

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure. It is the responsibility of the permit holder make adjustments to wellhead injection pressure.

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

Should you have any questions, please contact Kathryn Archibald at (250) 419-4406 or Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachments



## ORDER 19-02-009

- 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 disposal of produced water, including flowback from fracturing operations, into the Baldonnel formation – Altares field as a special project in the following area:  
NTS 94-B-08 Block H Units 7, 18, 19, 29, and 30
- 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, including well flowback completion fluids only into the horizontal well Canbriam HZ Altares c-7-H/94-B-8; WA# 31016 –Baldonnel formation (1918.0 to 3904.0 mKB MD).
  - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 14,850 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 in Petrinex.
  - i) Conduct two reservoir pressure tests, separated by at least four months, on the formation in the subject well every calendar year commencing from the date of initial disposal, 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) Continually observe and record seismic events within a 5 km radius of the well Canbriam HZ Altares c-7-H/94-B-8; WA# 31016, using a monitoring program that:
    - i) is capable of real-time monitoring;
    - ii) has a magnitude detection of 1.5Mw and greater;
    - iii) has hypocenter accuracy to within  $\pm 500$  meters;
  - k) Before commencing disposal operations, install and fully activate an accelerometer within 1 km of the wellsite able to record three components of ground acceleration with a minimum detectability of 0.005g and a dynamic range of  $\pm 2g$ .
  - l) Report the results of seismicity monitoring in Item j) and k), including date, time, location, magnitude, ground acceleration and depth of seismic events, to the Oil and Gas Commission (Commission) via email to Reservoir@bcogc.ca, at 1 month intervals, commencing one month from the date that disposal begins, or upon request.
  - m) Cease injection upon reaching a maximum formation pressure of 20,000 kPaa measured at 1726.4 mKB TVD.
  - n) 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 injection.



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- 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 injection.
- o) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.
- p) Complete an inspection, satisfactory to the Commission, within 4 weeks of initial disposal operations.

A handwritten signature in blue ink, appearing to read 'R. Stefik', written over a horizontal line.

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

DATED AT the City of Victoria, in the Province of British Columbia, this 7<sup>th</sup> day of June, 2019.

Advisory Guidance for Order 19-02-009

- 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 via Petrinex not later than the 20<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.