

June 26, 2020

0320-4800-32640-02

Hugo Martinez, P. Eng.
Senior Reservoir Engineer
Pacific Canbriam Energy Inc.
2100 – 215 2nd street SW
Calgary, AB T2P 1M4

Dear Mr. Martinez:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT
PACIFIC CANBRIAM HZ ALTARES d-A44-H/94-B-8 (WA #24348)
ALTARES FIELD – HALFWAY 'B' POOL**

The subject well was drilled horizontally into the Halfway 'B' pool in September of 2008, with cumulative gas production of 68.9 e⁶m³ between December 2010 and May 2016. All wells in the pool were shut-in due to depleted economic reserves in May of 2016. In March of 2020, the well d-A44-H was injection tested by Pacific Canbriam and found suitable for disposal operations.

Attached please find **Order 20-02-006**, designating an area in the Altares field – Halfway 'B' pool 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. The Commission is in agreement that this zone correlates as the Artex, however for well and pool administration and records the pool will continue to be designated as the Halfway 'B'. 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 2g) requires monitoring of the casing pressure to ensure it remains below the burst pressure, which is reduced due to the 50% penetration at 1,884.5 mKB MD shown in the casing inspection log. This is also the reason for the increased frequency of casing inspection logs as per condition 2m)i).

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. Should seismic events of concern be attributed to this well, an amendment to this Order to alter disposal operations, or cancellation of this Order may occur.

For the inspection requirement of Order condition 2n), please arrange via email to OGCPipelines.Facilities@bcogc.ca.

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.

Should you have any questions, please contact Logan Gray at (250) 419-4465 or Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachment

ORDER 20-02-006

- 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, in the Altares field – Halfway ‘B’ pool as a special project in the following area:

NTS 94-B-8 Block H Unit 54, 64, and 74
- 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 water into the well Pacific Canbriam HZ Altares d-A44-H/94-B-8; WA# 243248 Halfway ‘B’ pool from 1,953.0 – 4,074.0 mKB MD.
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 12,650 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) Include the disposal operating hours and the maximum injection pressure value on the monthly Petrinex disposal report.
 - f) Cease injection and notify the Commission at Reservoir@bcogc.ca immediately if there are any indications that hydraulic isolation is lost in the wellbore or formation.
 - g) The SCADA for this well must be set to alarm if the casing pressure exceeds 10 MPa. Cease injection and notify the Commission at Reservoir@bcogc.ca immediately if this occurs.
 - h) Conduct and submit an annual Surface Casing Vent Flow test to the Commission within 30 days of the completion of the test.
 - 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) Continually observe and record seismic events within a 5 km radius of the well Pacific Canbriam HZ Altares d-A44-H/94-B-8; WA# 243248, 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 ± 500 meters;
 - k) Before commencing disposal operations, install and fully activate an accelerometer within 3 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) Cease injection upon reaching a maximum formation pressure of 19,075 kPaa, measured at 1,822.0 mKB TVD.

- m) 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 5 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.
- n) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.
- o) 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 26th day of June 2020.

Advisory Guidance for Order 20-02-006

- 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 conducted and the associated report must be submitted to the Commission within 30 days of test completion, 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 20th 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.