



March 2, 2015

1400-7400-32640-02

Mark Staples  
Production Engineer  
Bonavista Energy Corporation  
1500, 525 – 8<sup>th</sup> Avenue SW  
Calgary AB T2P 1G1

Dear Mr. Staples:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT  
BONAVISTA BLUEBERRY d-50-C/94-A-13; (WA #25712)  
BLUEBERRY FIELD - DEBOLT "I" POOL**

Oil and Gas Commission staff have reviewed your application, dated December 10, 2014 requesting approval to dispose of produced water into the Debolt formation of the subject well.

This deviated well was drilled and dual completed for gas in the Debolt and Montney formations in January 2010. The Montney produced for 1 month while the Debolt continued to produce for 8 months but was then shut-in due to high water-gas ratio. Completion of the Doig formation did not result in commercial rates. The other well in the two-well Blueberry field Debolt "I" pool, Bonavista Blueberry c-60-C/94-A-13 (WA #26513), with cumulative production of 57.8 e<sup>6</sup>m<sup>3</sup>, continues to produce at approximately 12 e<sup>3</sup>m<sup>3</sup>/d, however with a recent dramatic rise in reported WGR.

In August of 2014, upon request from Bonavista Energy Corporation, the subject well d-50-C was reviewed by the Commission for potential disposal service and was considered suitable, provided Bonavista could confirm wellbore integrity and injectivity capacity. An injectivity test, cement log, temperature log and casing inspection log were completed and have been submitted with the final application.

The injection test was conducted to a rate of 1,656 m<sup>3</sup>/d and wellhead pressure of 6,700 kPa. However, the pumps on site could not achieve a high enough rate to determine the formation fracture gradient. The tested rate far exceeds Bonavista's proposed disposal operations. Formation fracture values from area wells were used to determine the maximum wellhead injection pressure for this well. A minor surface casing vent flow is noted on this well and will require annual testing and reporting.

The subject well is structurally down-dip of the pool production well, which has already recovered ~40% of the OGIP. Disposal is not anticipated to negatively impact gas recovery and will benefit area pool production economics with proximal water disposal.

Attached please find Order 15-02-003, designating an area in the Blueberry 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 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

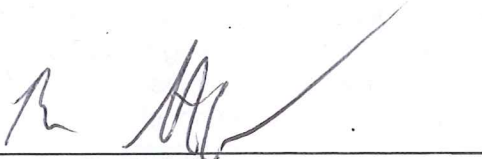
may be subject to enforcement under section 62 of OGAA, or suspension or cancellation of the Order under section 75(2)(b).

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>

Monthly reporting requirement instructions are posted at <http://www.bcogc.ca/node/11152/download>. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

Should you have any questions, please contact Michelle Gaucher at (250) 419-4482 or Ron Stefik at (250) 419-4430.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ron Stefik', is written over a horizontal line.

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

ORDER 15-02-003

- 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 salt water into the Debolt formation – Blueberry field as a special project in the following area:

NTS      94-A-13      Block - C      Unit - 50.

- 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 well Bonavista Blueberry d-50-C/94-A-13; WA 25712 – Debolt formation (2200.0 to 2205.0 mKB MD).
  - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 16,300 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 a reservoir pressure test on the formation in the subject well annually, 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 20,200 kPaa.
  - 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 injection.  
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.
  - k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.

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

DATED AT the City of Victoria, in the Province of British Columbia, this 2<sup>nd</sup> day of March, 2015.

## Advisory Guidance for Order 15-02-003

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered, 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 25<sup>th</sup> day of the month following the reported month, as per section 75 of the Drilling and Production Regulation.