



October 31, 2016

6400-4100-32640-02

Mark Staples  
Production Engineer  
Bonavista Energy Corporation  
1500, 525 8<sup>th</sup> Avenue S.W.  
Calgary, Alberta T2P 1G1

Dear Mr Staples,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL  
BONAVISTA ET AL NIG c-19-G/94-H-4; WA# 10696  
NIG CREEK FIELD – BALDONNEL FORMATION**

The Commission has reviewed Bonavista's application, received October 5, 2016, for produced water disposal into the subject well, Baldonnel formation. The subject well was initially completed in 1998 in the Doig, Halfway, Coplin, Baldonnel, and Bluesky formations, but was unsuccessful for gas in any formation. Bonavista's nearby active disposal well Bonavista Nig a-31-F/94-H-4 (WA 294) has been disposing into the Baldonnel formation since April 1969, and has surpassed formation fill-up. The Baldonnel formation in the subject well was deemed suitable as a replacement for WA 294. Tests provided in support of the application indicate good hydraulic isolation and a reservoir pressure below initial Nig Creek Baldonnel 'A' pool pressure.

Attached please find **Order 16-02-005**, designating an area in the Nig Creek 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 contains a number of detailed operational conditions, including continuous wellhead measurements, a maximum wellhead injection pressure, and an ultimate reservoir pressure limit. The casing inspection logging performed in September 2016 indicates a few casing joints with ~50% penetration. Condition 2c) of the attached Order requires that this be taken into consideration during operations and segregation testing. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

In certain circumstances, disposal well operation may induce seismicity. 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>

Should you have any questions, please contact Michelle Harding at (250) 419-4493 or the undersigned at (250) 419-4430.

Sincerely,

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

Attachment

ORDER 16-02-005

- 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 Baldonnel formation – Nig Creek field as a special project in the following area:  
NTS 94-H-04 Block G Unit 19
- 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 Bonavista et al Nig c-19-G/94-H-4; WA# 10696 – Baldonnel formation (disposal perforations 1296.5 – 1328.0 mKB).
  - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 6,640 kPag or the pressure required to fracture the formation, whichever is lesser.
  - c) During operations or segregation testing, ensure that the casing pressure does not exceed the reduced burst pressure of the casing joints with the highest metal loss.
  - d) Inject only through tubing with a packer set as near as is practical above the injection interval.
  - e) Continually measure and record the wellhead casing and tubing pressures electronically.
  - f) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
  - g) Submit the annual packer isolation test report 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 1312.25 mKB.
  - 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, 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.
  - l) 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 31<sup>st</sup> day of October, 2016.

Advisory Guidance for Order 16-02-005

- 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 25<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.