



May 26, 2014

9045-7400-32640-02

Darryl Mekechuk, P.Eng
Exploitation Engineer, Horn River Basin
Nexen Energy ULC
Calgary, AB T2P 3M9

Dear Mr. Mekechuk,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT AMENDMENT #1
NEXEN ENERGY TSEA c-A016-I/094-O-08; WA# 27360
DEBOLT FORMATION**

Oil and Gas Commission staff have reviewed the application, dated April 30, 2014, requesting amendment of the approval to dispose of produced water into the Debolt formation of the subject well, granted August 31, 2012.

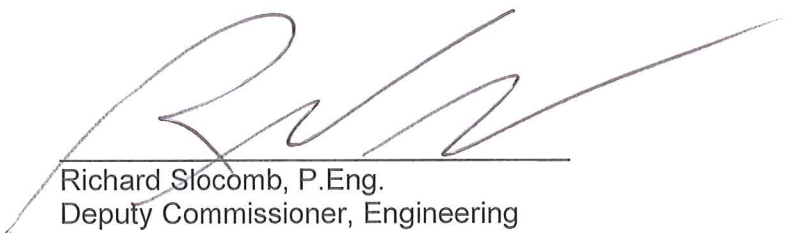
The subject well, rig released March 17, 2012, was drilled for the purpose of a water source well. In July 2012, Nexen applied to use this well as a produced water disposal well. Injectivity testing on the neighboring Debolt disposal well b-16-I/945-O-8 (WA#25113) indicated the Debolt would accept the required disposal volume of 2500 m³/d on vacuum. Therefore a conservative maximum wellhead injection pressure value of 1,000 kPa was approved.

When disposal operations began in April 2014, the expected rates and pressures were not achievable. Further analysis indicated drill cuttings may be plugging some of the perforations. An acid wash is planned to improve injectivity. As well, an amended maximum wellhead pressure has been approved based on the maximum pressure tested during the injectivity data on the neighboring b-16-I.

Attached please find **Order 12-02-022 Amendment #1** designating an area in the Tsea field – Debolt formation as a Special Project under section 75 of the *Oil and Gas Activities Act* (OGAA), for use of a storage reservoir for the disposal of produced water, including well stimulation flowback fluid. This Order includes a number of detailed operational conditions, including: maximum wellhead injection pressure, ultimate reservoir pressure limit, wellbore integrity testing and reporting requirements. Additional general information regarding disposal wells is available on the Commission's website at <http://bcogc.ca/node/5997/download>.

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

Sincerely,



Richard Slócomb, P.Eng.
Deputy Commissioner, Engineering
Oil and Gas Commission

Attachment

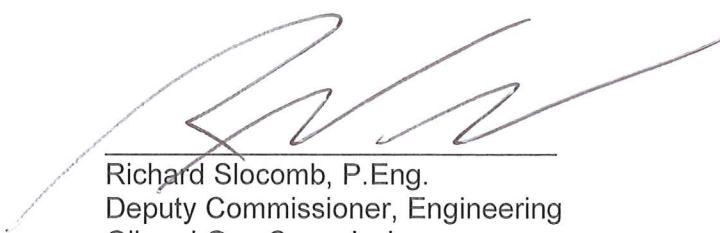
IN THE MATTER of the application from Nexen Inc., to the Oil and Gas Commission (Commission) dated April 30, 2014 for the operation and use of a storage reservoir.

ORDER 12-02-022 Amendment #1

- 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 salt water and flowback from fracturing operations into the Debolt formation – Tsea field as a special project in the following area:

NTS 94-O-08 Block I Unit 16, 17, 26, 27.

- 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 NEXEN ENERGY TSEA c-A016-I/094-O-08; WA# 27360 Debolt formation (open hole 632 – 719 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 3,400 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.
 - 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 values on the monthly disposal statement.
 - h) Conduct an annual reservoir pressure test on the formations 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 5,575 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 disposal.
ii) Perform a hydraulic isolation 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.



Richard Slocomb, P.Eng.
Deputy Commissioner, Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 27th day of May 2014.

Advisory Guidance for Order 12-02-022

- 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 25th day of the month following the reported month, as per section 75 of the Drilling and Production Regulation.