

December 9, 2014

2000-2800-32640-02

Scott Hagen  
Tervita Corporation  
500, 140 – 10<sup>th</sup> Avenue SE  
Calgary, AB T2G 0R1

Dear Mr. Hagen:

**RE: PRODUCED WATER AND NON-HAZARDOUS WASTE DISPOSAL  
SPECIAL PROJECT APPROVAL; AMENDMENT #1  
TERVITA BOUNDARY A16-13-84-14 W6M; WA# 9929  
BOUNDARY LAKE FIELD – CADOMIN FORMATION**

Oil and Gas Commission staff have reviewed the letter and supplemental information, dated November 28<sup>th</sup>, 2014, requesting an amendment to Order 14-02-010 to increase the maximum wellhead injection pressure from 10,530 kPag to 15,000 kPag.

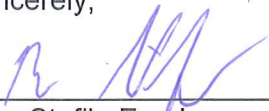
Approval was granted October 10, 2014 for disposal of produced water and non-hazardous waste into the Cadomin formation of the subject well under Order 14-02-010. This order included a wellhead injection pressure limit of 10,530 kPag, based on the ISIP frac gradient of 21.2 kPa/m found from a mini-frac test on the well. In October 2014 Tervita requested and was granted approval for a temporary increase in wellhead injection pressure to 15,700 kPag, based on a FG of 26 kPa/m as approved for disposal in Tervita's offsetting well B6-26-84-14 (WA 30410). The results of this test indicated that temporary injection at a higher pressure initiated greater reservoir contact beyond near wellbore damage. In the attached Order 14-02-010 Amendment #1, condition 2c) limits the maximum WHIP to 14,320 kPag. This value, based on a review of Cadomin disposal well fracture gradients, weights both near wellbore tests and trend average values.

Attached please find **Order 14-02-010 Amendment #1**, designating an area in the Boundary Lake field – Cadomin 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 and non-hazardous fluid. This Order includes a number of detailed operational conditions. 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 14-02-010 Amendment #1**

1. Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Oil and Gas Commission (Commission) designates the operation and use of a storage reservoir for the disposal of produced water, including flowback from fracturing operations, and non-hazardous waste into the Cadomin formation – Boundary Lake field as a special project in the following area:

DLS Twp 84 Rge 14 W6M Section 13 - Lsds 9, 10, 15 and 16.

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 and non-hazardous waste only into the well Tervita Boundary A16-13-84-14 W6M; WA# 9929 Cadomin formation perforations 1207.7 to 1222.7 mKB.
  - b) Hold a valid Permit under the Environmental Management Act for the disposal of non-hazardous waste.
  - c) Not exceed an injection pressure, measured at the wellhead on the subject well, of 14,320 kPag or the pressure required to fracture the formation, whichever is lesser.
  - 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.
  - 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) Cease injection upon reaching a maximum formation pressure of 12,580 kPaa.
  - j) 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.
  - k) i) Perform a casing inspection log to plug back depth 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 an annual hydraulic isolation log on the subject well to plug back depth and submit results to the Commission within 30 days of the completion of logging.
  - 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 9<sup>th</sup> day of December 2014.

Advisory Guidance for Order 14-02-010 Amendment #1

- I. A production packer must be set above the injection interval and the space between the tubing and casing (including the space between the 3 packers) 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.