



March 22, 2018

1600-7400-32640-02

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

Dear Mr. Longshore,

**RE: NON-HAZARDOUS WASTE AND PRODUCED WATER DISPOSAL  
SPECIAL PROJECT; AMENDMENT #2  
TERVITA E BLUEBERRY d-A96-K/94-A-12; WA# 27939  
BLUEBERRY EAST FIELD - DEBOLT FORMATION**

Approval for disposal of non-hazardous waste and produced water was issued for the subject well, Debolt formation, on May 24, 2012 and was amended March 10, 2015, increasing the maximum reservoir pressure limit. Disposal operations at this site have consistently been within the Order limits, with a total disposal volume of 798,950 m<sup>3</sup> in five and a half years.

Seismic events can occur as a result of disposal operations if fault orientation and rock stresses are favorable for movement. Recent seismic events near the subject well may be due to disposal activities. Installation of a near-field seismometer array and site accelerometer is required to accurately locate event hypocenters and frequency, enabling study of the seismicity cause and potential mitigations. This Order amendment establishes the measurement and reporting criteria for seismic monitoring. Guidance for ground motion monitoring can be found here: <https://www.bcogc.ca/node/13256/download>

Attached please find **Order 12-02-009 Amendment #2** designating an area in the Blueberry East field – Debolt formation as a Special Project under section 75 of the *Oil and Gas Activities Act*, for the use of a storage reservoir for the disposal of non-hazardous waste and produced water. The Commission must verify the detection capability of the seismic array that is required in this Order. When Tervita has finalized the seismometer types and locations, submit the array design by email to [Ron.Stefik@bcogc.ca](mailto:Ron.Stefik@bcogc.ca).

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

Sincerely,

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

Attachment




## ORDER 12-02-009 Amendment #2

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 Debolt formation – Blueberry East field as a special project in the following area:

NTS 94-A-12 Block K Unit 96

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 E Blueberry d-A96-K/94-A-12; WA# 27939 Debolt formation perforations 2179 to 2203 mKB MD.
  - 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 18,500 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 electronically.
  - f) Before April 30, 2018, install and fully activate a monitoring program to observe and record seismic events within a 5 km radius of the well Tervita E Blueberry d-A86-K/94-A-12; WA #27939, that:
    - i. is capable of real-time monitoring;
    - ii. has a magnitude detection of 2.5Mw and greater;
    - iii. has hypocenter accuracy to within  $\pm 500$  metres;
  - g) Before April 30, 2018, install and fully activate an accelerometer within 1 km of the wellsite able to record three components of ground acceleration with a minimum detectability of 0.8%g and a dynamic range of  $\pm 2g$ . For each event of 0.008g and above or felt event, the SEED file containing instrument response and waveform from 30 seconds before the observed event and 60 seconds after must be submitted.
  - h) Report the results of seismicity monitoring in items f) and g), including date, time, location, magnitude, ground acceleration and depth of seismic events, to the Oil and Gas Commission (Commission) via email to [Ron.Stefik@bcogc.ca](mailto:Ron.Stefik@bcogc.ca) and [Jeff.Johnson@bcogc.ca](mailto:Jeff.Johnson@bcogc.ca), at 1 month intervals, commencing one month from the date that monitoring begins, or upon request.
  - i) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
  - j) Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test.
  - k) Include the disposal operating hours and the maximum injection pressure value on the monthly BC-S18 disposal statement.

- l) Cease injection upon reaching a maximum formation pressure of 22,860 kPaa.
- m) 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.
- n) 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 injection.
- o) 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 <sup>22<sup>nd</sup></sup> day of March, 2018.

**Advisory Guidance for Order 12-02-009 Amendment #2**

- 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.