



October 16, 2017

8157-2800-32640-02

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

Dear Mr. Longshore:

**RE: NON-HAZARDOUS WASTE AND PRODUCED WATER DISPOSAL
SPECIAL PROJECT; AMENDMENT #1
TERVITA TOWER A08-31-81-17 W6M; WA# 30428
TOWER LAKE FIELD – CADOMIN FORMATION**

Oil and Gas Commission staff have reviewed Tervita's application submission, dated October 13, 2017, requesting an amendment to the current disposal approval in order to accommodate a new whipstock completion in the subject well.

The subject well was drilled into the Cadomin in September 2014 for disposal potential, and was approved for non-hazardous waste and produced water disposal into the Cadomin formation on November 21, 2014. Disposal occurred between January and November 2015. An obstruction in the casing just below the base of the first perforation interval was impacting disposal deliverability. In order to improve injectivity, Tervita drilled a new leg of the well in September 2017, also into the Cadomin zone. As determined in communication between the OGC and Tervita, both legs are allowed to be open in the wellbore since both are into the zone approved for disposal. Reservoir pressure testing, hydraulic isolation logging, and the directional survey have been examined to ensure disposal fluid will continue to be contained within the Cadomin formation.

Attached please find Order **14-02-012 Amendment #1**, designating an area in the Tower 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 makes a number of changes to Order 14-02-012, as follows. The perforation interval in condition 2a) captures the top and bottom of perforations from both the original and new Cadomin completion events, to cover off if disposal occurs into one or both legs. The maximum formation pressure in condition 2j) has been calculated to the new MPP depth of the second leg, as this is how the data will be captured in OGC systems.

In certain circumstances, disposal well operation may induce seismicity of values that require modification of operations to mitigate.

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure

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

Sincerely,

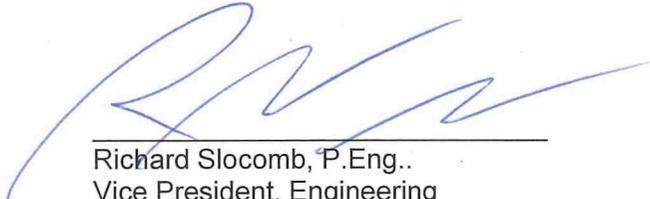
Richard Slocomb, P.Eng.
Vice President, Engineering
Oil and Gas Commission

Attachment



ORDER 14-02-012 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 water, including flowback from fracturing operations, into the Cadomin formation – Tower Lake field as a special project in the following area:
DLS Twp 81 Rge 17 W6M Section 31 - Lsds 1, 2, 7, 8, 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 only into the well Tervita Tower A8-31-81-17; WA# 30428 – Cadomin formation (disposal perforations 1283.0 to 1351.6 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 17,070 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) 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 12,680 kPaa, measured at 1181.9 mKB TVD.
 - 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.
 - l) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.



Richard Slocomb, P.Eng.,
Vice President, Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 16th day of October, 2017.

Advisory Guidance for Order 14-02-012 Amendment #1

- 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 25th 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.