

October 10, 2014

2000-2800-32640-02

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

Dear Mr. Hagen:

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

Oil and Gas Commission staff have reviewed the application, dated July 14th, 2014, requesting approval to dispose of produced water and non-hazardous fluids into the Boundary Lake field Cadomin formation via the subject well.

The well A16-13-84-14 was drilled in December 1996, producing from March 1998 to October 2000 from the Lower Kiskatinaw “A” pool until shut-in due to high water cut. In November of 2003 the well was abandoned at surface. Tervita re-entered the well in September 2007, completing the well as a non-hazardous waste disposal well in the Baldonnell formation. In 2011/12 Tervita experienced an operational challenge at this well resulting in replacement of the intermediate liner, cementing the new liner to surface. Disposal continued into the Baldonnell formation until July 2013 with a cumulative volume of 349,233 m³. It is apparent that the Baldonnell formation came into communication with the Boundary Lake formation below. The Order for disposal into the Baldonnell formation was terminated March 26, 2014, with the zone abandoned in April 2014.

Wellbore integrity has been examined to verify disposal fluid containment during operation and following eventual abandonment, with attention to casing damage detected in the section 1154.2-1160.5 meters, buckling and logging detection of potential metal loss. This section of the wellbore is above the Cadomin packer and has passed the required casing pressure test, with a temperature log showing test injection fluid placement within the objective zone. Specific approval conditions, for monitoring and testing and operational limits to ensure ongoing safe and contained disposal into the formation, are included in the attached Order.

Attached please find Order 14-02-010, 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 including: continuous wellhead measurements, a maximum wellhead injection pressure, ultimate reservoir pressure limit, as well as wellbore integrity monitoring and reporting requirements. Disposal wells are subject to regular field inspection and audit. Contravention of a condition of this Order may be subject to enforcement under section 62 of OGAA, or suspension or cancellation of the Order under section 75(2)(b).

Monthly reporting requirement instructions are posted at <http://www.bcogc.ca/node/11152/download>. 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 Petra Kriescher-Trudgeon at (250) 419-4415 or Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachment

ORDER 14-02-010

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 10,530 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

Advisory Guidance for Order 14-02-010

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



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

DATED AT the City of Victoria, in the Province of British Columbia, this 10th day of
October 2014.