



June 22, 2016

7740-8600-32640-02

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

Dear Mr. Hagen,

**RE: NON-HAZARDOUS WASTE AND PRODUCED WATER DISPOSAL
SPECIAL PROJECT APPROVAL; AMENDMENT #2
TERVITA ET AL SAHTANEH b-90-I/94-I-12; WA# 13925
SAHTANEH FIELD – PINE POINT FORMATION**

Approval for produced water disposal into the Pine Point formation of the subject well was issued June 8, 2004, as Order 04-02-008. Amendment #1, issued December 16, 2011, included the disposal of non-hazardous waste. The Commission is presently amending disposal well approvals to conform to current requirements.

Disposal operations commenced in 2004, and a cumulative volume of 955,500 m³ of fluids have been disposed to date. Disposal has consistently operated at very low wellhead pressures, and reservoir pressure has not increased significantly above initial pressure, indicating a large regional reservoir for disposal. In August 2014 a leak was located in the 177.8mm casing and a new 127mm casing string was cemented in place to repair.

Attached please find **Order 04-02-008 Amendment #2**, designating an area in the Sahtaneh field – Pine Point 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. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

The Ministry of Environment identifies the type of effluent approved for injection in the separate Waste Discharge Permit, granted under the Environmental Management Act.

Note that the MWHIP has been reduced, based on a more conservative fracture gradient value than originally utilized. Monitoring of injection pressure may indicate a change of either well or reservoir performance. Casing inspection logging will monitor the condition of the repair string. As the tubing packer is located over 350m above the injection zone, a bi-annual hydraulic isolation log is required to ensure the condition of casing and cement between the packer and the top of the open hole section.

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 04-02-008 Amendment #2

- 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 non-hazardous waste as well as produced water, including flowback from fracturing operations, into the Pine Point formation – Sahtaneh field as a special project in the following area:

NTS 94-I-12 Block I Unit 90

- 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 non-hazardous waste and produced water only into the well Tervita et al Sahtaneh b-90-I/94-I-12; WA# 13925 Pine Point formation (open hole from 2195 – 2285mKB 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 4,620 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 values on the monthly disposal statement.
 - i) Cease injection upon reaching a maximum formation pressure of 22,665 kPaa.
 - j) Maintain and manage the well head to prevent surface liquids from entering the well bore through the annulus outside or between casing and conductor strings.
 - k) Conduct a reservoir pressure test on the formation in the subject well every 2 years, 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.
 - l)
 - i) Perform a casing inspection log on the 127mm production casing 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 installation of the new 127mm casing string (August 2014).
 - 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 2 years, commencing from the date of initial disposal.
 - m) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 22nd day of June 2016.

Advisory Guidance for Order 04-02-008 Amendment #2

- 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.