



June 14, 2021

7820-4580-32640-02

Brent Generoux, P.L.(Eng.)
Sr. Reservoir Operations Engineering
Tervita Corporation
1600, 140 – 10th Ave SE
Calgary, AB T2G 0R1

Dear Mr. Generoux,

**RE: PRODUCED WATER AND NON-HAZARDOUS WASTE DISPOSAL
SPECIAL PROJECT APPROVAL; AMENDMENT #3
TERVITA SILVERBERRY 6-16-88-20; WA# 3076
SILVERBERRY FIELD – NORTH PINE 'A' POOL**

The Commission has reviewed the application submitted by Tervita Corporation, dated April 15, 2021, requesting an amendment to the existing produced water disposal approval to allow for disposal of non-hazardous waste in addition to produced water.

The subject well was drilled in March 1972 and completed in the North Pine formation for gas production. The well produced 329.1 e⁶e³ of gas from this single well pool before being suspended in May 1994. The well was approved for disposal on September 30, 2014, subject to groundwater monitoring. The approval was amended twice, both times to alter the groundwater monitoring program. The well commenced disposal operations in February of 2015 and has continued to date, with a cumulative disposal volume of 99,165m³.

Commission staff have reviewed the 2021 casing inspection log and 2020 hydraulic isolation log and concur that the well integrity continues to be appropriate for disposal operations. The groundwater monitoring requirements outlined in Appendix 'A' shall remain unchanged from Amendment #2.

Attached please find **Order 14-02-009 Amendment #3**, designating an area in the Silverberry field, North Pine 'A' pool, 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 injection of produced water and non-hazardous fluid. This Order includes a number of detailed operational, measurement and reporting conditions. 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).

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure. It is the responsibility of the permit holder make adjustments to wellhead injection pressure. Note that a Permit from the Ministry of Environment is required as per condition 2 b).

Should you have any questions, please contact Logan Gray at (250) 419-4465 or the undersigned at (250) 419-4430.

Sincerely,

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

Attachments



IN THE MATTER of the application from Tervita Corporation to the Oil and Gas Commission dated April 15th, 2021 requesting disposal approval:

ORDER 14-02-009 Amendment #3

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, in the Silverberry field – North Pine ‘A’ pool as a special project in the following area:
DLS Twp 88 Rge 20 W6M Section 16 – LDSs 3, 4, 5, and 6
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 Silverberry 6-16-88-20; WA# 3076 North Pine formation from 1,404.5 – 1,407.3 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 14,600 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 at Reservoir@bcogc.ca immediately if there are any indications that hydraulic isolation is lost in the wellbore or formation.
 - g) Conduct and submit an annual Surface Casing Vent Flow test 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 Petrinex disposal report.
 - 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 11,560 kPaa, measured at 1,405.9 mKB.
 - 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 an annual hydraulic isolation temperature log on the subject well 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.
 - m) Conduct a groundwater monitoring program as detailed in Appendix A.
 - n) Once annually, sample the disposal fluid, analyze for the same suite of parameters as groundwater monitoring wells in Appendix A, and submit composition analysis, indicating the disposal well as the sample source

A handwritten signature in blue ink, appearing to read 'R. Stefik'.

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

DATED AT the City of Victoria, in the Province of British Columbia, this 14th day of June 2021.

- 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 conducted and the associated report must be submitted to the Commission within 30 days of test completion, 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 via Petrinex not later than the 20th 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.

Appendix A – Groundwater Monitoring Requirements

Tervita Silverberry 6-16-88-20 (WA 3076) Produced Water Disposal

The following groundwater monitoring program is to be conducted on three groundwater monitoring wells, identified as “MW14-01”, “MW14-02S”, and “MW14-02D”, previously installed and sampled as per requirements outlined in Order 14-02-009 Appendix A, issued on September 30, 2014.

Groundwater Monitoring Requirements

1. The collection of groundwater samples from the three monitoring wells at the site on an annual basis, starting summer or fall season 2019, and analysis for general water chemistry parameters including Total Dissolved Solids (TD), cations and anions, and pH. Groundwater samples shall be collected using standard environmental sampling and handling protocols consistent with previous sampling.
2. Manual measurement of static water levels in the monitoring wells at least once annually OR continued monitoring of groundwater levels in the monitoring wells using a pressure transducer.
3. Groundwater monitoring reports shall be prepared by a qualified professional and submitted to the Commission on an annual basis. Reports shall document the field methods undertaken, document the groundwater monitoring results (corrected for barometric pressure) and analytical results, and include tabular comparison to previous sampling and monitoring results.
4. Additional documentation and/or further sampling or investigation may be required by the Commission based on a review of submitted monitoring documentation and/or other well information.

Submission of Documentation

Groundwater Monitoring Reports for the long term groundwater monitoring/sampling program (3, above) shall be submitted to the Commission annually. For each report:

- Sampling procedures and date shall be documented and any relevant site observations should be noted.
- Monitoring and sampling results shall be presented in tabular form with appropriate BC comparison criteria.
- Tables shall be presented to allow for comparison of groundwater sampling results over time at same well.
- Laboratory analytical reports for the sampling shall be appended to the report.
- Laboratory analytical reports may be requested by the Commission at any time prior to the submission of the annual report.