

June 25, 2019

8115-4580/4500-32640-02

James Munro, P.L (Eng.)
Tourmaline Oil Corp.
3700, 250 – 6th Avenue SW
Calgary AB T2P 3H7

Dear Mr. Munro:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT
TOURMALINE HZ BRASSEY 4-18-77-17 (WA #23042)
SUNDOWN FIELD – NORTH PINE AND CHARLIE LAKE FORMATIONS**

Oil and Gas Commission staff have reviewed the application, dated May 17th, 2019 requesting approval to dispose of produced water into the North Pine and Charlie Lake formations of the subject well. The horizontal well was drilled into the Montney formation for gas but never produced and the horizontal section of the well was abandoned in February 2019. The 'A' Marker/Base of Lime, North Pine and Charlie Lake formations were then perforated and tested for disposal purposes; however the 'A' Marker/Base of Lime formation was deemed unsuitable for disposal and has been zonally abandoned.

Attached please find **Order 19-02-010**, designating an area in the Sundown field – North Pine and Charlie Lake formations 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. This Order includes a number of detailed operational conditions including: continuous tubing and casing pressure measurements, a maximum wellhead injection pressure, an 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).

Conditions are included to address cement integrity concerns for this well. As outlined in condition 2e), casing and tubing alarms are to be set to ensure that abnormal wellhead pressures are immediately identified and investigated. Since only a hydraulic isolation temperature log can detect loss of integrity outside of the casing, an annual temperature log is required in condition 2l)ii). Reservoir pressure measurements must be taken at intervals of approximately 6 months, as outlined in condition 2j).

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.

For the inspection requirement of Order condition 2o), please arrange via email to OGCPipelines.Facilities@bcogc.ca.

The Commission advises disposal well permit holders to 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 Kathryn Archibald at (250) 419-4406 or Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachments




ORDER 19-02-010

- 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 disposal of produced water, including flowback from fracturing operations, into the North Pine and Charlie Lake formations – Sundown field as a special project in the following area:
DLS Twp 77 Rge 17 W6M Section 18 – Lsd 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 produced water, including well flowback completion fluids only into the well Tourmaline HZ Brassey 04-18-077-017; WA# 23042 – North Pine formation (2414.8 to 2419.6 mKB MD) and Charlie Lake formation (2218.6 to 2223.6 mKB MD).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 13,500 kPag or the pressure required to fracture the formation, whichever is lesser.
 - c) Inject only through tubing with a packer set as near as is practical above the injection interval.
 - d) Continually measure and record the wellhead casing and tubing pressures electronically.
 - e) Set casing and tubing pressure alarms for values at endpoints of normal operating range, and notify the Commission if significant changes occur.
 - 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) Conduct and submit an annual Surface Casing Vent Flow test to the Commission within 30 days of the completion of the test.
 - i) Report disposal volumes, in Petrinex, 70% to the North Pine formation and 30% to the Charlie Lake formation.
 - j) Include the disposal operating hours and the maximum injection pressure value in Petrinex.
 - k) Conduct two annual reservoir pressure tests, separated by at least four months, on the comingled formations in the subject well every calendar year commencing from the date of initial disposal, 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) Cease injection upon reaching a maximum formation pressure of 26,000 kPaa measured at 2215.5 mKB TVD.
 - m)
 - 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 injection.
 - 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.
 - n) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.

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- o) Complete an inspection, satisfactory to the Commission, within 4 weeks of initial disposal operations.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 25th day of June, 2019.

Advisory Guidance for Order 19-02-010

- 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 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.