



April 7, 2020

9045-7400-32640-02

James Armstrong
Ovintiv Canada ULC
P.O. Box 2850, 500 Centre St SE
Calgary, AB, T2P 2S5

Dear Mr. Armstrong:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL, AMENDMENT #2
OVV ECOG ETSHO d-C70-J/94-O-8; WA# 24469
HORN RIVER FIELD – DEBOLT FORMATION**

The Commission has reviewed Ovintiv's request to amend groundwater monitoring requirements for the subject well. The review included consideration of the active status and current disposal activity at the well, the depth of the disposal zone below the base of useable groundwater and related Commission policies for groundwater monitoring, and consideration of consistency in the groundwater chemistry results over the monitoring period since 2017. Appendix A has been amended to change the frequency of required groundwater sampling and water level measurements from the monitoring well at the site from once a year to once every two years. Please note that the Commission may, at any time, require additional sampling, further investigation and/or reporting respecting groundwater conditions at the site. Commission records indicate that a casing inspection log was last performed on this well on December 10th of 2009. **A new casing inspection log is required before disposal operations may recommence.**

Attached please find **Order 10-02-004 Amendment #2**, designating an area in the Horn River field – Debolt 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. This Order contains a number of detailed operational conditions including a maximum wellhead injection pressure, reservoir pressure fill-up limit, and continuous tubing and casing pressure monitoring. None of these conditions have been changed as a result of this amendment.

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 Logan Gray at (250) 419-4465 or the undersigned at (250) 419-4430.

Sincerely,

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

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

Attachment

ORDER 10-02-004 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 produced water, including flowback from fracturing operations, into the Debolt formation – in the Horn River field as a special project in the following area:

NTS 94-O-08 Block J Unit 70

- 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 OVV ECOG Etsho d-C70-J/94-O-08; WA# 24469 – Debolt formation (disposal perforations 693.0 – 776.0 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 3,500 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) Cease injection and notify the Commission immediately at Reservoir@BCOGC.ca if there are any indications that hydraulic isolation is lost in the wellbore or formation.
 - f) Conduct and submit an annual Surface Casing Vent Flow test to the Commission within 30 days of the completion of the test.
 - g) Include the disposal operating hours and the maximum injection pressure value on the monthly Petrinex disposal report.
 - h) Conduct an annual reservoir pressure test on the formation in the subject well using bottom-hole recorders, 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.
 - i) Cease injection upon reaching a maximum formation pressure of 5,295 kPaa, measured at 734.5 mKB.
 - j)
 - 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, commencing from the date of initial disposal.
 - k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.
 - l) Implement a groundwater monitoring program as detailed in Appendix A.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 7th day of April, 2020.

Advisory Guidance for Order 10-02-004 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 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**OVV ECOG ETSHO d-C70-J/94-O-8 (WA 24469) Produced Water Disposal**

1. Over the time period during which the disposal well is active, one sample shall be collected on a bi-annual basis (i.e., every 2 years starting from the most recent sampling in August 2019) from one groundwater monitoring well previously installed within 50 m of the disposal well. The sample shall be analyzed for the following parameters:
 - Routine Cations, Anions, and Metals (HCO₃, CO₃, SO₄, NO₂, NO₃, Cl, Ca, Mg, K, Na, Fe, Mn)
 - Total Dissolved Solids (TDS)
 - Alkalinity
 - pH
 - Electrical Conductivity
2. Groundwater sampling procedures for this program shall be consistent with standard practices for environmental investigations such as those outlined in the British Columbia Field Sampling Manual (2013). The static water level shall be measured following development/purging and prior to sampling.
3. The analytical results shall be submitted to the Commission annually within 60 days of sample collection by eSubmission, if available, or by Email to Hydrogeology@bcogc.ca.
4. At any time the Commission may require re-sampling to confirm a result or further investigation which may include additional sampling and/or additional analytical requirements.