

March 21, 2014

3600-4800-32640-02

Randy Wolsey
Orefyn Energy Advisors Corp
PO Box 6100
Fort St. John, BC
V1J 4H6

Dear Mr. Wolsey:

**RE: PRODUCED WATER DISPOSAL WELL SPECIAL PROJECT (AMENDMENT #2)
OREFYN FT ST JOHN 11-12-84-19 W6M; WA# 3010
FT ST JOHN FIELD – HALFWAY ‘C’ POOL**

Approval for disposal of produced water was issued for the subject well, Halfway formation, on September 24, 1992. This approval was continued under the *Oil and Gas Activities Act* as Order 92-02-005, and amended December 20, 2012. The Commission is presently amending active disposal well approvals to conform to current requirements.

Attached please find Order 92-02-005 Amendment #2, designating an area in the Fort Saint John field – Halfway ‘C’ 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 disposal of produced water and well stimulation flowback 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.

The subject well has been in semi-continuous disposal operation since December 1989, with a cumulative disposal volume of 410,692 m³ as of Jan 2014. The last reported reservoir pressure test was in 1992. No reports regarding zonal isolation verification and wellbore integrity logging have been received since disposal operation commenced. The attached Order contains current disposal well requirements, specifically:

- Current reservoir pressure, condition 2(i), is a periodic measurement (yearly) confirming continued disposal is viable, remaining below the maximum formation pressure limit, and providing information to potentially forecast remaining disposal life. For the purpose of this disposal condition, the reservoir pressure is the pressure measured at the perforated interval within 60 days of shut-in of the well (utilizing bottom-hole recorders). The well does not need to be shut-in 60 days, if the pressure drops to the reservoir pressure limit value (condition 2(h), 16,200 kPa) in a shorter time period, or if fall-off data is of a quality that pressure transient analysis can confidently be extrapolated to a 60-day shut-in value. The 60-day value provides assurance that the formation porosity and permeability allows fluid to dissipate without creation of a zone of excessive pressure at the injection location.
- Wellbore integrity verification, condition 2(j)(i), requires a full length casing inspection log capable of detecting anomalies, holes, pits, metal loss, wall thickness and internal and external corrosion and casing roundness. This is normally achieved with an electromagnetic phase shift tool (MTT) and caliper log from surface to plug back depth.
- Confirmation of zonal isolation of the injected fluids, condition 2(j)(ii), may be achieved with a temperature log.

The maximum wellhead injection pressure value remains unchanged from the previous approval.

Monthly reporting requirements have been amended, specifically reporting of the maximum wellhead pressure value. Instructions are posted at <http://www.bcogc.ca/node/11152/download>.

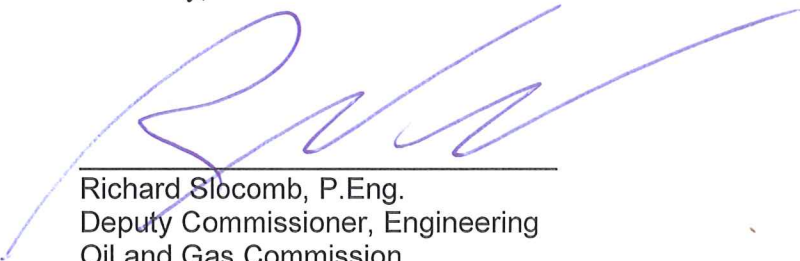
Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

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).

The Fort Saint John area is susceptible to seismic activity. In addition to the outlined conditions to operate an active disposal well, the Commission may in the future require seismic monitoring in the area of this well, as either a condition of an amended approval or as a separate Order under the *Oil and Gas Activities Act*.

Should you have any questions, please contact Petra Kriescher-Trudgeon at (250) 419-4415 or Ron Stefik at (250) 419-4430.

Sincerely,



Richard Slocomb, P.Eng.
Deputy Commissioner, Engineering
Oil and Gas Commission

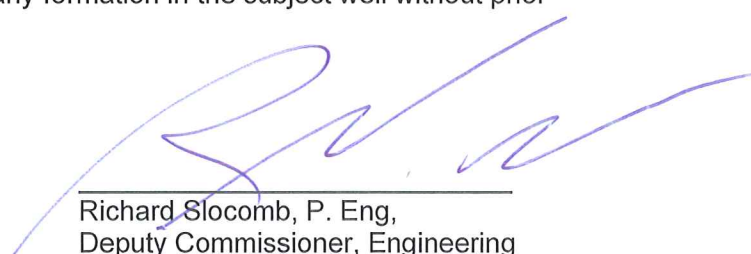
Attachment

ORDER 92-02-005, Amendment #2

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, into the Halfway 'C' Pool – Fort Saint John field as a special project in the following area:

DLS Twp 84 Rge 19 W6M Section 12 - Lsds 11, 12, 13 and 14.

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 Orefyn Ft St John 11-12-84-19 W6M; WA# 3010 Halfway 'C' Pool.
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 11,900 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.
 - e) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
 - f) Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test
 - g) Include the disposal operating hours and the maximum injection pressure values on the monthly disposal statement.
 - h) Cease injection upon reaching a maximum formation pressure of 16,200 kPaa.
 - i) Conduct a reservoir pressure test on the formation in the subject well, within 90 days of the date of this Order, 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, and annually thereafter.
 - j)
 - i) Perform a casing inspection log on the subject well, within 90 days of the date of this Order, and submit results to the Commission within 30 days of the completion of logging, and thereafter at an interval of not more than every 10 years.
 - ii) Perform a hydraulic isolation log on the subject well within 90 days of the date of this Order, and submit results to the Commission within 30 days of the completion of logging, and thereafter at an interval of not more than every 5 years.
 - k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.



Richard Slocomb, P. Eng,
Deputy Commissioner, Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 24th day of March 2014.

Advisory Guidance for Order 92-02-005, Amendment #2

- 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.