



August 22, 2019

3200-8400-32640-02

Izet Ferraj
Sr. Exploitation Engineer
Canlin Energy Corporation
2600, 237 - 4th Avenue SW
Calgary AB T2P 4K3

Dear Mr. Ferraj:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL, AMENDMENT #2
CANLIN ET AL CLARKE a-74-G/94-J-10; WA# 8226
CLARKE LAKE FIELD – SLAVE POINT 'A' POOL**

Approval for disposal of produced water, Order 02-02-005, was issued for the subject well, Slave Point formation, on March 20, 2002. The Commission issued Amendment #1 to the subject well on June 19, 2017 to conform to current requirements.

The subject well was drilled directionally into the Clarke Lake Slave Point 'A' pool. The well produced gas from March 1994 to October 1995. Disposal into the well started in January 2003, and has continued until present, with 3,124,617 m³ disposed to date. In January 2017, a casing patch was installed across the slowly leaking stage cementing tool at 1430 mKB. Recently, minor pressure buildup has been noted in the tubing-casing annulus, which must be periodically bled off and has caused the well to fail several packer isolation tests. The cause for this pressure buildup has been investigated and is likely due to thermal effects and gas ingress. The reservoir pressure in the well is presently at 71% of initial pool pressure.

Attached please find **Order 02-02-005 Amendment #2**, designating an area in the Clarke Lake field – Slave 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. 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 concerns regarding pressure buildup in the casing-tubing annulus. The maximum wellhead injection pressure has been adjusted to 1,500 kPa by Order condition 2b) to ensure disposal fluid is contained within the approved disposal zone. Order condition 2k) prescribes semi annual packer isolation tests to ensure rigorous monitoring of the degree of isolation of the casing-tubing annulus. Order conditions 2l) and 2m) require that the pressure in the casing-tubing annulus be controlled. Fluids recovered from the casing-tubing annulus during bleed downs must be recorded and reported to the Commission as outlined in Order condition 2n).

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

Sincerely,


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

Attachment

ORDER 02-02-005 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 Slave Point 'A' pool – Clarke Lake field as a special project in the following area:
NTS 94-J-10 Block G Unit 74

- 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 Canlin et al Clarke a-74-G/94-J-10; WA# 8226 – Slave Point 'A' pool (open hole from 2034.0 – 2041.2 mKB MD).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 1,500 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 pressure, tubing pressure, disposal rate, and disposal fluid temperature electronically and save the data for at least one year.
 - e) Cease injection and notify the Commission immediately if there are any indications that hydraulic isolation is lost in the wellbore or formation.
 - f) Include the disposal operating hours and the maximum injection pressure value on the monthly Petrinex disposal report.
 - g) Conduct a reservoir pressure test on the formation in the subject well once every 3 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.
 - h) Cease injection upon reaching a maximum formation pressure of 23,930 kPaa, measured at 1964 mKB MD.
 - i) 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.
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.
 - j) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.
 - k) Conduct and submit packer isolation tests every 6 months.
 - i. One full test must be conducted between June 15 and September 15 while the well is shut-in.
 - ii. For another PIT in the year, the 24 hour buildup test can be waived if there is a period equivalent to the 24 hour buildup test following a casing pressure bleed-off in the real-time monitoring data, after the last full test.
 - l) Casing pressure must be kept below 1400 kPa by periodically bleeding off the pressure.
 - m) If casing pressure cannot be bled off to the atmospheric pressure at the well site, notify the Commission immediately.
 - n) Record frequency and collected liquid volumes for each bleed off, and report this with the next packer isolation test report.
 - o) In the event that a new source of disposal fluid of significantly different composition is injected, inform the OGC immediately.



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 August, 2019.

Advisory Guidance for Order 02-02-005 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. 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.