

October 3, 2019

0760-4800-59240-09

Brittany Jorgensen
Canadian Natural Resources Ltd.
2100, 855 – 2nd St SW
Calgary, AB T2P 4J8

Dear Brittany Jorgensen:

**RE: PRESSURE MAINTENANCE WATERFLOOD ORDER 96-09-04 AMENDMENT #4
OTHER THAN NORMAL SPACING ORDER AMENDMENT #4
BEAVERTAIL HALFWAY "H" POOL**

The Commission is presently reviewing and amending waterflood approvals to conform to current requirements. The continued operation of a pressure maintenance waterflood in the Beavertail Halfway "H" pool by Canadian Natural Resources Ltd. requires this review.

The Beavertail Halfway "H" pool began production in January of 1995. The original pressure maintenance application was granted in July, 1996 and CNRL Beavertail c-40-A/94-A-15 (WA 9813) was converted to an injection well and began injection in March 1997. WA 9813 stopped injection in December 2009 due to pipeline failures and was only briefly used again for very little volumes. In December 2012, Amendment #3 approved the use of CNRL Beavertail c-40-A/94-A-15 (WA 9341) for injection, but injection did not begin until June 2013. Currently, only three wells in the pool are active; injection well WA 9341 and two oil producers, CNRL Beavertail c-39-A/94-A-15 (WA 9354) and CNRL Beavertail a-49-A/94-A-15 (WA 12999).

The following Orders are attached;

- 1) Order 96-09-04 Amendment #4 designating Pressure Maintenance Waterflood within the Beavertail field – Halfway "H" pool, as a Special Project under section 75 of the *Oil and Gas Activities Act*, and
- 2) Order 96-09-04 Amendment #4 - OTN approving Other Than Normal Spacing under section 65.1 of the *Petroleum and Natural Gas Act* for the subject area and formation.

This amended approval includes a maximum wellhead injection pressure (MWHIP), an ultimate pool pressure limit, restriction of injection for the purpose of oil recovery, the submission of annual packer isolation tests, and a requirement for annual reservoir pressure tests on the injector. The injector WA 9813 is no longer approved for injection as it has been inactive for several years and has not shown pressure support for the currently active oil production wells. The ultimate reservoir pressure has been limited to the initial pool pressure, rather than 120% of initial pool pressure which was prescribed in Order 96-09-04 Amendment #3.

Please note that, as per section 75 of the *Drilling and Production Regulation*, a record of the volume of water injected and the MWHIP must be included on a Monthly Injection statement to the Commission via Petrinex not later than 20th day of the month following the reported month.

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

Sincerely,



Ron Stefik, EngL
Supervisor, Reservoir Engineering
Oil and Gas Commission

Attachments



ORDER 96-09-004 – Amendment #4

1. Under Section 75 (1) (a) of the *Oil and Gas Activities Act*, the Commission designates by Order the development and production of petroleum and natural gas from a pool using pressure maintenance waterflood enhance recovery scheme within the Beavertail field – Halfway “H” pool following area;

NTS 94-A-15: Block A - units 38-40, 48-50, 60 and 70
 Block B - units 31, 41, 51 and 61.

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:
 - a) The project oil production for a month shall be based on the previous month’s voidage replacement.
 - b) All associated produced gas must be conserved.
 - c) Water may be injected into the Beavertail Halfway “H” pool through the well CNRL Beavertail c-49-A/94-A-15 (WA# 9341).
 - i) Inject only through tubing with a packer set as near as is practical above the injection interval.
 - ii) Not exceed an injection pressure, measured at the wellhead of 11,600 kPa or the pressure required to fracture the formation, whichever is lesser.
 - d) An annual reservoir pressure must be obtained from the injector CNRL Beavertail c-49-A/94-A-15 (WA# 9341), and submitted to the Commission within 60 days via e-submission.
 - e) Not exceed an average pool pressure of 10,700 kPaa measured at 537.0 meters subsea for the wells listed in (c).
 - f) Cease injection for the well listed in (c) and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation
 - g) Include the monthly injected volume, injection hours and the maximum injection pressure value for the well listed in (c) via Petrinex.
 - h) Injection must cease upon termination of production from the pool.

Advisory Guidance for 96-09-004 – Amendment #4

- 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 completed and 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 injection statement must be submitted to 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 injection operations suspended as per section 21.1 of the Drilling and Production Regulation.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 3rd day of October 2019.



ORDER 96-09-004 Amendment #4 – OTN

1 Under Section 65.1(2) of the *Petroleum and Natural Gas Act*, Other Than Normal Spacing within the Beavertail – Halfway “H” pool is hereby approved within the following area;

NTS 94-A-15: Block A - units 38-40, 48-50, 60 and 70
 Block B - units 31, 41, 51 and 61.

2 Under section 65.1(3) of the *Petroleum and Natural Gas Act*, I specify the following:

- a) the target area for an oil well completed within the project area is not nearer than 100 m to the sides of the Other Than Normal Spacing area,
- b) an oil well completed outside the specified target area may be subject to an off-target production penalty,
- c) oil wells drilled within the specified project area are not subject to spacing requirements.

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

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

DATED AT the City of Victoria, in the Province of British Columbia, this 3rd day of October 2019.