

November 9, 2022

6800-4800-59240-09

Quang-Hoa Hong, P. Eng
Exploitation Engineer
Canadian Natural Resources Limited
2100, 855 – 2nd St SW
Calgary, AB T2P 4J8

Dear Mr. Hong:

**RE: PRESSURE MAINTENANCE WATERFLOOD ORDER 66-09-001 AMENDMENT #9
PEEJAY FIELD – HALFWAY FORMATION, CNRL UNIT #2**

The Commission has reviewed Canadian Natural Resources Limited’s (“CNRL”) request for amendment to the pressure maintenance waterflood approval Order 67-09-001 to allow for testing of proxy pool wells in place of required annual reservoir pressure testing of injection wells.

The discovery well, CNRL et al Peejay b-9-F/94-A-16 (WA 1598), was drilled and began production in February of 1965. An additional 49 wells were drilled and completed into the Unit between 1964 and 1973 and the remaining 11 were drilled between 1986 and 1995. Approval for waterflood was granted on October 24th of 1966 and injection began in March of 1967 into 10 injection wells. Subsequent amendments were granted to allow conversion of an additional 12 wells to injection service. Of the total 60 wells in the Unit, 5 are active production wells, 5 are active injection wells, 1 is an observation well, 22 are suspended, and 27 are decommissioned or abandoned zone.

The Commission concurs that proximal pool wells can provide representative reservoir pressures as an alternative to testing the injection wells.

The following Orders are attached;

- 1) Order 66-09-001 Amendment #9 designating Pressure Maintenance Waterflood within the Peejay field – Halfway formation, as a Special Project under section 75 of the *Oil and Gas Activities Act*, and
- 2) Order 66-09-001 Amendment #9 - OTN approving Other Than Normal Spacing under section 65.1 of the *Petroleum and Natural Gas Act* for the subject area and formation.

Note that order condition 2d) allows for testing of “proxy wells in [the injection wells’] area of influence, as approved by the Commission”. Depending on historical data and current pool conditions in a given year, the Commission may or may not find proxy wells proposed by CNRL to be appropriate substitutes for injection wells and may require that different wells be tested. Conditions 2e) and 2f) require measurement and recording of tubing and casing pressure, respectively, to validate compliance with injection pressure and wellbore integrity requirements.

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

Sincerely,



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

Attachments

ORDER 66-09-001 – Amendment #9

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 enhanced recovery scheme within the Peejay field – Halfway CNRL Unit #2 following area;

NTS 94-A-16: Block C - units 58, 59, 60, 68-70, 78-80, 88-90, and 98-100
 Block D - units 62, 63, 71-73, 81-83, and 91-93
 Block E - units 1-3, 11-13, 22-26, 33-35, 43, 45, and 46
 Block F - units 9 and 10

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 unadjusted daily oil allowable (UDOA) is waived.
- b) All associated produced gas must be conserved.
- c) Water may be injected into the wells:

CNRL Peejay d-71-D/94-A-16 (WA 1657), interval 1,180.7-1,182.6 mKB
 CNRL et al Peejay d-100-C/94-A-16 (WA 1684), interval 1,176.0-1,177.4 mKB
 CNRL et al Peejay d-83-D/94-A-16 (WA 1749), interval 1,177.1-1,180.1 mKB
 CNRL et al Peejay a-2-E/94-A-16 (WA 2821), interval 1,167.0-1,168.5 mKB
 CNRL et al Peejay b-58-C/94-A-16 (WA 7493), Interval 1,186.0-1,193.5 mKB
 CNRL Peejay a-79-C/94-A-16 (WA 9433), interval 1,184.0-1,189.0 mKB

- 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 11,750 kPa for wells listed in (c), or the pressure required to fracture the formation, whichever is lesser.
- d) An annual reservoir pressure must be obtained from three of the six injectors listed in (c), or from proxy wells in their area of influence, as approved by the Commission, and submitted to the Commission within 60 days of completion of the tests via e-submission.
 - e) Continually measure and record the wellhead tubing pressures electronically for wells listed in (c).
 - f) Wellhead casing pressure for the wells listed in (c) must be measured and recorded a minimum of once daily.
 - g) Not exceed an average pool pressure of 9,075 kPaa measured at 454.0 meters subsea.
 - h) Cease injection for the well listed in (c) and notify the Commission immediately if there is any indication that hydraulic isolation is lost in the wellbore or formation.
 - i) Include the monthly injected volume, injection hours and the maximum injection pressure value for the well listed in (c) via Petrinex.
 - j) Injection must cease upon termination of production from the pool.

Advisory Guidance for 66-09-001 – Amendment #9

- 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, P.L.Eng.
Supervisor, Reservoir Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 9th day of November 2022.

ORDER 66-09-001 – Amendment #9 – OTN

- 1 Under Section 65.1(2) of the *Petroleum and Natural Gas Act*, Other Than Normal Spacing within the Peejay field – Halfway formation is hereby approved within the following area;

NTS 94-A-16: Block C - units 58, 59, 60, 68-70, 78-80, 88-90, and 98-100
Block D - units 62, 63, 71-73, 81-83, and 91-93
Block E - units 1-3, 11-13, 22-26, 33-35, 43, 45, and 46
Block F - units 9 and 10

- 2 Under section 65.1(3) of the Petroleum and Natural Gas Act, I specify the following:
- 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,
 - an oil well completed outside the specified target area may be subject to an off-target production penalty,
 - oil wells drilled within the specified project area are not subject to spacing requirements.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 9th day of November 2022.