

December 19, 2019

7000-4800-59240-09

Brittany Jorgensen, P.Eng.
Exploitation Engineer
Canadian Natural Resources Limited
Suite 2500, 855 – 2nd Street S.W.
Calgary, AB T2P 4J8

Dear Mrs. Jorgensen:

**RE: PRESSURE MAINTENANCE WATERFLOOD ORDER 96-09-007 AMENDMENT #5
OTHER THAN NORMAL SPACING ORDER AMENDMENT #5
PEEJAY WEST FIELD – HALFWAY “A” POOL**

The Commission is presently reviewing and amending waterflood approvals to conform to current requirements.

The Peejay West Halfway “A” oil pool commenced production in March 1962. A pressure maintenance waterflood project was approved in May 1997, with injection starting in October 1997. The pool currently has two producers and three injectors. A review of reservoir performance indicates that the waterflood was successful in stabilizing the GOR, achieving a cumulative oil recovery of approximately 34%. The Commission is concerned regarding the lack of reservoir pressures throughout the pool since 2012, combined with high VRR. Good reservoir management requires a limit on the ultimate reservoir pressure at the cessation of pool operation, with consideration of demonstrated potential for pool pressure equalization.

The following Orders are attached;

- 1) Order 96-09-007 Amendment #5 designating Pressure Maintenance Waterflood within the Peejay West field – Halfway “A” pool, as a Special Project under section 75 of the *Oil and Gas Activities Act*, and
- 2) Order 96-09-007 Amendment #5 - 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 a packer isolation test and a static gradient test pressure. Also included is a requirement to take reservoir pressure test on the injectors.

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 Petra Kriescher-Trudgeon at (250) 419-4415 or the undersigned at (250) 419-4430.

Sincerely,



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

Attachments

ORDER 96-09-007 – Amendment #5

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 Peejay West field – Halfway “A” pool following area;

NTS 94-A-15 Block G - Units 22, 23, 32, 33, 42-44, 53, 54 and 63-65.

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 oil production allowable 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 wells:

| Well Permit # | Well Name | Interval |
|---------------|-------------------------------------|---------------------|
| 5734 | CNRL et al W Peejay c- 33-G/94-A-15 | 1192.0 – 1204.0 mKB |
| 7941 | CNRL W Peejay d- 23-G/94-A-15 | 1206.0 – 1212.0 mKB |
| 8394 | CNRL W Peejay b- 43-G/94-A-15 | 1185.0 – 1194.5 mKB |
| 10344 | CNRL W Peejay b- 54-G/94-A-15 | 1189.0 – 1197.0 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 6,150 kPa or the pressure required to fracture the formation, whichever is lesser.
- d) Every second year a reservoir pressure must be obtained from two injectors listed in (c), and submitted to the Commission within 60 days via e-submission
- e) Not exceed an average pool pressure of 9,878 kPa measured at 490.0 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) Submit the annual packer isolation test report for the well listed in (c) to the Commission within 30 days of the completion of the test.
- h) Include the monthly injected volume, injection hours and the maximum injection pressure value for the well listed in (c) via Petrinex.
- i) Injection must cease upon termination of production from the pool.

ORDER 96-09-007 – Amendment #5

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Advisory Guidance for Order 96-09-007 – Amendment #5

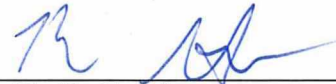
- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion and frost inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required to be submitted, as per section 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 CommissionDATED AT the City of Victoria, in the Province of British Columbia, this 19th day of December 2019.

ORDER 96-09-007 OTN - AMENDMENT #5

- 1 Under Section 65.1(2) of the *Petroleum and Natural Gas Act*, Other Than Normal Spacing within the Peejay West – Halfway “A” pool is hereby approved within the following area;
NTS 94-A-15: Block G - Units 22, 23, 32, 33, 42-44, 53, 54 and 63-65.
- 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.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 19th day of December 2019.