



January 7, 2013

1260-4100-59240-09

Jason Smith, P. Eng.
Exploitation Engineer
Canadian Natural Resources Limited
2500, 855 2nd Street SW
Calgary, AB T2P 4J8

Dear Mr. Smith:

**RE: WATERFLOOD PRESSURE MAINTENANCE ORDER 09-09-02, AMENDMENT #2
BIRCH FIELD – BALDONNEL 'C' POOL**

The Commission has reviewed your application, dated December 6, 2012, to amend the pressure maintenance waterflood order for the subject pool. The Commission concurs that the proposed project provides opportunity for enhanced recovery from this partially depleted oil pool as well as additional capacity for re-injection of Baldonnel 'C' produced water.


Attached is Order 09-09-022 Amendment #2 designating Pressure Maintenance Waterflood for the Birch field - Baldonnel 'C' pool as a Special Project under section 75 of the *Oil and Gas Activities Act*.

This amendment adds two additional injection wells, d-98-H & d-18-H/94-A-13 to the project. The project area remains unchanged.

Please note that, as per section 75 of the *Drilling and Production Regulation*, a record of the volume of water injected must be reported on a Monthly Injection or Disposal Statement (BC-S18), submitted to the Commission no later than the 25th day of the following month. The operation of the pressure maintenance waterflood project will be subject to periodic review and the Commission may modify the Order, if deemed appropriate.

Should you have any questions, please contact Curtis Kitchen at (250) 419-4443 or Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachments

IN THE MATTER of an application from Canadian Natural Resources Limited to the Commission dated December 6, 2012 for Other Than Normal Spacing.

ORDER 09-09-02-OTN (AMENDMENT #2)

- 1 Under Section 65.1(2) of the *Petroleum and Natural Gas Act*, Other Than Normal Spacing is approved within the Birch – Baldonnel “C” pool within the following area;

NTS 94-A-13 Block H - Units 52, 53, 62, 72-77, 82-88, 94-100

Block I - Units 4-10, 16-20, 28-30, 38-40, 48-50, 59, 60, 70, 80, 90

Block J - Units 1, 2,3, 11, 12, 13, 21-23, 31-35, 41-45, 51-55, 61-64, 71, 81.

- 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, EngL
A/ Supervisor
Reservoir Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this ^{7th} day of January 2013.

IN THE MATTER of an application from Canadian Natural Resources Limited (CNRL) to the Commission dated December 6, 2012 for the production of petroleum using pressure maintenance.

ORDER 09-09-002 AMENDMENT #2

1 Under Section 75(1)(a) of the *Oil and Gas Activities Act*, the Birch field – Baldonnel formation is designated as a special project for pressure maintenance for recovery of oil by water injection within the following area;

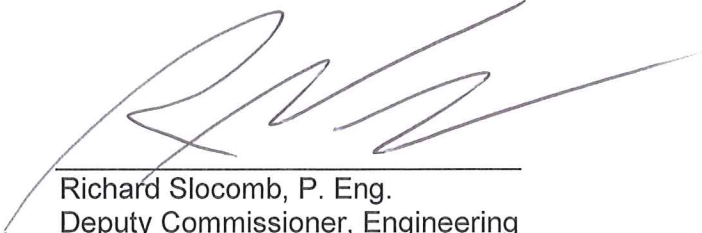
NTS 94-A-13 Block H - Units 52, 53, 62, 72-77, 82-88, 94-100
Block I - Units 4-10, 16-20, 28-30, 38-40, 48-50, 59, 60, 70, 80, 90
Block J - Units 1, 2,3, 11, 12, 13, 21-23, 31-35, 41-45, 51-55, 61-64, 71, 81.

2 Under section 75(2) of the *Oil and Gas Activities Act*, I specify the following:

- a) The daily oil allowable is waived.
- b) Water may be injected into the wells d-39-I/94-A-13 (WA# 8144), b-19-I/94-A-13 (WA# 8246), b-86-H/94-A-13 (WA# 8157), b-98-H/94-A-13 (WA# 8259) and d-18-I/94-A-13 (WA# 8244).
- c) The wellhead injection pressure must be continually measured and recorded, and must not exceed **15,250** kPa for injection wells noted in (b).
- d) The maximum average formation pressure must not exceed **13,896** kPa (120% of initial pressure of 11,580 kPa).
- e) The Permit Holder must conduct annual reservoir pressure (fall-off) tests of the Baldonnel formation in the subject wells (or a well in the area of influence), with a shut-in period of sufficient length to provide data for calculation of the reservoir pressure.
- f) All associated gas must be conserved.
- g) A Casing Bond Log must be run on the wells b-98-H/94-A-13 (WA# 8259) and d-18-I/94-A-13 (WA# 8244), with injection commencing only upon completion of any required remedial work.
- h) The quantity and rate of water injected into the wells must be metered by an appropriate method and reported to the Commission on the form BC S-18 no later than the 25th day of the following month, as per sections 74 and 75 of the Drilling and Production Regulation.
- i) The permit holder must submit a Progress report to the Commission for each twelve month period the project is in operation. The Progress report must be filed within 60 days after the end of each period and must contain the following:
 - i) the daily average rate during each month of oil production for each producing well, and for the project as a whole
 - ii) the average gas-oil and water-oil ratios during each month for each producing well, and for the project as a whole

Order 09-09-002 Amendment #2

- iii) the monthly cumulative gas, oil and water production for each producing well, and for the project as a whole
 - iv) for each type of fluid being injected, the daily average rate of injection per operating day during each month into each injection well, and for the project as a whole
 - v) for each type of fluid being injected, the weighted average wellhead injection pressure during each month for each injection well, and for the project as a whole
 - vi) for each type of fluid being injected, the monthly cumulative volume of fluid injected to each injection well, and for the project as a whole
 - vii) regional reservoir pressure mapping
 - viii) the date and type of any well treatment or workover must be included on the production/injection reports
 - ix) instantaneous and cumulative voidage calculations for the pool and for individual patterns when available
 - x) an outline of the quality control measures in place for injection fluid treatment
- j) The operations of the pressure maintenance scheme will be subject to periodic review. Modifications to the Order may be made if deemed appropriate by the Commission.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 7th day of January 2013.