



May 24, 2012

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 #1
BIRCH FIELD – BALDONNEL 'C' POOL**

The Commission has reviewed your application, dated March 26, 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 #1 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 Order includes all lands formerly covered by the GEP 93-06-06 Amendment #2, as well as land requested in a GEP amendment application dated March 26, 2012, except for unit 65-J/94-A-13 which was determined to be outside the pool boundary. **Therefore, GEP Order 93-06-06 Amendment #2 is hereby rescinded.**

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,

A handwritten signature in black ink, appearing to be 'Ken Paulson', written over a horizontal line.

Ken Paulson, P.Eng.
Chief Operating Officer
Oil and Gas Commission

Attachments

IN THE MATTER of an application from Canadian Natural Resources Limited (CNRL) to the Commission dated March 26, 2012 for the production of petroleum using pressure maintenance.

ORDER 09-09-002 AMENDMENT #1

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;

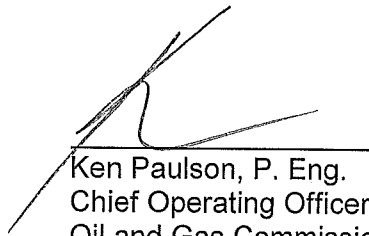
NTS 94-A-13 Block H - Units 52, 53, 62, 72-77, 82-88, 94-100
Block I - Units 4-10, 16-20, 28-30, 38-40, 48-50, 59, 60, 70, 80, 90
Block J - Units 1, 2,3, 11, 12, 13, 21-23, 31-35, 41-45, 51-55, 61-64, 71, 81.

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-9-I/94-A-13 (WA# 8246) and b-86-H/94-A-13 (WA# 8157).
- c) The Maximum Wellhead Injection pressure is 15,250 kPa for injection wells noted in (b).
- d) All associated gas must be conserved.
- e) A Casing Bond Log must be run on the wells b-9-I/94-A-13 (WA# 8246) and b-86-H/94-A-13 (WA# 8157), with injection commencing only upon completion of any required remedial work.
- f) 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.
- g) 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 rates during each month for each producing well, and for the project as a whole
 - 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

ORDER 09-09-002 AMENDMENT #1

- 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) the current volumetrically weighted formation pressure for the project as a whole and a copy of the isobaric map from which this pressure was calculated
- viii) the date and type of any well treatment or workover which must be indicated, in the case of injection wells, on the report of the injected volume, and in the case of producing wells, on the report of the daily average oil production rate
- ix) calculations of the balance during each month between fluids injected into, and fluids withdrawn from, the part of the pool subject to the project and by individual patterns, where applicable
- x) an outline of the method actually in use for the quality control and treatment of fluid being injected, or, where there has been no change in the control or treatment from that outlined in a previous report, a statement to that effect



Ken Paulson, P. Eng.
Chief Operating Officer
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 24 day of May 2012.

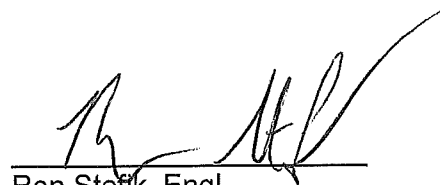
IN THE MATTER of an application from Canadian Natural Resources Limited to the Commission dated March 26, 2012 for Other Than Normal Spacing.

ORDER 09-09-02-OTN (AMENDMENT #1)

- 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 Stefk, EngL
Sr Technical Advisor,
Reservoir Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 24th day of May 2012.

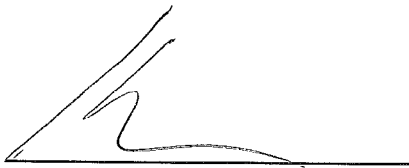
RATIONALE FOR ORDER

Order 09-09-02 (Amendment #1) has been made considering:

This order has added two injection wells and all lands of GEP 93-06-06 Amendment #2 to the waterflood project that formerly consisting of a single injector .

- **Conservation of the resource** – Development of this resource is dependent on operator ability to drill horizontal wells without regard to normal well spacing and target area restrictions. CNRL has started drilling dual leg horizontals in this pool; this has resulted in a significant increase in oil rate as well as proved reserves. The recent drills alone have increased pool reserves by 20%. Associated water production has been increasing and the new high rate horizontals typically have a significant water cut. The produced water will be injected to provide an economic means of disposing the waste water while also providing pressure support to the depleted oil pool.
- **Need for Special Project** – Special Project recognizes that an operator, in a specific area, is utilizing best available practices to achieve petroleum recovery while minimizing surface impacts (in this case central well pads, tie-ins and facilities). Special Project approval enables an Other Than Normal Spacing Order, removing well spacing and target area restrictions and a project target area of 100m. By extending the waterflood over the entire pool the Commission will enable the operator to utilize advanced techniques and increase reserves even further. Without an economic means for water disposal the operator would have to shut in high water cut wells and therefore lose out on late life oil reserves. No response has been noted from the single injector to-date. The Commission is satisfied that there is a need for this project.
- **P&NG rights** – Based on tenure information the Commission is satisfied that CNRL has the appropriate rights in the subject formation and project area.
- **Other Than Normal Spacing Order** under section 65.1 of the Petroleum and Natural Gas Act is the regulatory instrument to modify spacing and target areas within, and at the boundary of, a special project designated under section 75 of OGAA.
- **Objections** –There were no objections filed with the Commission regarding this project.

Prepared by Curtis Kitchen, Reservoir E.I.T.



Ken Paulson, P. Eng.
Chief Operating Officer
Oil and Gas Commission

May 28, 2012

