

April 26, 2012

1260-4800-32640-02

Jason D. Smith, P. Eng.  
Exploitation Engineer  
Canadian Natural Resources Limited  
Suite 2500, 2<sup>nd</sup> Street SW  
Calgary, AB T2P 4J8

Dear Mr. Smith:

**RE: SALT WATER DISPOSAL SPECIAL PROJECTS  
CNRL ET AL BIRCH D-56-I/94-A-13; WA#12015  
CNRL BIRCH B-064-I/094-A-13; WA#3476, AMENDMENT #1  
CNRL BIRCH B-066-I/094-A-13; WA#4125, AMENDMENT #1  
BIRCH FIELD – HALFWAY “A” POOL**

Commission staff have reviewed the application dated February 3, 2012, to dispose of produced water from the Birch - Baldonnel “C” oil pool into the depleted Birch - Halfway “A” gas pool. In conjunction, salt water disposal approvals issued September 3, 1993 for the off-setting wells b-64-I and b-66-I/94-A-13 were reviewed to establish maximum allowable wellhead injection pressures.

A step rate injectivity test was conducted on March 2, 2012 to determine the formation breakdown pressure, resulting in a fracture gradient of 19 kPa/m. Fracture reports from the two adjacent water disposal wells reported fracture gradients of 19 and 20 kPa/m. A study of valid fracture gradients in the Halfway for a 20 km surrounding radius provided an average formation breakdown pressure of 20.1 kPa/m, a value that has been utilized to establish maximum allowable wellhead injection pressures. We concur that the subject well appears to be a good candidate for salt water disposal in the Halfway formation. Notice of your application was posted on the OGC website with no objections received.

Attached please find Order 12-02-008, designating the Other Areas – Halfway formation a Special Project under section 75 of the *Oil and Gas Activities Act*, for the operation and use of a storage reservoir for the disposal of salt water. Also attached are Order 93-02-004 Amendment #1 and Order 93-02-006 Amendment #1 for the other two subject operating disposal wells.

Please note that, as per section 75 of the Drilling and Production Regulation, a record of the volume of salt water disposed of through this well must be included on a Monthly Injection or Disposal Statement (BC-S18), which must be submitted to the Oil and Gas Commission no later than the 25th day of the month in which activity occurred. Also, the operation of the salt water disposal project will be subject to periodic review and the Commission may modify the Order, if deemed appropriate.

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

Sincerely,



Paul Jeakins  
Commissioner & CEO  
BC Oil and Gas Commission

Attachments


IN THE MATTER of the application from Canadian Natural Resources Limited, to the Oil and Gas Commission (Commission) dated February 3, 2012 for the operation and use of a storage reservoir.

**ORDER 12-02-008**

- 1 Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Commission designates the temporary operation and use of a storage reservoir for the disposal of salt water or recovered fluids from a well completion, in the Birch – Halfway “A” pool as a special project in the following area:

NTS 094-A-13 Block I - Unit 56

- 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) Salt water shall be injected only into the Halfway “A” pool through the well CNRL et al Birch d-56-I/94-A-13 (WA 12015).
  - b) The wellhead injection pressure must be continually measured and recorded, and must not exceed 11,200 kPa.
  - c) The project shall be deemed commenced upon initiation of salt water injection into the well. The Supervisor, Reservoir Engineering, Resource Development, must be notified in writing within 72 hours of commencement of injection operations.
  - d) The operator must submit a form BC11 Notice of Commencement or Suspension of Operations, within 25 days of beginning of the month following commencement of disposal.

  
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Paul Jenkins  
Commissioner & CEO  
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 21 day of April 2012.

IN THE MATTER of the application from Canadian Natural Resources Limited, to the Oil and Gas Commission (Commission) dated February 3, 2012 for the operation and use of a storage reservoir.

**ORDER 93-02-004 Amendment #1**

- 1 Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Commission designates the temporary operation and use of a storage reservoir for the disposal of salt water or recovered fluids from a well completion, in the Birch – Halfway “A” pool as a special project in the following area:

NTS 094-A-13 Block I - Unit 64

- 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) Salt water shall be injected only into the Halfway “A” pool through the well CNRL Birch b-64-I/94-A-13 (WA 3476).
  - b) The wellhead injection pressure must not exceed 11,200 kPa.



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Paul Jeakins  
Commissioner & CEO  
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 26<sup>th</sup> day of April 2012.

IN THE MATTER of the application from Canadian Natural Resources Limited, to the Oil and Gas Commission (Commission) dated February 3, 2012 for the operation and use of a storage reservoir.

**ORDER 93-02-006 Amendment #1**

- 1 Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Commission designates the temporary operation and use of a storage reservoir for the disposal of salt water or recovered fluids from a well completion, in the Birch – Halfway “A” pool as a special project in the following area:

NTS 094-A-13 Block I - Unit 66

- 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) Salt water shall be injected only into the Halfway “A” pool through the well CNRL Birch b-66-1/94-A-13 (WA 4125).
  - b) The wellhead injection pressure must not exceed 11,200 kPa.



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Paul Jeakins  
Commissioner & CEO  
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 26<sup>th</sup> day of April 2012.