BC Oil & Gas COMMISSION

June 18, 2015 9045-7400/7450-32640-02

Chris Sieben, P.Eng.
Conventional Reservoir and Subsurface Engineering Supervisor
Imperial Oil Resources Limited
8095, 237 – 4th Avenue SW
Calgary AB T2P 0H4

Dear Mr. Sieben,

RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT AMENDMENT #2
IMP MCADAM c-24-I/094-O-02; WA# 27668
DEBOLT FORMATION

Commission staff have reviewed your application dated May 29, 2015 seeking approval for an increased maximum wellhead injection pressure (MWHIP) for a deep disposal well located in the McAdam field – Debolt formation. Deep disposal approval was issued for this location on May 24, 2012 through order 12-02-014. The MWHIP of 3,500 kPa was based on a step-rate test conduct on this well. The step-rate test inflection point was ambiguous, leading Imperial to re-test the formation and seek approval for an increase in the MWHIP. This well has not yet been activated for disposal.

In May of 2015, Imperial conducted two step-rate tests, the first with 500m3. Since this test did not achieve the high pressure or breakdown Imperial Oil Resources (IOR) was seeking, a request was submitted and an approval, 12-02-014 Amendment #1, for short term injection using 1,000m3 was issued. Neither test resulted in formation fracture. However, the second injection test did exceed the previous maximum pressures. The maximum pressure of 7,040kPa, recorded without breakdown, has been used to determine the MWHIP. An Encana Debolt step-rate test on a well 20 km to the northwest indicated a higher formation parting pressure but the Encana test is considered too distant to be comparable to the c-24-I Debolt.

Attached please find Order 12-02-014 Amendment #2, designating an area in the McAdam field, Debolt formation as 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 produced water. This Order includes a number of detailed operational conditions including: continuous tubing and casing pressure measurements, a maximum wellhead injection pressure, an ultimate reservoir pressure limit, as well as wellbore integrity monitoring and reporting requirements. Disposal wells are subject to regular field inspection and audit. Contravention of a condition of this Order may be subject to enforcement under section 62 of OGAA, or suspension or cancellation of the Order under section 75(2)(b).

Monthly reporting requirement instructions are posted at http://www.bcogc.ca/node/11152/download. Additional general information regarding disposal wells is available on the Commission's website at http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal.

Should you have any questions, please contact Michelle Gaucher at (250)419-4482 or Ron Stefik at (250)419-4430.

Sincerely,

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

Attachment

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ORDER 12-02-014 AMENDMENT #2

1 Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Commission designates the operation and use of a storage reservoir for the disposal of produced water, into the Debolt formation – near the McAdam field as a special project in the following area:

NTS Map 094 - O - 2 Block I Unit 24

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. The Permit Holder shall:

a) Inject produced water only into the well IMP McAdam c-24-I/94-O-2; WA# 27668 – Debolt formation (disposal perforations 461.0 – 572.0 mKB MD).

b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 5,475 kPag or the pressure required to fracture the formation, whichever is lesser.

c) Inject only through tubing with a packer set as near as is practical above the injection interval.

d) Continually measure and record the wellhead casing and tubing pressures electronically.

e) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.

f) Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test.

g) Include the disposal operating hours and the maximum injection pressure value on the monthly BC-S18 disposal statement.

h) Conduct an annual reservoir pressure test on the formation in the subject well, with a shut-in period of sufficient length to provide data for calculation of the reservoir pressure, and submit a report of the test within 60 days of the end of the test.

i) Cease injection upon reaching a maximum formation pressure of 6,525 kPaa, measured at MPP.

j) i) Perform a casing inspection log on the subject well and submit results to the Commission within 30 days of the completion of logging, at an interval of not more than every 10 years, commencing from the date of initial disposal.

ii) Perform a hydraulic isolation temperature log on the subject well and submit results to the Commission within 30 days of the completion of logging, at an interval of not more than every 5 years, commencing from the date of initial disposal.

k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.

Ron Stefik, Engl.
Supervisor, Reservoir Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 18th day of June, 2015.

Advisory Guidance for Order 12-02-014 Amendment #2

I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.

II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.

III. Injected fluids must be metered, as per section 74 of the Drilling and Production Regulation.

IV. A monthly disposal statement must be submitted to the Commission not later than the 25th day of the month following the reported month, as per section 75 of the Drilling and Production Regulation.