



December 11, 2015

2000-2800-32640-02

Sheldon Stepp, Operations Engineer
Whitecap Resources Inc.
Suite 3800, East Tower 525 – 8th Ave SW
Calgary, AB T2P 1G1

Dear Mr. Stepp,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL, AMENDMENT #1
WHITECAP ET AL BOUNDARY 2-29-84-13 W6M; WA# 7820
BOUNDARY LAKE FIELD – CADOMIN FORMATION**

Approval for disposal of produced water, Order 96-02-004, was issued for the subject well, Cadomin formation, on April 16, 1996. The Commission is presently amending disposal well approvals to conform to current requirements.

The subject well was rig released in February 1992, and produced oil from the Boundary Lake formation between February and March 1993. In July 1996 a workover was done to suspend the Boundary Lake and complete the Cadomin for disposal. Disposal into the Cadomin has been mostly continuous since July 1996, with a cumulative disposal volume of 2,490,000m³. It is noted that there is 92m of casing exposed to injected fluids between the base of Cadomin perforations and the PBDT on top of the Boundary Lake formation. The Baldonnell formation within this interval has developed porosity and could potentially accept disposal fluids if casing and cement integrity were to degrade. This should be taken into account when completing future wellbore integrity testing specified in the attached approval.

Attached please find **Order 96-02-004 Amendment #1** designating an area in the Boundary Lake field – Cadomin formation as a Special Project under section 75 of the *Oil and Gas Activities Act*, for the use of a storage reservoir for the disposal of produced water. This Order contains a number of detailed operational conditions including a maximum wellhead injection pressure, reservoir pressure fill-up limit, and continuous tubing and casing pressure monitoring. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

In certain circumstances, disposal well operation may induce seismicity. The Commission advises that disposal well permit holders monitor seismic events in proximity to the well and be prepared to modify operations to mitigate induced seismicity. Permit holders may monitor seismic events through Natural Resources Canada seismic monitoring network at <http://www.earthquakescanada.nrcan.gc.ca/recent/index-eng.php>.

Should you have any questions, please contact Ron Stefik at (250) 419-4430 or Michelle Harding at (250) 419-4493.

Sincerely,

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

Attachment



ORDER 96-02-004 Amendment #1

- 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 Cadomin formation – in the Boundary Lake field as a special project in the following area:
DLS Twp 84 Rge 13 W6M Section 29 -Lsds 1, 2, 7 and 8.
- 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 Whitecap et al Boundary 2-29-84-13 W6M; WA# 7820 – Cadomin formation (disposal perforations 1186.0 – 1200.0 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 13,695 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 12,654 kPaa, measured at MPP.
 - j) Maintain and manage the well head to prevent surface liquids from entering the well bore through the annulus outside or between casing and conductor strings.
 - k) 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.
 - l) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 11 day of December, 2015.

Advisory Guidance for Order 96-02-004 Amendment #1

- 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 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.
- V. Seismic events must be reported and disposal operations suspended as per section 21.1 of the Drilling and Production Regulation.