

May 22, 2014

7750-2800-32640-02

Brad Makowecki
Crew Energy Inc.
Suite 800, 250 – 5th Street S.W.
Calgary, Alberta
T2P 0R4

Dear Mr. Makowecki:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
CREW SEPTIMUS 13-29-081-18 W6M; WA# 21713
SEPTIMUS FIELD - CADOMIN FORMATION**

Oil and Gas Commission staff have reviewed the application; dated March 28th, 2014 requesting approval to dispose of produced water into the Cadomin formation of the subject well.

The subject well was originally drilled in September 2006 to evaluate the Belloy, Taylor Flat and Kiskatinaw formations. Logging showed no reservoir potential; consequently the well was not completed. In 2013 Crew Energy acquired the well bore and completed the well as a potential Cadomin water disposal well. The Cadomin formation was perforated at 1035 mKB to 1090 mKB, injection tested and fracture stimulated, confirming that the Cadomin formation is suitable for water disposal.

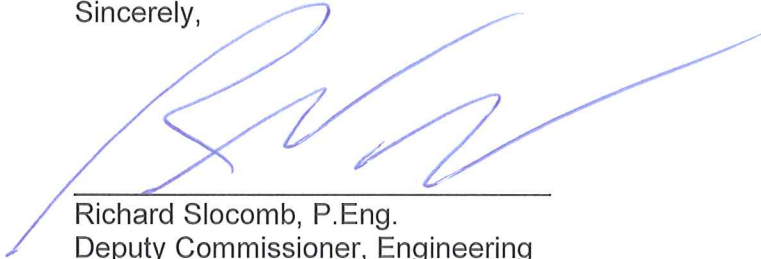
The Commission has concerns regarding the long term effects of having an extensive portion of production casing exposed to high salinity injection fluids; from packer setting depth to well total depth. Therefore, the Commission requires that a hydraulic isolation log be undertaken from well plugged back total depth as per Order condition 2. (j)(i).

Attached please find Order 14-02-006, designating an area in the Septimus field – Cadomin 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 and well stimulation flowback fluid. This Order includes a number of detailed operational conditions including: continuous wellhead measurements, a maximum wellhead injection pressure, 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 Petra Kriescher-Trudgeon at (250) 419-4415 or Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachment

ORDER 14-02-006

1. Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Oil and Gas Commission (Commission) designates the operation and use of a storage reservoir for the disposal of produced water, including flowback from fracturing operations, into the Cadomin formation – Septimus field as a special project in the following area:

DLS Twp 81 Rge 18 W6M Section 29 - Lsds 11, 12, 13 and 14.

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, including well flowback completion fluids, only into the well Crew Septimus 13-29-81-18 W6M; WA# 21713 Cadomin formation, 1035.0 – 1090.0 mKB
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 12,280 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.
 - 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 disposal statement.
 - h) Cease injection upon reaching a maximum formation pressure of 12,160 kPaa.
 - i) 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.
 - j)
 - i) Perform a casing inspection log to plug back depth 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 log on the subject well to plug back depth 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 hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 22nd day of May 2014.

Advisory Guidance for Order 14-02-006

- I. A production packer must be set above the injection interval and the space between the tubing and casing (including the space between the 3 packers) 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.