



April 8, 2015

8120-2010-32640-02

Mike Charles
Sr. Production Engineer
ARC Resources Ltd
1200, 308 – 4th Avenue SW
Calgary, AB T2P 0H7

Dear Mr. Charles:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
ARCRES SUNRISE 13-36-78-18 W6M; WA# 27024
PADDY-CADOTTE FORMATION**

Oil and Gas Commission staff have reviewed the application, dated March 5, 2015, requesting approval to dispose of produced water into the Cadotte formation of the subject well.

The subject well, rig released March 17, 2012, was drilled for the purpose of acid gas disposal into the Belloy formation, but tested noncommercial injectivity. In September/October 2014 the Belloy zone was suspended with a permanent bridge plug and the Cadotte zone was fracture stimulated and tested for produced water disposal. This well is intended to provide proximal disposal capacity for Montney development, with an expected injection rate between 250 – 350 m³/d.

Note that, for disposal/water source purposes in the Sunrise - Dawson Creek area, the Commission has created a formation designation of "Paddy-Cadotte" (code 2010), based on the apparent lack of hydraulic isolation separating the Paddy and Cadotte and anticipated communication between these formations.

Attached please find **Order 15-02-008**, designating an area near the Sunrise field – Paddy-Cadotte 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 to ensure that the subject well is in line with current OGC standards for disposal wells. Additional information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

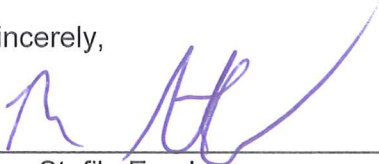
The application proposes reservoir pressure evaluation via a combination of surface monitoring and testing during gas plant maintenance shut-downs. This approval requires annual testing. Less frequent testing may be requested following sufficient annual testing to characterize reservoir behavior.

It has been noted that a surface casing vent flow was measured on the subject well June 22, 2011. The SCVF was determined to be non-serious by Commission staff. However the Commission expects routine tests for SVCFs to be conducted during well servicing operations, in order to prove safe well operation.

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 the Natural Resources Canada seismic monitoring network at <http://www.earthquakescanada.nrcan.gc.ca/recent/index-eng.php>

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

Sincerely,



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

Attachment

ORDER 15-02-008

- 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 Paddy-Cadotte formation – near the Sunrise field as a special project in the following area:

DLS Twp 78 Rge 18 W6M Section 36 - 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 only into the well ARGRES SUNRISE 13-36-78-18; WA# 27024 – Paddy-Cadotte formation (disposal perforations 881.0 – 899.8 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 13,070 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 6,740 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, Eng.L.
Supervisor, Reservoir Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 8th day of April 2015.

Advisory Guidance for Order 15-02-008

- 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.