



January 16, 2015

6600-2600-32640-02

Mike Charles  
ARC Resources Ltd.  
1200, 308 – 4<sup>th</sup> Avenue SW  
Calgary AB T2P OH7

Dear Mr. Charles:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT  
ARCRES PARKLAND 04-08-081-16 W6M (WA #22362)  
PARKLAND FIELD - BLUESKY FORMATION**

Oil and Gas Commission staff have reviewed your application, dated November 4, 2014 requesting approval to dispose of produced water into the Bluesky formation of the subject well.

In October 2007 the lower Montney was perforated (from 2082.0 – 2087.0 mKB) and fracture stimulated. After swabbing the well was dead and a bridge plug was set at 2077.0 mKB. The well was then completed and fracture stimulated in the upper Montney (2032.0 – 2038.0 mKB) and the zone was subsequently abandoned with a permanent bridge plug set at 2027 mKB and capped with 8 linear metres of cement.

In June 2014 the Bluesky formation was perforated from 1162.0 – 1176.0 mKB. The zone was swabbed to determine inflow and a fluid sample was analyzed. While swabbing the fluid level remained static at 510.0 mKB. No gas or hydrocarbon fluids were present during swabbing operations.

An injectivity test and a mini-frac were performed on the well and then the Bluesky formation was fracture stimulated.

An injection test was then performed using 500 m<sup>3</sup> produced water. Initial injection was at 260 m<sup>3</sup>/day at 5,700 kPa wellhead injection pressure. The injection pressure was re-calculated and fluid was pumped at a maximum injection pressure of 13,000 kPa. An extended test of 300 m<sup>3</sup> of produced water was performed at 10,400 kPa while pumping at 1,050 m<sup>3</sup>/d.

Attached please find Order 15-02-001, designating an area in the Parkland field – Bluesky 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).

It is noted that Induced Seismicity events have been observed in this area in the section at the Montney interval and deeper. The Commission considers there to be a minimal risk higher in the stratigraphic section at the Bluesky elevation. The existence of monitoring equipment in the area will have the ability to observe any further events.

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>

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 Janet Davies at (250) 419-4470 or Ron Stefik at (250) 419-4430.

Sincerely,



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

ORDER 15-02-001

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 disposal of produced salt water into the Bluesky formation – Parkland field as a special project in the following area:

DLS            Twp 081 Rge 16    Sec 08    LSD 03, 04, 05, 06    W6M

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 ARCRES Parkland 04-08-081-16 W6M; WA# 22362 – Bluesky formation (1162.0 to 1176.0 mKB MD).
- b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 12,900 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 a reservoir pressure test on the formation in the subject well annually, 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 10,130 kPaa.
- 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 injection.  
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 injection.
- k) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.

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

DATED AT the City of Victoria, in the Province of British Columbia, this 16<sup>th</sup> day of January, 2015.

## Advisory Guidance for Order 15-02-001

- 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 25<sup>th</sup> day of the month following the reported month, as per section 75 of the Drilling and Production Regulation.