

February 19, 2020

8120-2010-32640-02

Jaryn Flower, P.Eng
Production Engineer, NEBC
ARC Resources Ltd.
1200, 308- 4th Avenue S.W.
Calgary, AB T2P OH7

Dear Mr. Flower,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
ARCRES SUNRISE 2-25-78-18; WA# 24139
SUNRISE FIELD – PADDY-CADOTTE FORMATION**

The Commission has reviewed an application from Oviniv Canada ULC (Oviniv), dated October 7th, 2019, requesting an increase in the maximum reservoir storage pressure in the Paddy-Cadotte formation for four disposal wells in the Sunrise area. The application was in response to Commission correspondence to Oviniv dated July 4, 2019, which previously noted reservoir pressures approaching limit values in the associated Section 75 Special Project approval Orders. ARC Resources Ltd. (ARC)'s two disposal wells, Arcres Sunrise 2-25-78-18 (WA 24139) and Arcres Sunrise C13-30-78-17 (WA 30475), are likely in communication with Oviniv's disposal and source wells in the Paddy-Cadotte and as such, the new maximum reservoir pressure for Oviniv's disposal wells will also apply to ARC's disposal wells.

The subject well was drilled vertically in 2008 and completed in the Montney formation as a gas producer. In July 2014 the Montney zone was abandoned and the Cadotte zone was completed in August 2014. Test results confirmed that the wellbore and the Cadotte formation were suitable for disposal operations and on January 20th, 2015, this well was approved for disposal in the Cadotte formation and disposal operations began in August of 2015 and have continued to date.

Attached please find **Order 15-02-002 Amendment #1**, designating an area in 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. Order condition 2i) raises the maximum allowed formation pressure to a value equal to a hydrostatic column of water to surface elevation. Note that although this well was completed in the Cadotte formation, the Commission has defined a combined Paddy-Cadotte zone for the purposed of source and disposal due to the areal connectivity of the zones. All other conditions remain unchanged.

In certain circumstances, disposal well operation may induce seismicity of values that require modification of operations to mitigate.

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure.

Should you have any questions, please contact Logan Gray at (250) 419-4465 or Ron Stefik at (250) 419-4430.

Sincerely,



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

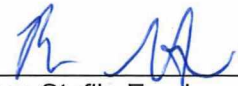
Attachment

ORDER 15-02-002 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, including flowback from fracturing operations, into the Sunrise field – Paddy-Cadotte formation as a special project in the following area:

DLS Twp 78 Rge 18 W6M Section 25 – 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 water only into the well ARCRES Sunrise 2-25-78-18; WA# 24139 – Paddy-Cadotte formation from 897.5 – 915.4 mKB MD.
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 13,400 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) Include the disposal operating hours and the maximum injection pressure value on the monthly Petrinex disposal statement.
 - f) Cease injection and notify the Commission immediately if there are any indications that hydraulic isolation is lost in the wellbore or formation.
 - g) Conduct and submit an annual surface casing vent flow test report to the Commission within 30 days of the completion of the test.
 - 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 8,900 kPaa, measured at 906.4 mKB TVD.
 - 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 19th day of February, 2020.



ORDER 15-02-002 Amendment #1

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Advisory Guidance for Order 15-02-002 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 conducted and the associated report must be submitted to the Commission within 30 days of test completion, 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 via Petrinex not later than the 20th 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.