

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 C13-30-78-17; WA# 30475
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 deviated well was purpose-drilled for disposal in July of 2018. Test results confirmed that the wellbore and the Paddy-Cadotte formation were suitable for disposal operations and on March 7th, 2019, this well was approved for disposal in the Paddy-Cadotte formation. Disposal operations began in March of 2019 and were last reported for July 2019.

Attached please find **Order 19-02-004 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. 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 19-02-004 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, including flowback from fracturing operations, into the Sunrise field – Paddy-Cadotte formation as a special project in the following area:

DLS Twp 78 Rge 17 W6M Section 30 – 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 water only into the well ARGRES Sunrise C13-30-78-17; WA# 30475 – Paddy-Cadotte formation from 974.0 – 989.0 mKB MD.
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 13,000 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 8,725 kPaa, measured at 889.9 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 19-02-004 Amendment #1

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Advisory Guidance for Order 19-02-004 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 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.