BRITISH COLUMBIA ENERGY REGULATOR

April 13, 2023 8120-2010-32640-02

Kristopher Kruse, P.Eng.
Senior Production Engineer
ARC Resources Ltd.
Suite 1200, 308 - 4th Ave SW
Calgary, AB T2P 0H7

Dear Mr. Kruse:

RE: PRODUCED WATER DISPOSAL & WATER SOURCE RESERVOIR PRESSURE MANAGEMENT
SUNRISE FIELD – PADDY-CADOTTE FORMATION

The BC Energy Regulator (Regulator) has reviewed ARC Resources Ltd. (ARC)'s application dated March 24, 2023, requesting consideration of maximum reservoir storage pressure equitable to Ovintiv Canada ULC (Ovintiv)'s Paddy-Cadotte water hub reservoir pressure management. This followed a virtual meeting on the topic between the Regulator and ARC on March 10th, 2023.

The Paddy-Cadotte appears to be a continuous reservoir over a large area which was below normal hydrostatic pressure at the time of discovery. The Regulator has issued Special Project Orders, under section 75 of the Oil and Gas Activities Act, for the disposal of produced water into this reservoir via wells operated by both ARC and Ovintiv. Ovintiv also operates several dedicated water source and observation wells completed in the same reservoir.

Water sourcing and produced water disposal operations have been ongoing for several years, with reservoir pressure testing, monitoring and reporting occurring in disposal, source and observation wells. Testing results indicate good reservoir transmissibility and far field source wells exhibit pressure communication from disposal wells but continue to remain below the maximum approved pressure. As this formation is extensive and is subject to dynamic activity of injection and withdrawal, instantaneous measurement of reservoir pressure at specific locations varies significantly. This information, together with geologic mapping and petrophysical and reservoir parameters have been used by Ovintiv to construct a 3-dimensional reservoir model.

Following several communications between the Regulator and the Ovintiv, an understanding was reached, communicated by letter dated June 22, 2021, that Ovintiv's model would be utilized in the interpretation of the Paddy-Cadotte reservoir pressure in relation to the maximum allowed reservoir storage pressure. This understanding was subject to several requirements, including:

- Measurement of sourcing (withdraw) and disposal volumes,
- Monthly pressure measurement and reporting from source wells,
- Initial pressure measurement at any new Paddy-Cadotte disposal or source wells,
- At an interval of no more than two years, conduct field wide quiescent pressure stabilization and measurement,
- Ensure disposal volume and pressure data from other permit holders is accounted for in ongoing pressure measurement, modeling, and forecasts,
- Updated 3-dimensional reservoir modelling and fall-off predictions as additional data becomes available.
- Annual presentation and reporting of reservoir performance including model updates to the Regulator.

Reservoir data and model results indicate that ARC's two Paddy-Cadotte disposal wells, ARCRes Sunrise 2-25-78-18 (WA# 24139) and ARCRes Sunrise C13-30-78-17 (WA# 30475), are in communication with Ovintiv's disposal and source wells. It is the Regulator's understanding that ARC has been working with and supplying well information to Ovintiv in order to support the reservoir model, and that Ovintiv has been sharing the results of the model with ARC.

The Regulator concurs that similar consideration of ARC's two Paddy-Cadotte disposal wells, WA# 24139 and WA#30475, is appropriate. Reservoir pressure values measured during testing will not be determinative of the disposal reservoir of having reached the maximum storage pressure, in deference to the modelling of the average reservoir pressure. It is expected that ARC and Ovintiv coordinate the field wide quiescent reservoir pressure tests, and comparable pressure transient analyses to allow for further validation of the model results. Continued sharing of information on reservoir management between ARC and Ovintiv is necessary for proper reservoir pressure management.

It is incumbent upon Ovintiv and ARC to manage the Paddy-Cadotte reservoir such that operators in the area looking to develop resources should be able to drill with reasonable and practicable mud weights that would enable well control and borehole stability.

As an 'open system' reservoir with dynamic use of both disposal and sourcing, this unique approach to regulation of the Paddy-Cadotte is appropriate. Any significant change to reservoir performance understanding, or failure by ARC or Ovintiv to meet expectations set out in this letter or the June 22nd, 2021 letter, may be grounds for amendment to approvals or reversion to a stricter interpretation of current reservoir pressure monitoring requirements. The conditions of OGAA section 75 approval orders for disposal wells remain in effect, with the understanding that this dynamic reservoir management strategy will result in the wells being within the approved reservoir storage pressure prior to their decommissioning.

Should you have any questions, please contact the undersigned at (250) 419-4430.

Sincerely,

Ron Stefik, P.L.Eng.
Supervisor, Reservoir Engineering
BC Energy Regulator

CC Russ Brausee, P.Eng.
Manager, COA Infrastructure & Water
Ovintiv Canada ULC