

April 30, 2019

8120-2800-32640-02

Nicholas Haddow
Regulatory Specialist
AQT Water Management (Canada) Inc.
700 – 1816 Crowchild Trail N.W.
Calgary, AB, T2M 3Y7

Dear Mr. Haddow,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL; AMENDMENT #2
AQTWM SUNRISE 7-24-78-17 W6M; WA# 35043
SUNRISE FIELD – CADOMIN FORMATION**

Approval 18-02-002 for a 1,500 m³ extended injectivity test into the Cadomin zone was granted on January 24, 2018. Order 18-02-002 Amendment #1 was granted March 8, 2018, designating an area near the Sunrise field, Cadomin formation, for the operation and use of a storage reservoir for the disposal of produced water. The Commission has reviewed the most recent groundwater sampling report submitted by AQT Water management (Canada) Inc. and has developed requirements for groundwater monitoring for this wellsite.

Attached please find **Order 18-02-002 Amendment #2**, designating an area near the Sunrise field – in the Cadomin 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 amendment contains a new Appendix A – Groundwater Monitoring Requirements. The Order also updates existing conditions to refer to Petrinex where applicable and removes the requirement to complete an initial inspection.

Please note that disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure, as per condition 2(b).

Should you have any questions, please contact Kathryn Archibald at (250) 419-4406 or Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachments



ORDER 18-02-002 Amendment #2

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

DLS Twp 78 Rge 17 W6M Section 24 – 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 produced water only into the well AQTWM Sunrise 7-24-78-17; WA# 35043 – Cadomin formation (perforations 1578.0 – 1606.0 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 19,710 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 in Petrinex.
 - 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 18,670 kPaa, measured at 1592 mKB.
 - 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.

A handwritten signature in black ink, appearing to read "Ron Stefik".

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

DATED AT the City of Victoria, in the Province of British Columbia, this 30th day of April, 2019.



Advisory Guidance for Order 18-02-002 Amendment #2

- 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 submitted, 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.

Appendix A – Groundwater Monitoring Requirements

AQTWM Sunrise 7-24-78-17 (WA# 35043) Produced Water Disposal

The Commission recognizes that AQT Water Management (Canada) Inc. has, as a stewardship initiative, installed groundwater monitoring wells at the wellsite and collected baseline samples. Should AQT Water Management (Canada) Inc. continue with the groundwater sampling program, all results shall be reported to the Commission. The following sampling and reporting program is recommended:

1. The collection of groundwater samples from the monitoring wells at the site on an annual basis, starting summer of fall field season 2019, and analysis for general water chemistry parameters including Total Dissolved Solids (TDS), cations and anions. Groundwater samples shall be collected using standard environmental sampling and handling protocols consistent with previous sampling.
2. Annual measurement of static water levels in the monitoring wells.
3. Groundwater monitoring reports shall be prepared by a qualified professional and submitted to the Commission on an annual basis. Reports shall document the field methods undertaken, document the groundwater monitoring results and analytical results, and include tabular comparison to previous sampling and monitoring results.

Note that the Commission may impose specific requirements for groundwater sampling, further site investigation, or reporting at any time.

Submission of Documentation

For each report submitted to the Commission;

- Sampling procedures and date shall be documented and any relevant site observation should be noted.
- Monitoring and sampling results shall be presented in tabular form with appropriate BC comparison criteria.
- Tables shall be presented to allow for comparison of groundwater sampling results collected on different dates from the same well.
- Laboratory analytical reports for the sampling shall be appended to the report.
- Laboratory analytical reports may be requested by the Commission at any time prior to the submission of the annual report.