

September 11, 2020

8120-2600-32640-02

Nicholas Haddow
Regulatory Specialist
AQT Water Management Inc.
700 – 1816 Crowchild Trail NW
Calgary, AB T2M 3Y7

Dear Mr. Haddow,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT
AQT SUNRISE 7-24-78-17; WA# 35043
SUNRISE FIELD – BLUESKY FORMATION**

The subject well was drilled and completed in the Cadomin and Nikanassin formations in 2017. Approval for disposal into the Cadomin formation was granted in 2018 by Order 18-02-002 while the Nikanassin was suspended and later abandoned. Disposal occurred from March 2018 until November 2019 with a cumulative injection volume of 102,310 m³. In early 2020, a pressure test showed that the Cadomin had reached its maximum allowed reservoir pressure and it was zonally abandoned and Order 18-02-002 was cancelled. The Gething formation was perforated and found to be unsuitable for disposal and was abandoned. On July 4, 2020, the Bluesky formation was perforated and showed potential for disposal and was hydraulically fractured on July 27. On August 7th, 2020 the well was approved for an extended injectivity test in the Bluesky formation. The results of the injectivity testing were included in AQT's August 19th, 2020 disposal application.

Attached please find **Order 20-02-007 Amendment #1**, designating an area in the Sunrise 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 injection of produced water. This Order includes a number of detailed operational, measurement and reporting conditions. The maximum wellhead injection pressure considers the formation fracture pressure measured at this well and at proximal Bluesky well locations, as representative of the value within the area of fluid contact. The ultimate reservoir pressure limit is based on typical area Bluesky initial pressure gradient values. 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). Groundwater monitoring requirements are outlined in the attached Appendix A.

For the inspection requirement of Order condition 2n), please arrange via email to OGCPipelines.Facilities@bcogc.ca.

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure. It is the responsibility of the permit holder make adjustments to wellhead injection pressure.

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

Sincerely,



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

Attachment



IN THE MATTER of the application from CG Engineering Ltd. on behalf of AQT Water Management Inc. to the Oil and Gas Commission (Commission) dated August 19, 2020 requesting disposal approval:

ORDER 20-02-007 Amendment #1

- a) Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Commission designates the temporary operation and use of a storage reservoir for produced water, including flowback from fracturing operations, in the Sunrise field – Bluesky formation as a special project in the following area:

DLS Twp 78 Rge 17 W6M Section 24 – LSDs 1, 2, 7, and 8

- b) 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 into the well AQT Sunrise 7-24-78-27; WA# 35043 Bluesky formation from 1,411.0 – 1,420.0 mKB MD.
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 16,375 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 report.
 - f) Cease injection and notify the Commission at Reservoir@bcogc.ca 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 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 15,400 kPaa, measured at 1,415.5 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.
 - l) Complete an inspection, satisfactory to the Commission, within 4 weeks of initial disposal operations.

A handwritten signature in blue ink, appearing to read 'R. 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 11th day of September 2020.

Advisory Guidance for Order 20-02-007 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.

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.