



April 1, 2020

3600-2885-32640-02

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

Dear Mr. Haddow:

**RE: PRODUCED WATER AND NON-HAZARDOUS WASTE DISPOSAL  
SPECIAL PROJECT APPROVAL; AMENDMENT #4  
AQT FT ST JOHN 6-24-084-19; WA# 3060  
FORT ST JOHN FIELD – CADOMIN-NIKANASSIN FORMATION**

Approval for disposal of non-hazardous waste and produced water was issued for the subject well, Cadomin formation, on February 3, 2010. Order 10-02-001 Amendment #1 was issued on December 5, 2014, updating approval conditions to conform to current requirements. Order 10-02-001 Amendment #2 was issued on June 10, 2016, revising the completed disposal zone into two formations; Cadomin and Nikanassin. Amendment #3 was issued May 29, 2019, revising the disposal zones into a single Cadomin-Nikanassin zone, reducing the maximum wellhead pressure, and revising the groundwater monitoring requirements. Order 10-02-001 Amendment #3 was suspended on February 20, 2020 because the required casing inspection and hydraulic temperature isolation logs had not been performed.

A set of perforations at 1052.5 to 1058.7 mKB (Gething formation), outside of the approved disposal formation interval, were discovered upon completion of a casing inspection log on February 28, 2020. AQT Water Management Inc. (AQT) performed a cement squeeze on March 5, 2020, to isolate the Gething formation from the Cadomin-Nikanassin disposal zone. The packer is now set with the center element at 1065.7 mKB; providing additional isolation from the Cadomin-Nikanassin perforations located at 1071.5 to 1120.0 mKB. AQT has submitted packer isolation testing that indicates the cement squeeze passes both a positive and a negative pressure test.

Attached please find **Order 10-02-001 Amendment #4**, designating an area in the Fort St John field – Cadomin-Nikanassin 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 and non-hazardous fluid. This amendment contains a number of updated conditions to monitor the cement squeeze including: submission of continuous casing and tubing pressure, injection rate, and fluid temperature on a monthly basis; requiring the well be shut-in if the casing pressure exceeds 400 kPag; and requiring a casing inspection log to be conducted at an interval of not more than five years. The amendment also clarifies the procedure for notifying the Commission should a loss of hydraulic isolation occur. Issuance of Amendment #4 removes the suspension of February 20, 2020.

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

Sincerely,

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

Attachments

#### ORDER 10-02-001 Amendment #4

- 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 non-hazardous waste as well as produced water, including flowback from fracturing operations, into the Cadomin and Nikanassin formations – Fort St John field as a special project in the following area:

DLS Twp 84 Rge 19 W6M Section 24 - Lsds 3, 4, 5, and 6
- 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 non-hazardous waste and produced water only into the well AQT Ft St John 06-24-84-19; WA# 3060 Cadomin-Nikanassin (1066.0 – 1120.0 mKB) formation.
  - b) Hold a valid Permit under the Environmental Management Act for the disposal of non-hazardous waste.
  - c) Not exceed an injection pressure, measured at the wellhead on the subject well, of 9,780 kPag or the pressure required to fracture the formation, whichever is lesser.
  - d) Inject only through tubing with a packer set as near as is practical above the injection interval.
  - e) Continually measure and record electronically the wellhead casing and tubing pressures, the injection rate, and the temperature of the fluid being injected.
  - f) Cease injection and notify the Commission at [reservoir@bcogc.ca](mailto:reservoir@bcogc.ca) immediately if the casing pressure exceeds 400 kPag.
  - g) Submit data recorded under 2e) for each calendar month, in csv or Excel format, to [reservoir@bcogc.ca](mailto:reservoir@bcogc.ca) within the first 10 days of the following month.
  - h) Cease injection and notify the Commission at [reservoir@bcogc.ca](mailto:reservoir@bcogc.ca) immediately if there are any indications that hydraulic isolation is lost in the wellbore or formation.
  - i) Conduct two packer isolation tests each calendar year with a minimum of four months between tests and submit the test report to the Commission within 30 days of the completion of the test.
  - j) Include the disposal operating hours and the maximum injection pressure value in Petrinex.
  - k) Cease injection upon reaching a maximum formation pressure of 11,670 kPaa at 1093 mKB.
  - l) Maintain and manage the well head to prevent surface liquids from entering the well bore through the annulus outside or between casing and conductor strings.
  - m) 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.
  - n)
    - 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 5 years, commencing from the date of initial disposal operation into the Cadomin and Nikanassin zones.
    - ii) Perform an annual hydraulic isolation log on the subject well and submit results to the Commission within 30 days of the completion of logging.
  - o) Not conduct a hydraulic fracture stimulation on any formation in the subject well without prior Commission approval.

**ORDER 10-02-001 Amendment #4**

p) Implement a groundwater monitoring program as detailed in Appendix A.

A handwritten signature in blue ink, appearing to read 'R Stefik'.

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

DATED AT the City of Victoria, in the Province of British Columbia, this 1<sup>st</sup> day of April 2020.

**Advisory Guidance for Order 10-02-001 Amendment #4**

- 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. 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 20<sup>th</sup> 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**

**AQT Ft St John 6-24-84-19 (WA# 3060) Non-Hazardous Waste and Produced Water Disposal**

1. The collection of groundwater samples from the three monitoring wells at the site on an annual basis, starting summer or 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. Continued monitoring of groundwater levels in the monitoring wells using a pressure transducer, with the installation of equipment to enable correction of readings for barometric pressure.
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 (corrected for barometric pressure) and analytical results, and include tabular comparison to previous sampling and monitoring results.
4. Additional documentation and/or further sampling or investigation may be required by the Commission based on the review of submitted documentation.

**Submission of Documentation**

Groundwater Monitoring Reports for the long term groundwater monitoring/sampling program (3, above) shall be submitted to the Commission annually. For each annual report;

- 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.