

March 11, 2016

3600-2800-32640-02

Nicholas Haddow, Regulatory Specialist
Aqua Terra Water Management Inc.
#108, 32 Burnt Lake Crescent
Red Deer, AB T4S 0K6

Dear Mr. Haddow:

**RE: PRODUCED WATER AND NON-HAZARDOUS WASTE DISPOSAL
SPECIAL PROJECT APPROVAL; AMENDMENT #1
AQTWM FT ST JOHN 11-12-084-19 W6M; WA# 3010
FORT ST JOHN FIELD – CADOMIN FORMATION**

Oil and Gas Commission staff have reviewed the application from Aqua Terra Water Management Inc, received January 18, 2016, requesting approval to dispose of non-hazardous waste and produced water into the Cadomin formation of the subject well. Order 16-02-002 was issued on January 22, 2016 for an extended injectivity test of 500m³ into the Cadomin formation.

The well 11-12 was utilized for disposal into the Halfway formation from July 1989 until the December 2015 suspension due to reaching storage pressure limit. The Cadomin formation has been completed and tested. A number of disposal risk factors are identified for this well, including corrosion at 348mKB and proximity to community groundwater wells. In addition to well operation mitigation measures, a shallow groundwater sampling program is required. Aqua Terra has submitted information from a previous well site groundwater monitoring system, including monitor well locations and sampling analysis. This configuration addresses a portion of the Commission's requirement for current groundwater monitoring. Aqua Terra is hereby approved to start disposal operation into the Cadomin formation, subject to the conditions of this Order, and with a forthcoming amendment which will detail requirements for the groundwater monitoring wells program.

Attached please find **Order 16-02-002 Amendment #1**, designating an area in the Fort St John field – 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 and non-hazardous fluid. This Order includes a number of detailed operational conditions. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

The Ministry of Environment identifies the type of effluent approved for injection in the separate Waste Discharge Permit, granted under the Environmental Management Act.

In certain circumstances, disposal well operation may induce seismicity. The Commission advises that disposal well permit holders monitor seismic events in proximity to the well and be prepared to modify operations to mitigate induced seismicity. Permit holders may monitor seismic events through the Natural Resources Canada seismic monitoring network at <http://www.earthquakescanada.nrcan.gc.ca/recent/index-eng.php>

Should you have any questions, please contact Michelle Harding at (250) 419-4493 or the undersigned at (250) 419-4430.

Sincerely,



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

Attachment




ORDER 16-02-002 Amendment #1

1. Under Section 75(1)(d) of the *Oil and Gas Activities Act*, the Oil and Gas Commission (Commission) designates the operation and use of a storage reservoir for the disposal of produced water, including flowback from fracturing operations, and non-hazardous waste into the Cadomin formation – Fort St John field as a special project in the following area:

DLS Twp 84 Rge 19 W6M Section 12 - 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 produced water and non-hazardous waste only into the well AQTWM Ft St John 11-12-84-19 W6M; WA# 3010 Cadomin formation (perforations from 1030.5 to 1067.0 mKB).
 - 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 9,480 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 the wellhead casing and tubing pressures electronically.
 - f) Cease injection and notify the Commission immediately if hydraulic isolation is lost in the wellbore or formation.
 - g) Submit the annual packer isolation test report to the Commission within 30 days of the completion of the test.
 - h) Include the disposal operating hours and the maximum injection pressure value on the monthly disposal statement.
 - i) Cease injection upon reaching a maximum formation pressure of 11,485 kPaa measured at MPP.
 - j) 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.
 - k) 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.
 - l)
 - 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.
 - m) 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 11th day of March 2016.

Advisory Guidance for Order 16-02-002 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 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 not later than the 25th 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.