



June 21, 2017

2940-4100-32640-02

Jarred Anstett
Progress Energy Canada Ltd.
1200, 205 5th Ave S.W.
Calgary, Alberta T2P 2V7

Dear Mr Anstett,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL; AMENDMENT #1
PROGRESS HZ KAHTA c-61-K/94-G-07; WA# 13815
CARIBOU FIELD – BALDONNEL FORMATION**

Approval for disposal of produced water, Order 09-02-002, was issued for the subject well, Baldonnel formation, on February 12, 2009. The Commission is presently amending disposal well approvals to conform to current requirements.

The subject well was initially drilled vertically down to a depth of 1695 mKB, but this drilling event was subsequently abandoned with cement plugs. In August 2001 the well was re-entered and drilled horizontally into the Baldonnel. The Baldonnel was not commercially productive, and disposal has been occurring into the zone since March 2009 with a total volume of 171,044 m³ to date. In January 2017, a temperature log and casing inspection log were run to check wellbore integrity and hydraulic isolation. In March 2017 the tubing was replaced due to a hole discovered in the tubing.

Attached please find **Order 09-02-002 Amendment #1**, designating an area in the Caribou field – Baldonnel 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 Order contains a number of detailed operational conditions, including continuous tubing and casing pressure monitoring requirements, a maximum wellhead injection pressure and an ultimate reservoir pressure limit. Note that the January 2017 temperature log was run following the logging guidelines outlined in the AER Directive 51 Appendix 2 "Method 2" for temperature surveys. The Commission expects that temperature logs in the future will be run using the OGC methodology outlined in the Water Service Well Summary Information document available on the Commission's website: <http://www.bcogc.ca/water-service-well-summary-information>.

In certain circumstances, disposal well operation may induce seismicity of values that require modification of operations to mitigate.

Disposal of fluid with high total dissolved solids content requires adjustment of the wellhead injection pressure to remain below formation fracture pressure

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

Sincerely,


A handwritten signature in black ink, appearing to read "Ron Stefik", written over a horizontal line.

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

Attachment

ORDER 09-02-002 Amendment #1

- 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 Baldonnel formation – Caribou field as a special project in the following area:
NTS 94-G-07 Block K Unit 61, and Block J Units 60 and 70
- 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 Progress Hz Kahta c-61-K/94-G-07; WA# 13815 – Baldonnel formation (disposal perforations 1458.0 – 2305.0 mKB MD).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 8,215 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 on the monthly BC-S18 disposal statement.
 - 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 14,580 kPaa, measured at 1416.3 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.
 - 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.
 - k) 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 21st day of June, 2017.



Advisory Guidance for Order 09-02-002 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.