



June 23, 2016

7780-4800-32640-02

Glen Klein, P.Eng
Lightstream Resources Ltd.
209, 6614 – 50th Ave
Drayton Valley, AB, T7A 1R7

Dear Mr Klein,

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL, AMENDMENT #1
LTS SILVER b-6-D/94-H-11; WA# 3964
SILVER FIELD – HALFWAY 'B' POOL**

Approval for disposal of produced water, Order 96-02-005, was issued for the subject well, Halfway formation, on November 25, 1996. The Commission is presently amending disposal well approvals to conform to current requirements.

The subject well was drilled into the single well Halfway 'B' pool, and produced gas between 1978 and 1996. Disposal commenced in September 1999. This depleted pool has significant remaining disposal capacity, as evidenced by a July 2015 pressure test showing a reservoir pressure of 30% of initial pool pressure after 16 years of disposal. New integrity testing shows that the casing condition is excellent, and hydraulic isolation is maintained. A cement bond log was approved to be delayed by 5 years based on low risk factors on the well.

Attached please find **Order 96-02-005 Amendment #1**, designating an area in the Silver field – Halfway 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 a maximum wellhead injection pressure, reservoir pressure fill-up limit, and continuous tubing and casing pressure monitoring. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

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,


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

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

Attachment

ORDER 96-02-005 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 Halfway 'B' pool – in the Silver field as a special project in the following area:
NTS 94-H-11 Block D Unit 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 produced water only into the well LTS Silver b-6-D/94-H-11; WA# 3964 – Halfway formation (disposal perforations 1179.0 – 1185.1 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 2,670 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 a reservoir pressure test on the formation in the subject well once every 2 years, 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 9,430 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)
 - i) Perform a cement bond log on the subject well at the next workover to pull tubing, or by July 2021, whichever comes first. Submit results to the Commission within 30 days of the completion of logging.
 - ii) 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 once every 15 years.
 - iii) 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 once every 6 years.
 - l) 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 23rd day of June, 2016.



Advisory Guidance for Order 96-02-005 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.