



January 20, 2015

8120-2200-32640-02

Mike Charles
ARC Resources Ltd.
1200, 308 – 4th Avenue SW
Calgary AB T2P OH7

Dear Mr. Charles:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT
ARCRES SUNRISE 02-25-078-18 W6M (WA #24139)
SUNRISE FIELD - CADOTTE FORMATION**

Oil and Gas Commission staff have reviewed your application, dated December 5, 2014 requesting approval to dispose of produced water into the Cadotte formation of the subject well.

The subject well was drilled in 2008 into the Montney formation and was completed as a vertical Montney producer. As part of ARC's water strategy, this well was identified as a preferred water well conversion candidate and work began in July 2014 to abandon the Montney, then complete and test the Cadotte. Test results confirmed this wellbore and the Cadotte formation are suitable for disposal operations.

Attached please find Order 15-02-002, designating an area in the Sunrise field – Cadotte 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 includes a number of detailed operational conditions including: continuous tubing and casing pressure measurements, a maximum wellhead injection pressure, an ultimate reservoir pressure limit, as well as wellbore integrity monitoring and reporting requirements. 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).

Though there have been no induced seismicity events observed in this area, the Commission advises disposal well permit holders to 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>

Monthly reporting requirement instructions are posted at <http://www.bcogc.ca/node/11152/download>. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

Should you have any questions, please contact Michelle Gaucher at (250) 419-4482 or Ron Stefik at (250) 419-4430.

Sincerely,

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

Attachment

ORDER 15-02-002

- 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 disposal of produced salt water into the Cadotte formation – Sunrise field as a special project in the following area:

DLS Twp 078 Rge 18 Sec 25 LSD 01, 02, 07, 08 W6M

- 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, including well flowback completion fluids only into the vertical well ARCRES Sunrise 02-25-078-18 W6M; WA# 24139 – Cadotte formation (897.5 to 915.4 mKB MD).
- b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 13,400 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 annually, 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 6,820 kPaa.
- 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 injection.
 - 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 injection.
- 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 20th day of January, 2015.

Advisory Guidance for Order 15-02-002

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered, 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.



March 10, 2015

8115-2010-32640-02

Aaron White
Exploitation Engineer
Murphy Oil Company Ltd.
4000, 520 – 3rd Avenue SW
Calgary AB T2P 0R3

Dear Mr. White:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT
MURPHY SUNDOWN D16-01-78-18; (WA #26366)
SUNDOWN FIELD – PADDY-CADOTTE FORMATION**

Oil and Gas Commission staff have reviewed your application, dated January 20, 2015, requesting approval to dispose of produced water into the Paddy formation of the subject well. This vertical well was purpose drilled for disposal to a total depth of 1,145 mKB in May of 2010. In August of 2013, the Paddy formation was perforated and tested for reservoir pressure, formation breakdown pressure, cement integrity and injectivity. Due to skin damage on the well, two acidize operations were conducted with the result of improved injectivity.

The OGC has created a compound Paddy-Cadotte formation designation in recognition that these formations are geologically unsegregated in this area, providing aggregate disposal capacity.

Attached please find Order 15-02-004, designating an area in the Sundown field – Paddy-Cadotte 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 includes a number of detailed operational conditions including: continuous tubing and casing pressure measurements, a maximum wellhead injection pressure, an ultimate reservoir pressure limit, as well as wellbore integrity monitoring and reporting requirements. 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).

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>

Monthly reporting requirement instructions are posted at <http://www.bcogc.ca/node/11152/download>. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

Should you have any questions, please contact Michelle Gaucher at (250) 419-4482 or Ron Stefik at (250) 419-4430.

Sincerely,

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

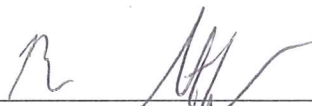
Attachment

ORDER 15-02-004

- 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 disposal of produced water into the Paddy-Cadotte formation – Blueberry field as a special project in the following area:

DLS Twp 78 Rge 18 W6M Sec 1 Lsd 09, 10, 15, 16

- 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, including well flowback completion fluids only, into the well Murphy Sundown D16-01-078-18W6M; WA26366 – Paddy-Cadotte formation (1012.0 to 1042.0 mKB MD).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 12,300 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 annually, 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 7,400 kPaa.
 - 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 injection.
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 injection.
 - 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 10th day of March, 2015.

Advisory Guidance for Order 15-02-004

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered, 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.



April 8, 2015

8120-2010-32640-02

Mike Charles
Sr. Production Engineer
ARC Resources Ltd
1200, 308 – 4th Avenue SW
Calgary, AB T2P 0H7

Dear Mr. Charles:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPROVAL
ARCRES SUNRISE 13-36-78-18 W6M; WA# 27024
PADDY-CADOTTE FORMATION**

Oil and Gas Commission staff have reviewed the application, dated March 5, 2015, requesting approval to dispose of produced water into the Cadotte formation of the subject well.

The subject well, rig released March 17, 2012, was drilled for the purpose of acid gas disposal into the Belloy formation, but tested noncommercial injectivity. In September/October 2014 the Belloy zone was suspended with a permanent bridge plug and the Cadotte zone was fracture stimulated and tested for produced water disposal. This well is intended to provide proximal disposal capacity for Montney development, with an expected injection rate between 250 – 350 m³/d.

Note that, for disposal/water source purposes in the Sunrise - Dawson Creek area, the Commission has created a formation designation of "Paddy-Cadotte" (code 2010), based on the apparent lack of hydraulic isolation separating the Paddy and Cadotte and anticipated communication between these formations.

Attached please find **Order 15-02-008**, designating an area near the Sunrise field – Paddy-Cadotte 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 includes a number of detailed operational conditions to ensure that the subject well is in line with current OGC standards for disposal wells. Additional information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.

The application proposes reservoir pressure evaluation via a combination of surface monitoring and testing during gas plant maintenance shut-downs. This approval requires annual testing. Less frequent testing may be requested following sufficient annual testing to characterize reservoir behavior.

It has been noted that a surface casing vent flow was measured on the subject well June 22, 2011. The SCVF was determined to be non-serious by Commission staff. However the Commission expects routine tests for SVCFs to be conducted during well servicing operations, in order to prove safe well operation.

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 Ron Stefik at (250) 419-4430.

Sincerely,



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

Attachment

ORDER 15-02-008

- 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, into the Paddy-Cadotte formation – near the Sunrise field as a special project in the following area:

DLS Twp 78 Rge 18 W6M Section 36 - 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 only into the well ARGRES SUNRISE 13-36-78-18; WA# 27024 – Paddy-Cadotte formation (disposal perforations 881.0 – 899.8 mKB).
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 13,070 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 6,740 kPaa, measured at MPP.
 - 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.



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

DATED AT the City of Victoria, in the Province of British Columbia, this 8th day of April 2015.

Advisory Guidance for Order 15-02-008

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered, 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.



April 09, 2014

8120-2200-32640-02

Sam Coles
Encana Corporation
500 Centre Street SE
P.O. Box 2850
Calgary, Alberta
T2P 2S5

Dear Mr. Coles:

**RE: PRODUCED WATER DISPOSAL SPECIAL PROJECT APPLICATION
ECA CRP SUNRISE 14-35-78-17 W6M; WA# 10677
SUNRISE FIELD - CADOTTE FORMATION**

Oil and Gas Commission staff have reviewed the application, dated January 21, 2014 requesting approval to dispose of produced water into the Cadotte formation of the subject well. The subject well is part of a four well application for Dual Water Source and Water Disposal. The additional three wells are:

- ECA CRP HZ Sunrise A13-33-078-17 W6M; WA 26471
- ECA CRP HZ Sunrise 09-34-078-17 W6M; WA 28495
- ECA CRP HZ Sunrise A09-34-078-17 W6M; WA 28496

The subject well was originally drilled to the Montney formation and rig released October 14, 1997. The well was initially completed in the Bluesky and Cadomin formations in 1998 and 1999 respectively. Both formations were perforated, production tested and cement squeezed. The lower Montney formation was perforated and fracture treated in October 2000. In 2008, the upper Montney was perfered. Both zones were fracture treated and production tested. Two permanent bridge plugs were set, one above the upper Montney formation and the second above the Cadomin formation. The Cadotte formation was subsequently perforated at 974.5mKB to 1002.0mKB and fracture treated. A step rate injection test followed in Oct 2013 with a maximum rate of 2880 m³/d at 7760kPa, confirming along with other information that the Cadotte formation is suitable for water disposal.

Attached please find Order 14-02-005, designating an area in the Sunrise field – Cadotte 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 well stimulation flowback fluid. This Order includes a number of detailed operational conditions including: continuous wellhead measurements, a maximum wellhead injection pressure, ultimate reservoir pressure limit, as well as wellbore integrity monitoring and reporting requirements. 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).

Encana long-term plans to build a water recycling facility in this area should reduce fresh water use. However, as indicated by Encana the three horizontal wells are currently completed as water source wells and will not be converted to water injection wells for a minimum of two years. Before granting water disposal to these wells the Commission requires confirmation that all data requirements for a disposal well(s) are met. Operation of the vertical well 14-35 will provide additional performance data as well. Additional general information regarding disposal wells is available on the Commission's website at <http://www.bcogc.ca/industry-zone/documentation/Subsurface-Disposal>.



Should you have any questions, please contact Petra Kriescher-Trudgeon at (250) 419-4415 or Ron Stefik at (250) 419-4430.

Sincerely,

A handwritten signature in blue ink, appearing to read 'R. Slocomb', written over a horizontal line.

Richard Slocomb, P.Eng.
Deputy Commissioner, Engineering
Oil and Gas Commission

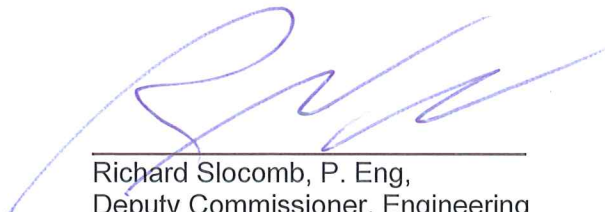
Attachment

ORDER 14-02-005

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, into the Cadotte formation – Sunrise field as a special project in the following area:

DLS Twp 78 Rge 17 W6M Section 35 - 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, including well flowback completion fluids, only into the well ECA CRP Sunrise 14-35-78-17 W6M; WA# 10677 Cadotte formation.
 - b) Not exceed an injection pressure, measured at the wellhead on the subject well, of 14,400 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.
 - 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 values on the monthly disposal statement.
 - h) Cease injection upon reaching a maximum formation pressure of 6,290 kPaa.
 - i) Conduct an annual reservoir pressure test on the formations 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.
 - 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 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.



Richard Slocomb, P. Eng,
Deputy Commissioner, Engineering
Oil and Gas Commission

DATED AT the City of Victoria, in the Province of British Columbia, this 9th day of April 2014.

Advisory Guidance for Order 14-02-005

- I. A production packer must be set above the injection interval and the space between the tubing and casing (including the space between the 3 packers) filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered, 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.



September 19, 2014

8120-2000/2200-32640-02

Randy Wolsey
Integrity Processing Inc
PO Box 6100
Fort St John, BC
V1J 4H6

Dear Mr. Wolsey,

**RE: NON-HAZARDOUS WASTE AND PRODUCED WATER DISPOSAL
SPECIAL PROJECT; AMENDMENT #1
INTEGRITY SUNRISE 10-24-078-17 W6M; WA# 19319
PADDY & CADOTTE FORMATIONS**

Approval for disposal of non-hazardous waste and produced water, Order 11-02-012 under the *Oil and Gas Activities Act (OGAA)*, was issued for the subject well, Paddy and Cadotte formations, on October 27, 2011. The Commission is presently amending disposal well approvals to conform to current requirements.

The subject well, drilled in March 2005, was unsuccessful for gas in the Dunvegan and Paddy/Cadotte formations. In May 2010 Integrity Processing Inc applied for an injectivity test on the Paddy/Cadotte formations. During the November/December 2010 workover, the uphole Dunvegan perforations were unsuccessfully cement squeezed. In August 2011, another cement squeeze was successfully completed on the Dunvegan. As noted above, approval for disposal was granted for the subject well in October 2011, however the well has not commenced disposal.

This disposal well addresses a need in the area for disposal of non-hazardous liquid waste. However, it is noted that high pressure injection above formation fracture pressure was required to pump fluids into the formation during the injection test. This indication of low permeability in the area is a concern as to the suitability for long term disposal operation. Condition 2 c) stipulates the maximum injection pressure on the subject well. Continuous monitoring is required to ensure this value is not exceeded.

Attached please find **Order 11-02-012 Amendment #1** designating an area in the Sunrise field – Paddy and Cadotte formations as a Special Project under section 75 of the *Oil and Gas Activities Act*, for the use of a storage reservoir for the disposal of non-hazardous waste and produced water. This Order contains 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 Paddy and Cadotte formations may be operated as an unsegregated interval, however monthly disposal volumes must be reported allocated as per Condition 2 h). Separate BC-11 forms must be submitted to the Commission for each formation at commencement of injection.

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 the undersigned at (250) 419-4430 or Michelle Harding at (250) 419-4493.

Sincerely,



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

Attachment

cc: Sarah Penny, P.Eng., Gaines Consulting Ltd.

ORDER 11-02-012 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 non-hazardous waste and produced water, into the Paddy and Cadotte formations – Sunrise field as a special project in the following area:

DLS Twp 78 Rge 17 W6M Section 24 - Lsds 9, 10, 15, and 16

- 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 Integrity Sunrise 10-24-078-17; WA# 19319 – Paddy and Cadotte formations (perforation interval 937-990 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 9,050 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 BC-S18 disposal statement. Report monthly disposal volumes 10% to the Paddy and 90% to the Cadotte.
 - i) 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.
 - j) Cease injection upon reaching a maximum formation pressure of 6,450 kPaa.
 - k) 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.
 - 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 day of September 2014.

Advisory Guidance for Order 11-02-012

- I. A production packer must be set above the injection interval and the space between the tubing and casing filled with corrosion inhibiting fluids, as per section 16(2) of the Drilling and Production Regulation.
- II. Annual packer isolation tests are required, as per section 16(3) of the Drilling and Production Regulation.
- III. Injected fluids must be metered, 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.