

STATE OF SOUTH DAKOTA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Application for a Permit to Inject - Class II Underground Injection Control

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**DEPT OF ENVIRONMENT & NATURAL
RESOURCES - RAPID CITY**

Return To: PMB 2020
SD Department of Environment and Natural Resources
Ground Water Quality Program
523 East Capitol Ave. - Joe Foss Building
Pierre SD 57501
Telephone 605.773.3296
Fax 605.773.6035

1.0 General Information

1.1 Application Type

- New Permit to Inject
- Major Modification to Existing Permit to Inject
- Minor Modification to Existing Permit to Inject

1.2 If requesting a new permit or major modification, provide a brief description of the new activity or proposed modification (include additional attachments as needed).

Luff Exploration Company respectfully requests permission to inject water long-term into the Crooked Creek RRU F-3H, a medium-radius horizontal Red River "B" well. This well is within the Crooked Creek Red River Unit in the Corey Butte Field, Harding County, South Dakota. This secondary recovery unit was approved, based on technical and economic merit, by the South Dakota Board of Minerals and Environment (SD-BME) in 2018 (Oil & Gas Case Number 6-2018).

1.3 If requesting a minor modification, select the type(s) of modification requested (ARSD 74:12:07:09)

- Correction of typographical errors and language changes that have no legal or substantive effect
- More frequent monitoring or reporting proposed by the permittee
- A change in ownership or operational control of the well if the secretary determines that no other change in the permit is necessary, provided a written agreement containing a specific date for transfer of responsibility for the injection well, coverage, and liability between the current and new owner or operator has been submitted to the secretary pursuant to ARSD 74:12:07:06
- A change in quantities or types of fluids injected which are within the capacity of the injection well as permitted and, in the judgement of the secretary, would not interfere with the operation of the injection well or its ability to meet conditions described in the permit, and would not change its classification
- A change in construction requirements approved by the secretary pursuant to this chapter if the alteration complies with the conditions of the permit to inject and this section
- Amendment of a plugging and abandonment plan which has been updated pursuant to this article
- Recementing, reworking, or reconditioning a well
- Deepening, extending, or sidetracking an existing well within the permitted injection horizon

As described in ARSD 74:12:07:09, if the department determines that a minor modification request has the potential to degrade or threaten freshwater resources, it will be treated as a major modification and subject to the Notice of Recommendation procedures (ARSD 74:12:09)

1.4 Operator Information (ARSD 74:12:07:03(8))

Name: Luff Exploration Company

Address: 1580 Lincoln Street, Suite 850
Denver, CO 80203

Telephone: 303-861-2468

Email: rd.george@luffex.com

1.5 Basic information about the well(s) covered by the requested permit to inject

API Number	Well Name	Legal Location	Latitude	Longitude
40 063 20787	Crooked Creek RRU F-3H	SE NW, Sec 3, T22N, R6E	45.901842	-103.370334

The information required below should be included as attachments to the application form. The following should be used as a checklist to ensure all necessary material is submitted. The department recommends using the same numbering system as shown in the application form; however, if a different system is used please use the location box to identify the location of the information in the application.

1.6 Affidavit of Delivery (ARSD 74:12:07:04) - Include an affidavit showing the names and addresses of the parties to whom the application has been delivered.

Included

Location: 8. No other operators

2.0 Specific Application Requirements

2.1 Maps (ARSD 74:12:07:03(1))

2.1.1 Vertical Wells (ARSD 74:12:07:03(1)(a))

A one-half mile fixed radius area of review plat which shows the location of the injection well or wells, existing or proposed; the location of all oil and gas wells; the location of all water wells, active and abandoned; the location of all other wells, including plugged and abandoned wells; abandoned locations; dry holes; current drilling locations; the names of operators; the surface and mineral owners; and each offset operator

Included

Location: 1. Information within a half-mile radius of vertical well

2.1.2 Horizontal Wells (ARSD 74:12:07:03(1)(b))

A one-half mile fixed radius area of review plat extending in all directions from the horizontal well and any sidetracks. The plat must show the location of the injection well or wells, existing or proposed; the location of all oil and gas wells; the location of all water wells, active and abandoned; the location of all other wells, including plugged and abandoned wells; abandoned locations; dry holes; current drilling locations; the names of operators; the surface and mineral owners; and each offset operator

Included

Location: 1. Information within a half-mile radius of vertical well

2.2 Formation or formations from which oil, gas, and water wells are producing or have produced within the area of review (ARSD 74:12:07:03(2))

Included

Location: 2. Formations with production

2.3 The name, stratigraphic and structural description, and depth of the receiving formation or formations and the overlying and underlying confining zone(s) or formation(s) (ARSD 74:12:07:03(3))

Included

Location: 3. Receiving formation and overlying formation

2.4 The well type, construction, spud date, total depth, formation tops, record of completion or recompletion, and plugging for all oil, gas, and injection wells within the area of review, **and any additional pertinent information which the secretary determines is necessary to make an informed judgement on the issuance of a permit**, including drill stem tests and well logs for all oil and gas wells identified in the area of review (ARSD 74:12:07:03(4))

Included

Location: 4. Well Information within area of review

2.5 Information on abandoned and active water wells within the area of review, as follows (ARSD 74:12:07:03(5))

2.5.1 Abandoned water wells:

2.5.1.1 The legal location

2.5.1.2 Well name

2.5.1.3 Method and supporting information on abandonment, if available

2.5.2 Active Water Wells

2.5.2.1 The legal location

2.5.2.2 Well name

2.5.2.3 An analysis of water quality, including information on total dissolved solids content, chlorides, sodium, sulfates, nitrates, and hydrocarbons

2.5.2.4 The construction program, including casing size and type, if available

2.5.2.5 Depth of the well, if available

2.5.2.6 A geologic / driller's log, if available

2.5.2.7 The water level and pump type, if available

Included

Location: 5. Active or abandoned water wells within area of review

2.6 A description of the injection well's casing and the proposed casing program, and the proposed method for testing the casing for mechanical integrity before use as an injection well (ARSD 74:12:07:03(6))

Included

Location: 6. Casing program and proposed M.I.T.

2.7 The geologic name and the depth to and interval of all freshwater resources which may be affected by injection (ARSD 74:12:07:03(7))

Included

Location: 7. Information on fresh water resources

2.8 Schematic drawings of the surface and subsurface construction details of the well with detailed drawings of the gauge connections (ARSD 74:12:07:03(9))

Included

Location: 9. Wellbore diagram

2.9 The source and nature of the substance or substances to be injected, its viscosity, its compatibility with the receiving formation, including stability indices, and the estimated average and maximum daily amounts to be injected. If the nature of the injected fluid is produced water, a water quality analysis must be submitted and must include information on total dissolved solids content, chlorides, sodium, sulfates, nitrates, and hydrocarbons. (ARSD 74:12:07:03(10))

Included

Location: 10. Water analysis and maximum rate

2.10 The average and maximum estimated injection pressure (ARSD 74:12:07:03(11))

Included

Location: 11. Average and maximum injection pressure

2.11 A narrative description of any proposed production stimulation program, including a feasibility study, process description, and an explanation of how the data were determined, such as working calculations (ARSD 74:12:07:03(12))

Included

Location: 12. Water flood feasibility

2.12 A list of wells identified in subdivision 74:12:07:03(1) in need of corrective action or where corrective action has been performed, and a written justification describing how the corrective action will protect freshwater resources. (ARSD 74:12:07:03(13))

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Included

Location: 13. Corrective action

2.13 The injection zone characteristics including porosity, compressibility, and intrinsic permeability. Please include the reference or source of the information. (ARSD 74:12:07:03(14))

Included

Location: 14. Injection zone characteristics

2.14 The expected project life (ARSD 74:12:07:03(15))

Included

Location: 15. Expected project life

2.15 Surface owner name, address, and telephone number (ARSD 74:12:07:03(16))

Included

Location: 16. Surface owner's information

3.0 Certification of Applicant

3.1 Certification of Applicant (Form 13). The applicant is required to submit a notarized Certification of Applicant (Form 13). This form can be found at <http://denr.sd.gov/documents/form13.pdf> or by contacting the Ground Water Quality Program at 605.773.3296.

Included

Location: Attached

3.2 Applicant's Signature



Signature

March 11, 2019

Date

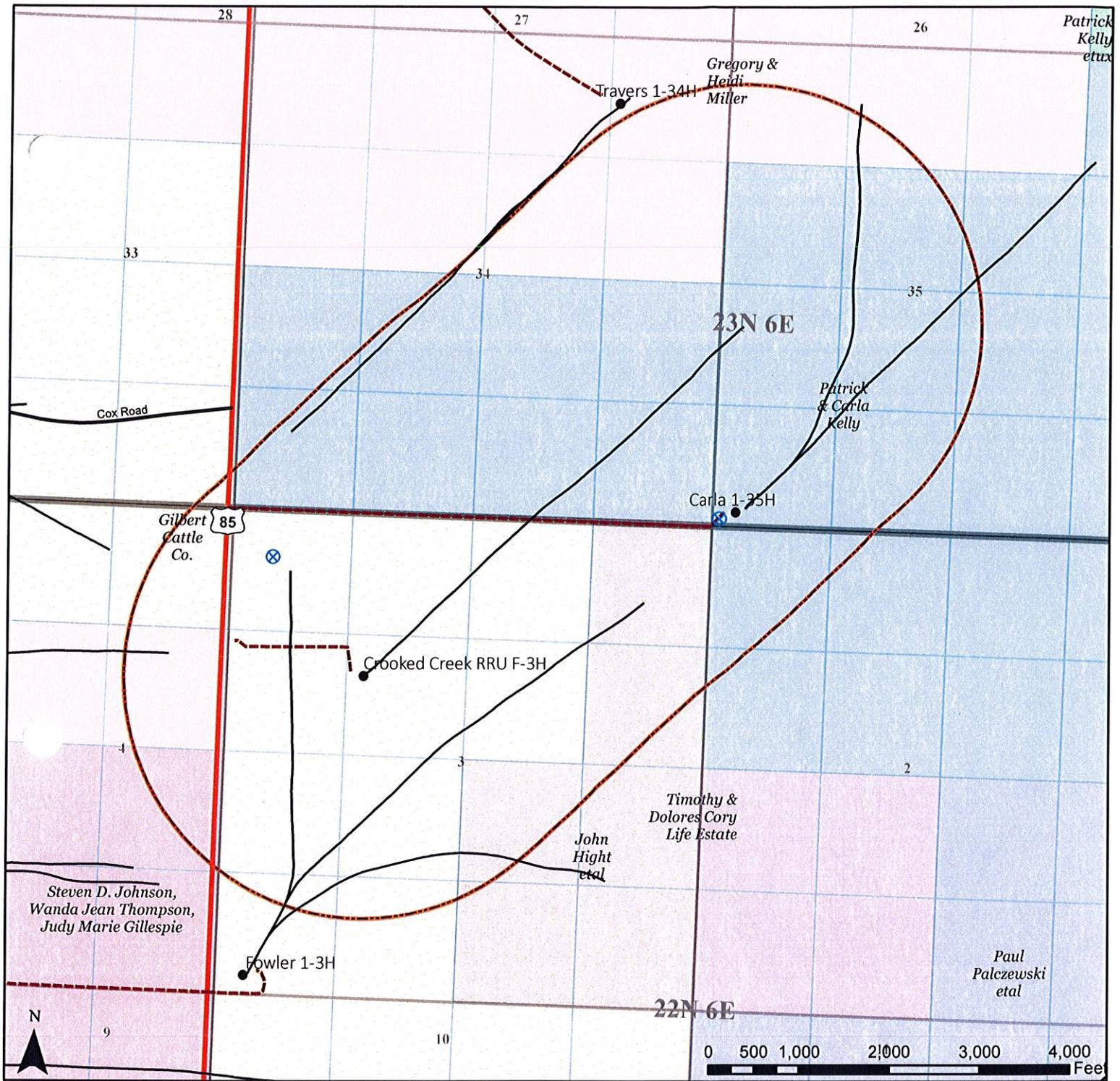
Richard D. George

Printed Name of Person Signing

Manager of Engineering

Title

Print Form



1:18,000

Area of Review - Crooked Creek RRU F-3H
 Sec. 3, T22N, R6E
 Harding County, South Dakota

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Legend

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|------------------|-------|-------------|------------|--------------|-----------------|-------------|-------------------|--------------------------|
| Wellbores | ● OG | ⊙ P&A - Dry | ⊙ P&A - OG | ⊗ Water Well | Laterals | — RR B | Boundaries | ▭ Townships |
| | ⊙ WIW | | | | | | ▭ Sections | |
| | ⊙ WDW | | | | Roads | — Hwy 85 | ▭ Quarters | ▭ 1/2 Mile Radius Buffer |
| | | | | | | — Paved | | |
| | | | | | | --- Unpaved | | |