

**BEFORE THE NEW MEXICO OIL CONSERVATION DIVISION**

**APPLICATION OF BLACKBUCK RESOURCES, LLC  
FOR A SALT WATER DISPOSAL WELL,  
IN EDDY COUNTY, NEW MEXICO.**

Case No. *20461*

**APPLICATION FOR SALT WATER DISPOSAL**

Blackbuck Resources, LLC, by and through its undersigned attorney, applies for an order approving a salt water disposal well, and in support thereof, states:

1. Applicant seeks an order proposing a salt water disposal well its Ian SWD Fed 1, to be drilled at a location 1,505 FNL and 2,444 FEL, Unit G, Section 18, Township 24 South, Range 31 East, N.M.P.M., Eddy County, New Mexico.
2. Applicant proposes to set a packer at 16,230 feet below the surface of the earth and then inject into the Devonian and Silurian-Fusselman formations at depths between 16,250' through 17,915' open hole, as stated in the attached C-108.
3. Attached hereto as Exhibit A is the C-108.
4. The granting of this application will prevent waste and protect correlative rights.

**WHEREFORE**, Applicant requests that, after notice and hearing, the Division enter its order approving this application.

Respectfully submitted,

PADILLA LAW FIRM, P.A.

/s/ ERNEST L. PADILLA

ERNEST L. PADILLA,  
Attorney for Blackbuck Resources, LLC  
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505-988-7577  
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# EXHIBIT A

***NMOCD Case No.***

***Application of Blackbuck Resources, LLC for approval of a salt water disposal well in Eddy County, New Mexico;*** Applicant seeks an order for a salt water disposal well in its Ian SWD Fed 1, to be drilled at a location 1,505 FNL and 2,444 FEL, Unit G, Section 18, Township 24 South, Range 31 East, N.M.P.M., Eddy County, New Mexico for injection into the Devonian and Silurian-Fusselman formations at depths between 16,250' through 17,915 open hole. The well will be located approximately 16 miles east of Malaga, New Mexico.

|         |          |          |           |      |         |
|---------|----------|----------|-----------|------|---------|
| DATE IN | SUSPENSE | ENGINEER | LOGGED IN | TYPE | APP NO. |
|---------|----------|----------|-----------|------|---------|

ABOVE THIS LINE FOR DIVISION USE ONLY

**NEW MEXICO OIL CONSERVATION DIVISION**  
- Engineering Bureau -  
1220 South St. Francis Drive, Santa Fe, NM 87505



**ADMINISTRATIVE APPLICATION CHECKLIST**

THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND REGULATIONS  
WHICH REQUIRE PROCESSING AT THE DIVISION LEVEL IN SANTA FE

**Application Acronyms:**

**[NSL-Non-Standard Location] [NSP-Non-Standard Proration Unit] [SD-Simultaneous Dedication]**  
**[DHC-Downhole Commingling] [CTB-Lease Commingling] [PLC-Pool/Lease Commingling]**  
**[PC-Pool Commingling] [OLS - Off-Lease Storage] [OLM-Off-Lease Measurement]**  
**[WFX-Waterflood Expansion] [PMX-Pressure Maintenance Expansion]**  
**[SWD-Salt Water Disposal] [IPI-Injection Pressure Increase]**  
**[EOR-Qualified Enhanced Oil Recovery Certification] [PPR-Positive Production Response]**

**[1] TYPE OF APPLICATION - Check Those Which Apply for [A]**

[A] Location - Spacing Unit - Simultaneous Dedication  
☐ NSL ☐ NSP ☐ SD

Check One Only for [B] or [C]

[B] Commingling - Storage - Measurement  
☐ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM

[C] Injection - Disposal - Pressure Increase - Enhanced Oil Recovery  
☐ WFX ☐ PMX ☒ SWD ☐ IPI ☐ EOR ☐ PPR

[D] Other: Specify \_\_\_\_\_

**[2] NOTIFICATION REQUIRED TO: - Check Those Which Apply, or Does Not Apply**

[A] ☐ Working, Royalty or Overriding Royalty Interest Owners

[B] ☒ Offset Operators, Leaseholders or Surface Owner

[C] ☒ Application is One Which Requires Published Legal Notice

[D] ☐ Notification and/or Concurrent Approval by BLM or SLO  
U.S. Bureau of Land Management - Commissioner of Public Lands, State Land Office

[E] ☒ For all of the above, Proof of Notification or Publication is Attached, and/or,

[F] ☐ Waivers are Attached

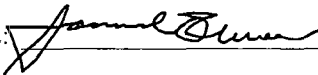
**[3] SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED ABOVE.**

**[4] CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is **accurate** and **complete** to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications are submitted to the Division.

**Note: Statement must be completed by an individual with managerial and/or supervisory capacity.**

|                     |                            |                                               |                   |
|---------------------|----------------------------|-----------------------------------------------|-------------------|
| <u>Nate Alleman</u> | <u><i>Nate Alleman</i></u> | <u>Regulatory Specialist - ALL Consulting</u> | <u>11/30/2018</u> |
| Print or Type Name  | Signature                  | Title                                         | Date              |
|                     |                            | <u>nalleman@all-llc.com</u>                   |                   |
|                     |                            | Date e-mail Address                           |                   |

**APPLICATION FOR AUTHORIZATION TO INJECT**

- I. PURPOSE: \_\_\_\_\_ Secondary Recovery \_\_\_\_\_ Pressure Maintenance X \_\_\_\_\_ Disposal \_\_\_\_\_ Storage  
Application qualifies for administrative approval? X Yes \_\_\_\_\_ No
- II. OPERATOR: Blackbuck Resources LLC  
ADDRESS: 2601 Westheimer Rd., Suite C210, Houston, TX 77098  
CONTACT PARTY: Samuel Oliver PHONE: 1-855-432-1400
- III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection.  
Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? \_\_\_\_\_ Yes X \_\_\_\_\_ No  
If yes, give the Division order number authorizing the project: \_\_\_\_\_
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
  2. Whether the system is open or closed;
  3. Proposed average and maximum injection pressure;
  4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
  5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- \*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- \*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).
- \*XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
- NAME: Samuel Oliver TITLE: Chief Commercial Officer  
SIGNATURE:  DATE: 30 November 2018  
E-MAIL ADDRESS: samuel.oliver@blackbuckresources.com
- \* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: \_\_\_\_\_

### III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

- (1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

### XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and,
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

**NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.**

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**NOTICE:** Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

Application for Authorization to Inject  
Well Name: Ian SWD Fed 1

### III – Well Data *(The Wellbore Diagram is included as Attachment 1)*

A.

#### (1) General Well Information:

Operator: Blackbuck Resources LLC (OGRID No. 373619)  
Lease Name & Well Number: Ian SWD Fed 1  
Location Footage Calls: 1,505' FNL & 2,444' FEL  
Legal Location: Unit Letter G, S18 T24S R31E  
Ground Elevation: 3,529'  
Proposed Injection Interval: 16,250' – 17,915'  
County: Eddy

#### (2) Casing Information:

| Type           | Hole Size | Casing Size | Casing Weight | Setting Depth | Sacks of Cement | Estimated TOC | Method Determined |
|----------------|-----------|-------------|---------------|---------------|-----------------|---------------|-------------------|
| Surface        | 24"       | 20"         | 133.0 lb/ft   | 615'          | 970             | Surface       | Circulation       |
| Intermediate 1 | 14-3/4"   | 13-3/8"     | 68.0 lb/ft    | 4,315'        | 1,500           | Surface       | Circulation       |
| Intermediate 2 | 12-1/4"   | 9-5/8"      | 53.5 lb/ft    | 13,490'       | 4,950           | Surface       | Circulation       |
| Liner          | 8-1/2"    | 7-5/8"      | 39 lb/ft      | 16,250'       | 245             | 13,290'(TOL)  | CBL               |

#### (3) Tubing Information:

4-1/2" (composite weight string) of fiberglass-coated tubing with setting depth of 16,230"

(4) Packer Information: Lok-set or equivalent packer set at 16,230'

B.

#### (1) Injection Formation Name: Devonian and Silurian-Fusselman formations

Pool Name: SWD; Devonian - Silurian

Pool Code: 97869

(2) Injection Interval: Open-hole injection between 16,250' – 17,915'

(3) Drilling Purpose: New Drill for Salt Water Disposal

(4) Other Perforated Intervals: No other perforated intervals exist.

(5) Overlying Oil and Gas Zones: Below are the approximate formation tops for known oil and gas producing zones in the area.

- Delaware (4,315')
- Bone Springs (7,920')
- Wolfcamp (11,350')
- Atoka (13,660')
- Morrow (14,460')

Underlying Oil and Gas Zones: No underlying oil and gas zones exist.

## **V – Well and Lease Maps**

The following maps are included in **Attachment 2**:

- 2-mile Oil & Gas Well Map
- 2-mile Lease Map
- 1.5-mile Deep SWD Map (Devonian/Silurian SWDs)

## **VI – AOR Well List**

No wells within the 1-mile AOR penetrate the proposed injection zone.

A list of the wells within the 1-mile AOR is included in **Attachment 2**.

## **VII – Proposed Operation**

- (1) **Proposed Maximum Injection Rate:** 30,000 bpd  
**Proposed Average Injection Rate:** 15,000 bpd
- (2) A closed system will be used.
- (3) **Proposed Maximum Injection Pressure:** 3,250 psi (surface)  
**Proposed Average Injection Pressure:** approximately 1,500 – 2,000 psi (surface)
- (4) **Source Water Analysis:** It is expected that the injectate will consist of produced water from production wells completed in the Wolfcamp and Bone Springs formations. Analysis of water from these formations is included in **Attachment 3**.
- (5) **Injection Formation Water Analysis:** The proposed SWD will be injecting water into the Devonian and Silurian-Fusselman formations which are non-productive zones known to be compatible with formation water from the Wolfcamp and Bone Springs formations. Water analyses from Silurian-Fusselman could not be located; however, water analyses from the Devonian formation in the area are included in **Attachment 4**.

## **VIII – Geologic Description**

The proposed injection interval includes the Devonian and Silurian-Fusselman formations from 16,250 – 17,915 feet. These formations consist of carbonates including light colored dolomite and chert intervals interspersed with some tight limestone intervals. Several thick sections of porous dolomite capable of taking water are present within the subject formations in the area. The freshwater formation is the Rustler at a depth of approximately 590 feet. Water well depths in the area range from approximately 20 – 625 feet below ground surface.

## **IX – Proposed Stimulation Program**

A small cleanup acid job may be used to remove mud and drill cuttings from the formation. However, no other formation stimulation is currently planned.

## **X – Logging and Test Data**

Logs will be submitted to the Division upon completion of the well.

## **XI – Fresh Groundwater Samples**

Based on a review of data from the New Mexico Office of the State Engineer, no groundwater wells are located within 1-mile of the proposed SWD location; therefore, no groundwater samples were collected in association with this application.

A water well map of the area is included in **Attachment 5**.

## **XII – No Hydrologic Connection Statement**

No faulting is present in the area that would provide a hydrologic connection between the injection interval and overlying USDWs. Additionally, the casing program has been designed to ensure there will be no hydrologic connection between the injection interval and overlying USDWs. A letter from a knowledgeable and qualified expert stating that there is a low risk of seismic activity from the proposed injection activities is included in **Attachment 6**.

## **XIII – Proof of Notice**

A Public Notice was filed with the Carlsbad Current-Argus newspaper and an affidavit is included in **Attachment 7**.

A copy of the application was mailed to the OCD District Office, landowner, and leasehold operators within 1-mile of the proposed SWD location. A list of the recipients, as well as delivery confirmations, are included in **Attachment 7**.

# Attachments

**Attachment 1:** Wellbore Diagram

**Attachment 2:** Area of Review Information:

- 2-mile Oil & Gas Well Map
- 2-mile Lease Map
- 1.5-mile Deep SWD Map (Devonian/Silurian SWDs)
- 1-mile Well Detail List

**Attachment 3:** Source Water Analyses

**Attachment 4:** Injection Formation Water Analyses

**Attachment 5:** Water Well Map and Well Data

**Attachment 6:** Induced Seismicity Assessment Letter

**Attachment 7:** Public Notice Affidavit and Notice of Application Confirmations

**Attachment 1**

Wellbore Diagram

| MUD LOGGING<br>E LOGGING/<br>DIRECTIONAL                                 | CASING SIZE (IN.)<br>CEMENT (SACKS) | RKB DRILL<br>DEPTH<br>MD TVD | BOPE                         | FORMATION                      | HOLE<br>SIZE<br>(IN.) | MUD<br>WT.         | FRAC<br>GRAD | TUBING  |
|--------------------------------------------------------------------------|-------------------------------------|------------------------------|------------------------------|--------------------------------|-----------------------|--------------------|--------------|---------|
| GRND LEVEL                                                               | RKB                                 | 32                           |                              |                                |                       |                    |              |         |
| GL ELEV.                                                                 |                                     | 3,529'                       |                              |                                |                       |                    |              |         |
| 30"                                                                      |                                     | 120 / 120                    | OPEN                         |                                | 32"                   | 8.8                |              |         |
| GROUT TO SURFACE                                                         |                                     |                              |                              |                                |                       |                    |              |         |
| 20"                                                                      |                                     | 590                          |                              |                                | 24"                   | 8.4                |              |         |
| 133# J55 BTC                                                             |                                     | 615 / 615                    |                              | PERMIAN RUSTLER FM (USDW)      |                       |                    |              |         |
| 970 SACKS, CEMENTED<br>TO SURFACE                                        |                                     |                              | 26-3/4" -3M ANNULAR/DIVERTER |                                |                       | 8.4                |              |         |
|                                                                          |                                     |                              |                              |                                |                       | 9.5                |              |         |
| MUD LOGGING TO BEGIN<br>AT 2500'                                         |                                     |                              |                              |                                | 14 3/4"               | 9.5<br>to<br>10.0  |              |         |
| 13 3/8"                                                                  |                                     | 4,315                        |                              | PERMIAN DELAWARE MTN.<br>GROUP |                       |                    |              |         |
| 68# N-80 LTC                                                             |                                     | 4,315 / 4,315                | 21-3/4" -5M ANNULAR          |                                |                       | 10.0               |              |         |
| 1,500 SACKS, CEMENTED<br>TO SURFACE                                      |                                     |                              | 21-3/4" -5M BOP              |                                |                       | 9.4                |              |         |
| DV TOOL AT ±3,300'IN<br>9 5/8" OPEN HOLE,<br>ECP BELOW                   |                                     | 7,920                        |                              | PERMIAN BONE SPRING FM.        |                       | 9.4<br>to<br>10.0  |              |         |
|                                                                          |                                     | 11,350                       |                              | PERMIAN WOLFCAMP FM.           | 12 1/4"               |                    |              |         |
|                                                                          |                                     |                              |                              |                                |                       |                    |              | 13,190  |
|                                                                          |                                     | 13,290 / 13,290              |                              |                                |                       |                    |              |         |
| 9 5/8"                                                                   |                                     | 13,490 / 13,490              | 13-5/8" -10M ANNULAR         |                                |                       | 10.0               |              |         |
| 53.5# L-80 LTC                                                           |                                     |                              | 13-5/8" -10M BOP             |                                |                       | 12.5               |              |         |
| 4,950 SACKS, CEMENTED<br>TO SURFACE<br>IN TWO STAGES                     |                                     | 13,490                       |                              | PENNSYLVANIAN STRAWN FM.       |                       |                    |              |         |
|                                                                          |                                     | 13,660                       |                              | PENNSYLVANIAN ATOKA FM.        | 8 1/2"                | 12.5<br>to<br>14.6 |              |         |
|                                                                          |                                     | 14,460                       |                              | PENNSYLVANIAN MORROW<br>FM.    |                       |                    |              |         |
| 7 5/8"                                                                   |                                     | 16,250                       |                              | DEVONIAN                       |                       |                    |              |         |
| 39# P110, ULTRA F)                                                       |                                     | 16,250 / 16,250              | 13-5/8" -10M ANNULAR         |                                |                       | 14.6               |              |         |
| 245 SACKS, EST. TOC 13,290'                                              |                                     |                              | 13-5/8" -10M BOP             |                                |                       |                    |              | 16,230' |
| BACK UP INTO THE 9 5/8" CASING (VERIFIED WITH<br>RADIAL CEMENT BOND LOG) |                                     |                              |                              |                                | 6 1/2"                | 9.0                |              |         |
| RUN #1                                                                   |                                     |                              |                              |                                |                       |                    |              |         |
| GR/NEUTRON                                                               | 18,015 - 0                          |                              | 13-5/8" -10M ANNULAR         | Base of FUSSELMAN FM           |                       |                    |              |         |
| USIT/CBL                                                                 | 16,250 - 0                          | 17,915                       | 13-5/8" -10M BOP             |                                |                       |                    |              |         |
|                                                                          |                                     | TO 18,015 / 18,015           |                              |                                |                       |                    |              |         |

IAN SWD FED 1

SECTION 18, T-24-S, R-31E  
1,505' FNL & 2,444' FEL  
EDDY COUNTY, NEW MEXICO

PN # 1680.NM.00

NOVEMBER 2018



**ALL**CONSULTING  
GOVERNMENT RELATIONS - ENERGY - PLANNING - TECHNOLOGY  
ENGINEERING - ENVIRONMENTAL

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SIZE

A

SCALE

NTS

WELL BORE DATA SHEET

## A-3 and AL-2 LOK-SET Retrievable Casing Packers

Product Family No. H64630 and H64628

### APPLICATION

The A-3™ LOK-SET™ packer combines advantages of a retrievable packer with the features of a permanent packer. An ability to lock down tubing forces makes the A-3 suitable for a broad range of applications, including production, injection, zone isolation, and remedial operations. The AL-2™ LOK-SET packer is similar to the A-3, and has a larger bore.

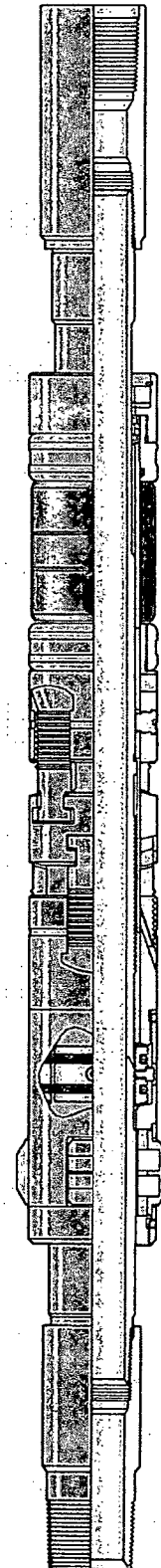
### Advantages

- Holds pressure from above and below, without relying on set-down weight, tubing tension, or hydraulic hold down
- Provides tubing anchoring with tension applied, suitable for pumping wells or injection, controlling tubing forces related to change fluid temperatures
- Opposed, non-transferring, dovetail slips prevent packer movement associated with changing differential pressures, while allowing the landing of the tubing in tension, neutral or compression
- Right-hand tubing rotation controls setting and releasing
- Packing element compression locks in by ratcheting action of lock segments, which restricts rotation to one direction

### Accessories

To provide a simple and reliable injection system for retrieving an injection string without having to unseat the packer:

L-10 or L-316 on-off sealing connectors, Product Family Nos. H68420 and H68422. Baker Hughes blanking plug can be used in the seating nipple profile of the on-off sealing connector to provide a means of plugging the lower zone while the tubing is being pulled.



A-3 LOK-SET  
Retrievable Casing Packer  
Product Family No. H64630

## SPECIFICATION GUIDES

A-3™ LOK-SET Retrieable Casing Packer, Product Family No. H64630

| Casing |       |           | Packer |        |      |                  |       |
|--------|-------|-----------|--------|--------|------|------------------|-------|
| OD     |       | Weight *  | Size   | Nom ID |      | Max Gage Ring OD |       |
| In.    | mm    | lb/ft     |        | In.    | mm   | In.              | mm    |
| 4      | 101.6 | 9.5-12.9  | 41A2   | 1.500  | 38.1 | 3.244            | 82.4  |
| 4-1/2  | 114.3 | 21.6-23.6 | 41A2   | 1.500  | 38.1 | 3.244            | 82.4  |
| 4      | 101.6 | 9.5       | 41A4   | 1.500  | 38.1 | 3.423            | 112.4 |
| 4-1/2  | 114.3 | 18.8      | 41A4   | 1.500  | 38.1 | 3.423            | 112.4 |
|        |       | 13.5-17.7 | 41B    |        |      | 3.578            | 90.9  |
|        |       | 11.6-13.5 | 43A2   |        |      | 3.786            | 96.2  |
|        |       | 9.5-10.5  | 43A4   |        |      | 3.786            | 96.2  |
| 5      | 127.0 | 15-18     | 43B    | 1.978  | 50.2 | 4.140            | 105.2 |
|        |       | 11.5-15   | 43C    |        |      | 4.265            | 108.3 |
| 5-1/2  | 139.7 | 26        | 43C    | 1.978  | 50.2 | 4.265            | 108.3 |
|        |       | 20-23     | 45A2   |        |      | 4.515            | 114.7 |
|        |       | 15.5-20   | 45A4   |        |      | 4.656            | 118.3 |
|        |       | 13-15.5   | 45B    |        |      | 4.796            | 121.8 |
| 6      | 152.4 | 26        | 45B    | 1.978  | 50.2 | 4.796            | 121.8 |
|        |       | 20-23     | 45C    |        |      | 5.078            | 129.0 |
|        |       | 15-18     | 45D    |        |      | 5.171            | 131.3 |
| 6-5/8  | 168.3 | 34        | 45E    | 1.978  | 50.2 | 5.421            | 137.7 |
|        |       | 24-32     | 45F    |        |      | 5.499            | 139.7 |
|        |       | 24        | 47A2   | 2.441  | 62.0 | 5.671            | 144.0 |
|        |       | 17-24     | 45G    | 1.978  | 50.2 | 5.796            | 147.2 |
| 7      | 177.8 | 17-20     | 47A4   | 2.441  | 62.0 | 5.827            | 148.0 |
|        |       | 38        | 47A2   | 2.441  | 62.0 | 5.671            | 144.0 |
|        |       | 32-35     | 47A4   |        |      | 5.827            | 148.0 |
|        |       | 26-29     | 47B2   |        |      | 5.983            | 152.0 |
|        |       | 23-26     | 47B4   |        |      | 6.093            | 154.8 |
|        |       | 17-20     | 47C2   |        |      | 6.281            | 159.5 |
| 7-5/8  | 193.7 | 33.7-39   | 47C4   | 2.441  | 62.0 | 6.468            | 164.3 |
|        |       | 24-29.7   | 47D2   |        |      | 6.687            | 169.9 |
|        |       | 20-24     | 47D4   |        |      | 6.827            | 173.4 |
| 8-5/8  | 219.1 | 44-49     | 49A2   | 3.500  | 88.9 | 7.327            | 186.1 |
|        |       | 32-40     | 49A4   |        |      | 7.546            | 191.7 |
|        |       | 20-28     | 49B    |        |      | 7.796            | 198.0 |
| 9-5/8  | 244.5 | 47-53.5   | 51A2   | 3.500  | 88.9 | 8.234            | 209.1 |
|        |       | 40-47     | 51A4   |        |      | 8.452            | 214.7 |
|        |       | 29.3-36   | 51B    |        |      | 8.608            | 218.6 |

AL-2™ Large Bore LOK-SET Retrieable Casing Packer Product Family No. H64628

| Casing |       |          | Packer       |        |      |                  |       |                                       |
|--------|-------|----------|--------------|--------|------|------------------|-------|---------------------------------------|
| OD     |       | Weight * | Size         | Nom ID |      | Max Gage Ring OD |       | Max Diameter of Compressed Drag Block |
| In.    | mm    | lb/ft    |              | In.    | mm   | In.              | mm    | In.                                   |
| 5-1/2  | 139.7 | 20       | 45A2 x 2-3/8 | 2.375  | 60.3 | 4.562            | 115.9 | 4.592                                 |
|        |       | 15.5-17  | 45A4 x 2-3/8 |        |      | 4.656            | 118.3 | 4.750                                 |
|        |       | 13       | 45B x 2-3/8  |        |      | 4.796            | 121.8 | 4.902                                 |
| 6      | 152.4 | 26       | 45B x 2-3/8  | 2.375  | 60.3 | 4.796            | 121.8 | 4.902                                 |

\* When selecting a packer for a casing weight common to two weight ranges (same OD), choose the packer size shown for the lighter of the two weight ranges. Example: for 7-in. (177.8 mm) OD 26 lb/ft casing use packer size 47B4. Under certain circumstances the other packer size may be run, such as when running in mixed casing strings.

Repair kits, including such items as packing elements, seal rings, etc., are available for redressing Baker Retrieable Packers. Contact your Baker Hughes representative. Use only Baker Hughes repair parts.

## **Attachment 2**

### **Area of Review Information:**

- 2-mile Oil & Gas Well Map
- 2-mile Lease Map
- 1.5-mile Deep SWD Map (Devonian/Silurian SWDs)
- 1-mile Well Detail List



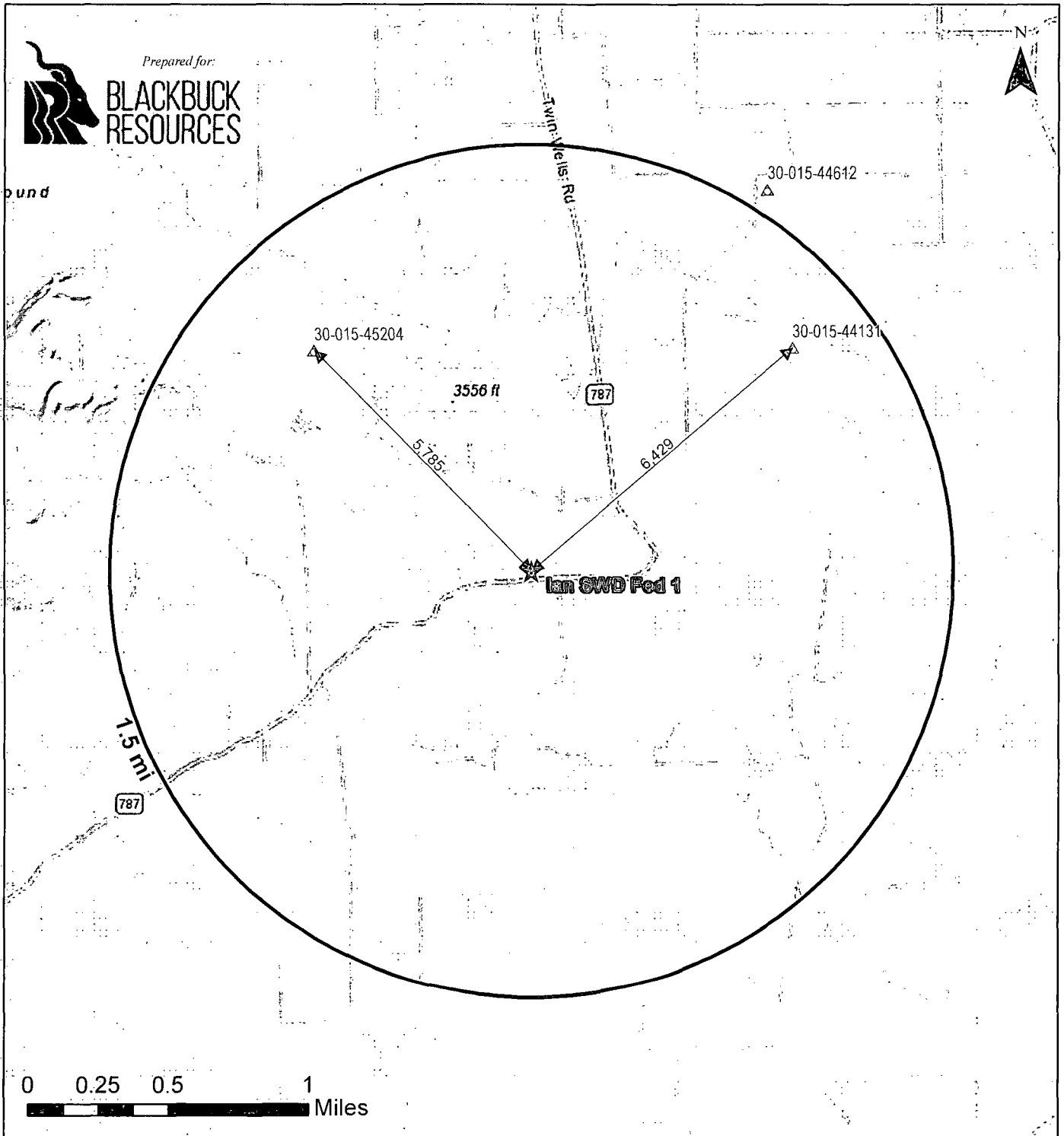




Prepared for:

**BLACKBUCK  
RESOURCES**

ound



0 0.25 0.5 1  
Miles

### Ian SWD Fed 1 Devonian/Silurian SWDs AOR

Proj Mgr:  
Dan Arthur

Nov 15, 2018

Mapped by:  
Ben Bockelmann

Prepared by:

**ALLCONSULTING**

### Legend

- ★ Proposed SWD
- ↔ Distances
- △ Salt Water Injection, Active (1)
- △ Salt Water Injection, New (2)

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

**AOR Tabulation for Ian SWD Fed 1 (Top of Injection Interval: 16,250')**

| Well Name                              | API#         | Well Type | Operator              | Spud Date   | Location (Sec., Tn., Rng.) | Total Depth      | Penetrate Inj. Zone? |
|----------------------------------------|--------------|-----------|-----------------------|-------------|----------------------------|------------------|----------------------|
| POKER LAKE 18 FEDERAL #001             | 30-015-27453 | O         | EOG RESOURCES INC     | 6/5/1993    | F-18-24S-31E               | 8250             | No                   |
| GILA 12 FEDERAL #001                   | 30-015-28168 | O         | EOG RESOURCES INC     | 10/26/1994  | P-12-24S-30E               | 8291             | No                   |
| SUNRISE MDP1 8 5 FEDERAL COM #172H     | 30-015-44977 | G         | OXY USA INC           | Not Drilled | C-17-24S-31E               | Proposed (11649) | No                   |
| PATTON MDP1 17 FEDERAL #171H           | 30-015-44989 | G         | OXY USA INC           | Not Drilled | C-17-24S-31E               | Proposed (11620) | No                   |
| SUNRISE MDP1 8 5 FEDERAL COM #173H     | 30-015-44931 | G         | OXY USA INC           | Not Drilled | C-17-24S-31E               | Proposed (11646) | No                   |
| PATTON 18 FEDERAL #009H                | 30-015-43343 | O         | OXY USA INC           | Not Drilled | 4-07-24S-31E               | Proposed (10002) | No                   |
| PALLADIUM MDP1 7 6 FEDERAL COM #005H   | 30-015-44294 | O         | OXY USA INC           | 8/13/2017   | P-07-24S-31E               | 10064            | No                   |
| PALLADIUM MDP1 7 6 FEDERAL COM #004H   | 30-015-44295 | O         | OXY USA INC           | 8/24/2017   | C-18-24S-31E               | 10034            | No                   |
| PATTON MDP1 18 FEDERAL #073H           | 30-015-44318 | O         | OXY USA INC           | 8/14/2017   | B-18-24S-31E               | 11192            | No                   |
| PATTON 17 FEDERAL #002H                | 30-015-43345 | O         | OXY USA INC           | Not Drilled | N-08-24S-31E               | Proposed (10254) | No                   |
| SUNRISE MDP1 8 5 FEDERAL COM #004H     | 30-015-44475 | O         | OXY USA INC           | 11/22/2017  | N-08-24S-31E               | 10059            | No                   |
| NIMITZ MDP1 13 FEDERAL COM #002H       | 30-015-44498 | O         | OXY USA INC           | 3/15/2018   | P-12-24S-30E               | 15062            | No                   |
| PATTON 18 FEDERAL COM #010H            | 30-015-43341 | O         | OXY USA INC           | Not Drilled | K-07-24S-31E               | Proposed (9982)  | No                   |
| PATTON 17 FEDERAL #001H                | 30-015-43344 | O         | OXY USA INC           | Not Drilled | M-08-24S-31E               | Proposed (10226) | No                   |
| PATTON 17 FEDERAL #007                 | 30-015-29904 | O         | OXY USA INC           | 5/23/1998   | G-17-24S-31E               | 8320             | No                   |
| PALLADIUM MDP1 7 6 FEDERAL COM #006H   | 30-015-44293 | O         | OXY USA INC           | 8/15/2017   | P-07-24S-31E               | 10059            | No                   |
| PALLADIUM MDP1 7 6 FEDERAL COM #002H   | 30-015-44299 | O         | OXY USA INC           | 10/10/2017  | 4-07-24S-31E               | 10033            | No                   |
| PATTON MDP1 18 FEDERAL #006H           | 30-015-43854 | G         | OXY USA INC           | 8/15/2016   | A-18-24S-31E               | 11613            | No                   |
| PATTON MDP1 18 FEDERAL #033H           | 30-015-44338 | O         | OXY USA INC           | 8/15/2017   | B-18-24S-31E               | 8878             | No                   |
| PALLADIUM MDP1 7 6 FEDERAL COM #003Y   | 30-015-44457 | O         | OXY USA INC           | 10/8/2017   | C-18-24S-31E               | 10001            | No                   |
| PATTON MDP1 17 FEDERAL #002H           | 30-015-44460 | O         | OXY USA INC           | 11/8/2017   | M-08-24S-31E               | 9985             | No                   |
| PALLADIUM 7 FEDERAL #005               | 30-015-32816 | O         | OXY USA INC           | 6/3/2003    | F-07-24S-31E               | 8200             | No                   |
| PATTON 18 FEDERAL #009                 | 30-015-35038 | O         | OXY USA INC           | Not Drilled | C-18-24S-31E               | Proposed (8400)  | No                   |
| PATTON MDP1 18 FEDERAL #023H           | 30-015-44316 | O         | OXY USA INC           | 8/12/2017   | B-18-24S-31E               | 10286            | No                   |
| PATTON MDP1 17 FEDERAL #003H           | 30-015-44496 | O         | OXY USA INC           | 11/20/2017  | N-08-24S-31E               | 10060            | No                   |
| NIMITZ MDP1 13 FEDERAL COM #003H       | 30-015-44525 | O         | OXY USA INC           | 3/16/2018   | P-12-24S-30E               | 14945            | No                   |
| NIMITZ MDP1 12 FEDERAL COM #006H       | 30-015-44528 | O         | OXY USA INC           | 3/17/2018   | P-12-24S-30E               | 10190            | No                   |
| PATTON MDP1 18 FEDERAL #007H           | 30-015-44273 | O         | OXY USA INC           | 8/29/2017   | A-18-24S-31E               | 10018            | No                   |
| PATTON MDP1 18 FEDERAL #002H           | 30-015-44337 | O         | OXY USA INC           | 9/6/2017    | C-18-24S-31E               | 10084            | No                   |
| SUNRISE MDP1 8 5 FEDERAL COM #001H     | 30-015-44369 | O         | OXY USA INC           | 11/2/2017   | M-08-24S-31E               | 9946             | No                   |
| SUNRISE MDP1 8 5 FEDERAL COM #002H     | 30-015-44395 | O         | OXY USA INC           | 11/6/2017   | M-08-24S-31E               | 9990             | No                   |
| PATTON MDP1 17 FEDERAL #001H           | 30-015-44459 | O         | OXY USA INC           | 11/3/2017   | M-08-24S-31E               | 9996             | No                   |
| PATTON MDP1 18 FEDERAL #001H           | 30-015-44317 | O         | OXY USA INC           | 10/18/2017  | 4-07-24S-31E               | 10055            | No                   |
| PATTON MDP1 18 FEDERAL #005H           | 30-015-44272 | O         | OXY USA INC           | 8/26/2017   | A-18-24S-31E               | 10016            | No                   |
| PALLADIUM MDP1 7 6 FEDERAL COM #001H   | 30-015-44298 | O         | OXY USA INC           | 10/16/2017  | 4-07-24S-31E               | 10050            | No                   |
| PATTON MDP1 18 FEDERAL #003H           | 30-015-44333 | O         | OXY USA INC           | 9/7/2017    | C-18-24S-31E               | 10010            | No                   |
| SUNRISE MDP1 8 5 FEDERAL COM #003H     | 30-015-44474 | O         | OXY USA INC           | 11/17/2017  | N-08-24S-31E               | 10050            | No                   |
| PATTON MDP1 17 FEDERAL #004H           | 30-015-44497 | O         | OXY USA INC           | 11/24/2017  | N-08-24S-31E               | 10063            | No                   |
| NIMITZ MDP1 12 FEDERAL COM #007H       | 30-015-44529 | O         | OXY USA INC           | 3/14/2018   | P-12-24S-30E               | 10005            | No                   |
| SUNRISE MDP1 8 5 FEDERAL COM #171H     | 30-015-44930 | G         | OXY USA INC           | Not Drilled | C-17-24S-31E               | Proposed (11652) | No                   |
| PATTON MDP1 17 FEDERAL #173H           | 30-015-44991 | G         | OXY USA INC           | Not Drilled | C-17-24S-31E               | Proposed (11630) | No                   |
| PATTON MDP1 17 FEDERAL #172H           | 30-015-44990 | G         | OXY USA INC           | Not Drilled | C-17-24S-31E               | Proposed (11652) | No                   |
| PATTON 17 FEDERAL #002                 | 30-015-29604 | O         | OXY USA INC           | 5/8/1997    | K-17-24S-31E               | 9700             | No                   |
| PALLADIUM 7 FEDERAL #002               | 30-015-29145 | O         | OXY USA INC           | 12/26/1996  | G-07-24S-31E               | 8200             | No                   |
| PATTON 18 FEDERAL #007                 | 30-015-33731 | O         | OXY USA INC           | 3/24/2005   | 4-18-24S-31E               | 8270             | No                   |
| PALLADIUM 7 FEDERAL #010               | 30-015-33969 | O         | OXY USA INC           | 6/1/2005    | N-07-24S-31E               | 9450             | No                   |
| PATTON 17 FEDERAL #009T                | 30-015-33034 | O         | OXY USA INC           | 10/17/2004  | M-17-24S-31E               | 8375             | No                   |
| PALLADIUM 7 FEDERAL #008T              | 30-015-33894 | O         | OXY USA INC           | Not Drilled | 2-07-24S-31E               | Proposed (8400)  | No                   |
| PATTON 18 FEDERAL #006                 | 30-015-33825 | O         | OXY USA INC           | 1/29/2005   | N-18-24S-31E               | 8275             | No                   |
| PALLADIUM 7 FEDERAL #009               | 30-015-33732 | O         | OXY USA INC           | 1/10/2005   | O-07-24S-31E               | 8308             | No                   |
| PATTON 18 FEDERAL #008H                | 30-015-41343 | O         | OXY USA INC           | 7/22/2013   | O-18-24S-31E               | 10011            | No                   |
| PATTON 18 FEDERAL #003                 | 30-015-33451 | O         | OXY USA INC           | 9/8/2004    | B-18-24S-31E               | 8270             | No                   |
| PATTON 18 FEDERAL #004                 | 30-015-33710 | O         | OXY USA INC           | 11/29/2004  | J-18-24S-31E               | 8300             | No                   |
| PALLADIUM 7 FEDERAL #006Q              | 30-015-33890 | O         | OXY USA INC           | 10/29/2005  | P-07-24S-31E               | 8400             | No                   |
| SUNDANCE 8 FEDERAL #003Q               | 30-015-32775 | O         | OXY USA INC           | 5/19/2003   | M-08-24S-31E               | 8350             | No                   |
| PATTON 18 FEDERAL #001                 | 30-015-32435 | G         | OXY USA INC           | 9/20/2003   | G-18-24S-31E               | 13223            | No                   |
| PALLADIUM 7 FEDERAL #012               | 30-015-35037 | O         | OXY USA INC           | Not Drilled | I-07-24S-31E               | Proposed (8400)  | No                   |
| SQUIRES ALR #002                       | 30-015-34246 | O         | EOG Y RESOURCES, INC. | 1/2/2006    | I-12-24S-30E               | 8240             | No                   |
| POKER LAKE UNIT CVX JV BS #035H        | 30-015-42427 | O         | BOPCO, L.P.           | 9/23/2014   | C-19-24S-31E               | 10230            | No                   |
| POKER LAKE UNIT #393H                  | 30-015-40951 | O         | BOPCO, L.P.           | 5/27/2012   | A-19-24S-31E               | 8127             | No                   |
| POKER LAKE UNIT CVX JV BS #036H        | 30-015-42428 | O         | BOPCO, L.P.           | 9/21/2014   | C-19-24S-31E               | 10785            | No                   |
| PALLADIUM 13 FEDERAL #001              | 30-015-28057 | S         | BOPCO, L.P.           | 8/7/1994    | P-13-24S-30E               | 8170             | No                   |
| POKER LAKE CVX JV BS FEDERAL COM #014H | 30-015-40261 | O         | BOPCO, L.P.           | 5/17/2012   | C-19-24S-31E               | 9550             | No                   |

**AOR Tabulation for Ian SWD Fed 1 (Top of Injection Interval: 16,250')**

| Well Name                       | API#         | Well Type | Operator                   | Spud Date | Location (Sec., Tn., Rng.) | Total Depth     | Penetrate Inj. Zone? |
|---------------------------------|--------------|-----------|----------------------------|-----------|----------------------------|-----------------|----------------------|
| LOTOS FEDERAL #802              | 30-015-28654 | O         | CHEVRON U S A INC          | 2/8/1998  | L-08-24S-31E               | 8340            | No                   |
| PLU BIG SINKS 19 24 31 USA #001 | 30-015-40181 | O         | CHESAPEAKE OPERATING, INC. | 4/12/2012 | C-19-24S-31E               | Plugged (14008) | No                   |
| PRE-ONGARD WELL #001            | 30-015-25709 | O         | PRE-ONGARD WELL OPERATOR   | 3/9/1987  | I-13-24S-30E               | Plugged (378)   | No                   |
| PRE-ONGARD WELL #001            | 30-015-05851 | O         | PRE-ONGARD WELL OPERATOR   | 8/12/1961 | P-18-24S-31E               | Plugged (4368)  | No                   |
| PRE-ONGARD WELL #001            | 30-015-05849 | O         | PRE-ONGARD WELL OPERATOR   | 9/8/1959  | P-07-24S-31E               | Plugged (4392)  | No                   |

**Notes:** No wells within the 1-mile AOR penetrate the injection interval.

**Attachment 3**  
Source Water Analyses

Wolfcamp



## Water Analysis

Date: 23-Aug-11

2708 West County Road, Hobbs NM 88240

Phone (575) 392-5556 Fax (575) 392-7307

Analyzed For

Brushy Draw 1#1

| Company | Well Name | County | State      |
|---------|-----------|--------|------------|
|         | BD        | Lea    | New Mexico |

Sample Source

Swab Sample

Sample #

Eddy

1-265-295

Formation

Depth

|                  |       |                 |        |
|------------------|-------|-----------------|--------|
| Specific Gravity | 1.170 | SG @ 60 °F      | 1.172  |
| pH               | 8.30  | Sulfides        | Absent |
| Temperature (°F) | 70    | Reducing Agents |        |

### Cations

|                    |         |        |        |        |
|--------------------|---------|--------|--------|--------|
| Sodium (Calc)      | in Mg/L | 77,982 | in PPM | 66,520 |
| Calcium            | in Mg/L | 4,000  | in PPM | 3,413  |
| Magnesium          | in Mg/L | 1,200  | in PPM | 1,024  |
| Soluble Iron (Fe2) | in Mg/L | 10.0   | in PPM | 9      |

### Anions

|              |         |         |        |         |
|--------------|---------|---------|--------|---------|
| Chlorides    | in Mg/L | 130,000 | in PPM | 110,922 |
| Sulfates     | in Mg/L | 250     | in PPM | 213     |
| Bicarbonates | in Mg/L | 127     | in PPM | 108     |

|                               |         |         |        |         |
|-------------------------------|---------|---------|--------|---------|
| Total Hardness (as CaCO3)     | in Mg/L | 15,000  | in PPM | 12,799  |
| Total Dissolved Solids (Calc) | in Mg/L | 213,549 | in PPM | 182,209 |
| Equivalent NaCl Concentration | in Mg/L | 182,868 | in PPM | 156,031 |

### Scaling Tendencies

\*Calcium Carbonate Index 507,520

Below 500,000 Remote / 500,000 - 1,000,000 Possible / Above 1,000,000 Probable

\*Calcium Sulfate (Gyp) Index 1,000,000

Below 500,000 Remote / 500,000 - 10,000,000 Possible / Above 10,000,000 Probable

\*This Calculation is only an approximation and is only valid before treatment of a well or several weeks after treatment.

Remarks RW=.048@70F

Report # 3188

Sec 22, T25S, R28E

North Permian Basin Region

P.O. Box 740

Sundown, TX 79372-0740

(806) 228-8121

Lab Team Leader - Shelia Hernandez

(432) 495-7240

Bone Spring

## Water Analysis Report by Baker Petrolite

|                     |                          |                  |                               |
|---------------------|--------------------------|------------------|-------------------------------|
| Company:            |                          | Sales RDT:       | 33514.1                       |
| Region:             | PERMIAN BASIN            | Account Manager: | TONY HERNANDEZ (575) 910-7135 |
| Area:               | ARTESIA, NM              | Sample #:        | 534665                        |
| Lease/Platform:     | PINOCHLE 'BPN' STATE COM | Analysis ID #:   | 106795                        |
| Entity (or well #): | 2 H                      | Analysis Cost:   | \$90.00                       |
| Formation:          | UNKNOWN                  |                  |                               |
| Sample Point:       | WELLHEAD                 |                  |                               |

| Summary                    |              | Analysis of Sample 534665 @ 75 F |          |         |            |         |         |
|----------------------------|--------------|----------------------------------|----------|---------|------------|---------|---------|
| Sampling Date:             | 03/10/11     | Anions                           | mg/l     | meq/l   | Cations    | mg/l    | meq/l   |
| Analysis Date:             | 03/18/11     | Chloride:                        | 109618.0 | 3081.92 | Sodium:    | 70275.7 | 3058.82 |
| Analyst:                   | SANDRA GOMEZ | Bicarbonate:                     | 2135.0   | 34.99   | Magnesium: | 195.0   | 18.04   |
| TDS (mg/l or g/m3):        | 184911.1     | Carbonate:                       | 0.0      | 0.      | Calcium:   | 844.0   | 42.12   |
| Density (g/cm3, tonne/m3): | 1.113        | Sulfate:                         | 747.0    | 15.55   | Strontium: | 220.0   | 5.02    |
| Anion/Cation Ratio:        | 1            | Phosphate:                       |          |         | Barium:    | 0.8     | 0.01    |
|                            |              | Borate:                          |          |         | Iron:      | 6.5     | 0.23    |
|                            |              | Silicate:                        |          |         | Potassium: | 889.0   | 22.22   |
|                            |              |                                  |          |         | Aluminum:  |         |         |
| Carbon Dioxide:            | 0.50 PPM     | Hydrogen Sulfide:                |          | 0 PPM   | Chromium:  |         |         |
| Oxygen:                    |              | pH at time of sampling:          |          | 7       | Copper:    |         |         |
| Comments:                  |              | pH at time of analysis:          |          |         | Lead:      |         |         |
|                            |              | pH used in Calculation:          |          | 7       | Manganese: | 0.100   | 0.      |
|                            |              |                                  |          |         | Nickel:    |         |         |

| Conditions |              | Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl |        |                                                |        |                                |        |                                |        |                             |        |                       |
|------------|--------------|-----------------------------------------------------------------------------|--------|------------------------------------------------|--------|--------------------------------|--------|--------------------------------|--------|-----------------------------|--------|-----------------------|
| Temp       | Gauge Press. | Calcite<br>CaCO <sub>3</sub>                                                |        | Gypsum<br>CaSO <sub>4</sub> ·2H <sub>2</sub> O |        | Anhydrite<br>CaSO <sub>4</sub> |        | Celestite<br>SrSO <sub>4</sub> |        | Barite<br>BaSO <sub>4</sub> |        | CO <sub>2</sub> Press |
| F          | psi          | Index                                                                       | Amount | Index                                          | Amount | Index                          | Amount | Index                          | Amount | Index                       | Amount | psi                   |
| 80         | 0            | 1.08                                                                        | 188.52 | -1.20                                          | 0.00   | -1.18                          | 0.00   | -0.11                          | 0.00   | 0.68                        | 0.29   | 1.72                  |
| 100        | 0            | 1.10                                                                        | 208.05 | -1.28                                          | 0.00   | -1.20                          | 0.00   | -0.15                          | 0.00   | 0.35                        | 0.28   | 2.35                  |
| 120        | 0            | 1.12                                                                        | 224.17 | -1.38                                          | 0.00   | -1.18                          | 0.00   | -0.17                          | 0.00   | 0.16                        | 0.00   | 3.17                  |
| 140        | 0            | 1.13                                                                        | 243.17 | -1.42                                          | 0.00   | -1.18                          | 0.00   | -0.18                          | 0.00   | 0.00                        | 0.00   | 4.21                  |

Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered.

Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the five scales.

Note 3: The reported CO<sub>2</sub> pressure is actually the calculated CO<sub>2</sub> fugacity. It is usually nearly the same as the CO<sub>2</sub> partial pressure.

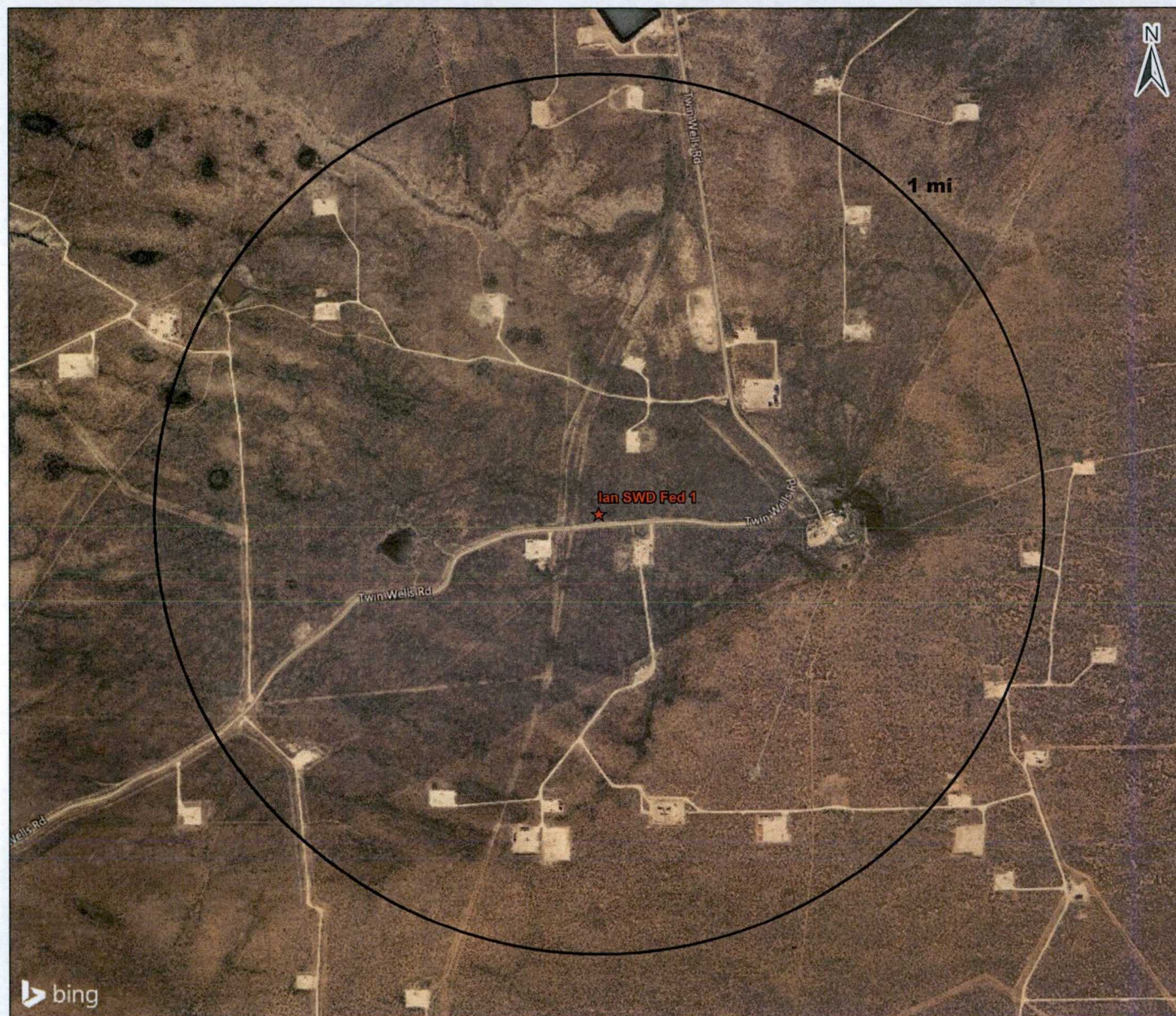
#### **Attachment 4**

#### **Injection Formation Water Analyses**



**Attachment 5**

Water Well Map and Well Data



### Legend

- ★ Proposed SWD
- ⊙ Water Well (iWATERS)
- Proposed SWD 1-mile AOR



### Water Wells Area of Review

#### Ian SWD Fed 1 Eddy County, New Mexico

Proj Mgr:  
Dan Arthur

October 25, 2018

Mapped by:  
Ben Bockelmann

Prepared by:

**ALL** CONSULTING

0 0.225 0.45 0.9 Miles

Service Layer Credits: © 2018 Microsoft Corporation © 2018 DigitalGlobe © CNES (2018) Distribution Airbus DS © 2018 HERE

| Water Well Sampling Rationale |       |                               |     |       |
|-------------------------------|-------|-------------------------------|-----|-------|
| Jan SWD Fed 1                 |       |                               |     |       |
| Water Wells                   | Owner | Available Contact Information | Use | Notes |
|                               |       |                               |     |       |
|                               |       |                               |     |       |
|                               |       |                               |     |       |

Note: No water wells are present within 1 mile of the proposed SWD location.

**Attachment 6**

Induced Seismicity Assessment Letter

November 8, 2018

Mr. Phillip Goetze, P.G.  
NM EMNRD – Oil Conservation Division  
1220 South St. Francis Drive  
Santa Fe, NM 87505

Subject: Induced Seismicity Potential Statement for the Ian SWD Fed 1

Dear Mr. Goetze,

This letter provides information regarding the seismic potential associated with injection operations associated with Blackbuck Resources, LLC's (Blackbuck), proposed Ian SWD Fed 1, hereinafter referred to as the "Subject Well".

As outlined herein, based on my experience as an expert on the issue of induced seismicity, it is my opinion that the potential for the proposed injection well to cause injection-induced seismicity is expected to be minimal, at best. This conclusion is based on (1) the lack of historic seismic activity and faulting in the area, (2) the low fault slip potential (FSP) of Precambrian faults in the area, (3) the presence of confining layers, and (4) the overall vertical distance between the proposed injection zone and basement rock.

The Subject Well, is located 1,505' FNL & 2,444' FEL of Section 18, in T24-S and R31-E of Eddy County, New Mexico. Historically, the Eddy County area has experienced very limited recorded seismic activity (per the U.S. Geological Survey [USGS] earthquake catalog database). There have been two known seismic events located within a 25-mile radius of the proposed subject well. The closest recorded seismic event was a M 3.1 that occurred on March 18, 2012, and was located approximately 6.1 miles northwest of the subject well (See Exhibit 1). The closest Class IID well injecting into the same formations (Devonian-Silurian) of the Subject Well is approximately 1.2 miles to the northeast (See Exhibit 1).

Blackbuck does not own either 2D or 3D seismic reflection data in the area of the Subject Well. Fault data from USGS indicates that the closest known fault is approximately 11.1 miles southwest of the Subject Well (See Exhibit 1).

In a recent paper written by Snee and Zoback (2018) entitled "State of Stress in the Permian Basin, Texas and New Mexico: Implications for Induced Seismicity," the authors found that large groups of mostly north-south striking Precambrian basement faults, predominantly located along the Central Basin Platform, the western Delaware Basin, and large parts of the Northwest Shelf (which includes Eddy and Lea counties, New Mexico) have low FSP at the modeled fluid-pressure

perturbation. The map in Exhibit 2 depicts the low probability risk of FSP for the Delaware Basin and Northwest Shelf areas (Snee and Zoback 2018).

Geologic analysis indicates that the proposed Devonian-Silurian injection zone is overlain by approximately 200 to 400 feet of Woodford Shale, which is the upper confining zone and will serve as a barrier for upward injection fluid migration. Additionally, the Simpson Group that lies directly below the Montoya Formation will act as a lower confining zone to prohibit fluids from migrating downward into the underlying Ellenburger Formation and Precambrian basement rock. See the stratigraphic column for the Delaware Basin included in Exhibit 3.

In the Eddy and Lea Counties area of New Mexico, the Simpson Group is comprised of a series of Middle to Upper Ordovician carbonates, several sandstones, and sandy shales that range from approximately 350 to 650 feet thick (Jones 2008). This group of rocks is capped by the limestones of the Bromide Formation, which is approximately 200 feet thick in this area (Jones 2008). The closest deep well drilled into the Precambrian basement was completed by the Skelly Oil Company in 1975. This well is located in Section 17, Range 36E, Township 25S of Lea County (API No.30-025-25046) and encountered 602 feet of Ellenburger Formation before reaching the top of the Precambrian granite at a depth of 18,920 feet. Based on the estimated thickness of the Simpson Group and Ellenburger Formation in this area, the Precambrian basement should be approximately 1,000 to 1,200 feet below the bottom of the proposed injection zones in the Subject Well.

#### **Conclusion**

As an expert on the issue of induced seismicity, it is my opinion that the potential for the proposed injection well to cause injection-induced seismicity is expected to be minimal, at best. This conclusion is based on (1) the lack of historic seismic activity and faulting in the area, (2) the low FSP of Precambrian faults in the area, (3) the presence of confining layers, and (4) the overall vertical distance between the proposed injection zone and basement rock.

Sincerely,  
ALL Consulting

A handwritten signature in black ink, appearing to read "J. Daniel Arthur".

J. Daniel Arthur, P.E., SPEC  
President and Chief Engineer

Enclosures  
References  
Exhibits

## References

Ball, Mahlon M. 1995. "Permian Basin Province (044)." In *National Assessment of United States Oil and Gas Resources—Results, Methodology, and Supporting Data*. U.S. Geological Survey. <https://certmapper.cr.usgs.gov/data/noga95/prov44/text/prov44.pdf> (accessed June 18, 2018).

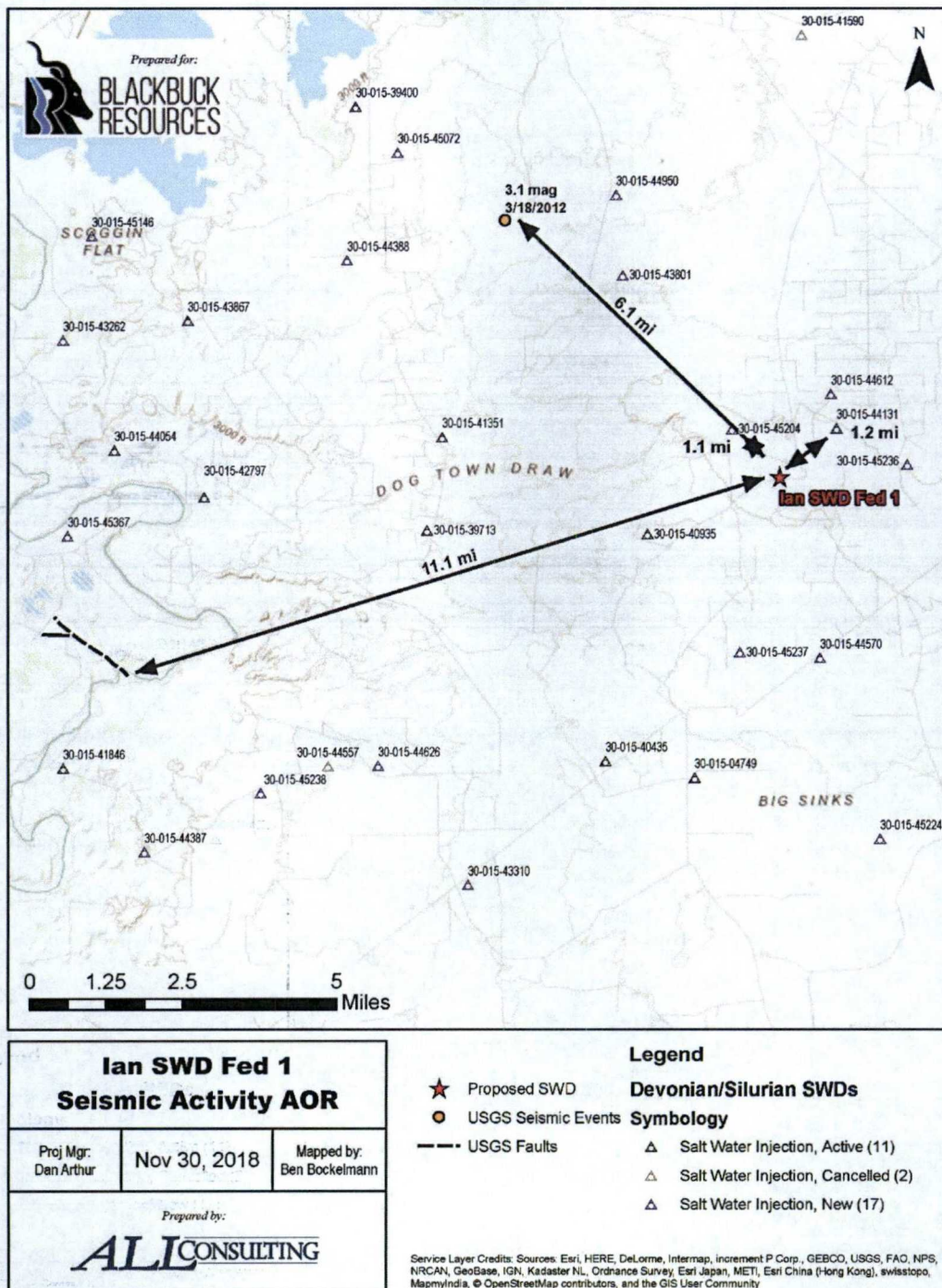
Green, G.N., and G.E. Jones. 1997. "The Digital Geologic Map of New Mexico in ARC/INFO Format." U.S. Geological Survey Open-File Report 97-0052. <https://mrdata.usgs.gov/geology/state/state.php?state=NM> (accessed June 14, 2018).

Jones, Rebecca H. 2008. "The Middle-Upper Ordovician Simpson Group of the Permian Basin: Deposition, Diagenesis, and Reservoir Development." [http://www.beg.utexas.edu/resprog/permianbasin/PBGSP\\_members/writ\\_synth/Simpson.pdf](http://www.beg.utexas.edu/resprog/permianbasin/PBGSP_members/writ_synth/Simpson.pdf) (accessed June 19, 2018).

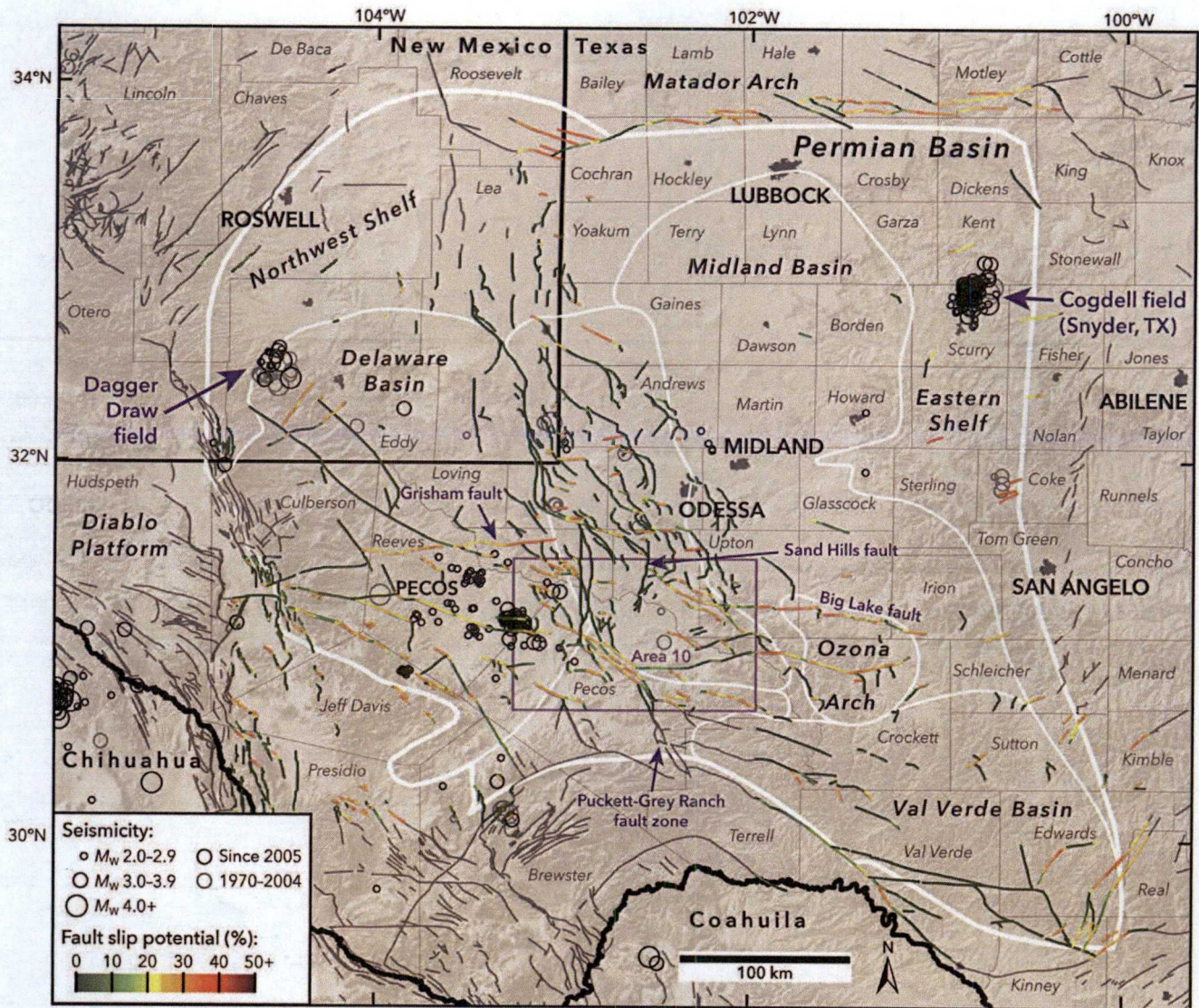
Snee, Jens-Erik Lund, and Mark D. Zoback. 2018. "State of Stress in the Permian Basin, Texas and New Mexico: Implications for Induced Seismicity." *The Leading Edge* 37, no. 2 (February 2018): 127-34.

U.S. Geological Survey (USGS). No date. Earthquakes Hazard Program: Earthquake Catalog. <https://earthquake.usgs.gov/earthquakes/search/> (accessed June 14, 2018).

## **Exhibits**



**Exhibit 1. Map Showing the Distances from Known and Inferred Faults, Seismic Event, and Closest Deep Injection Well**



**Exhibit 2. Results of the Snee and Zoback (2018) Probabilistic FSP Analysis Across the Permian Basin**

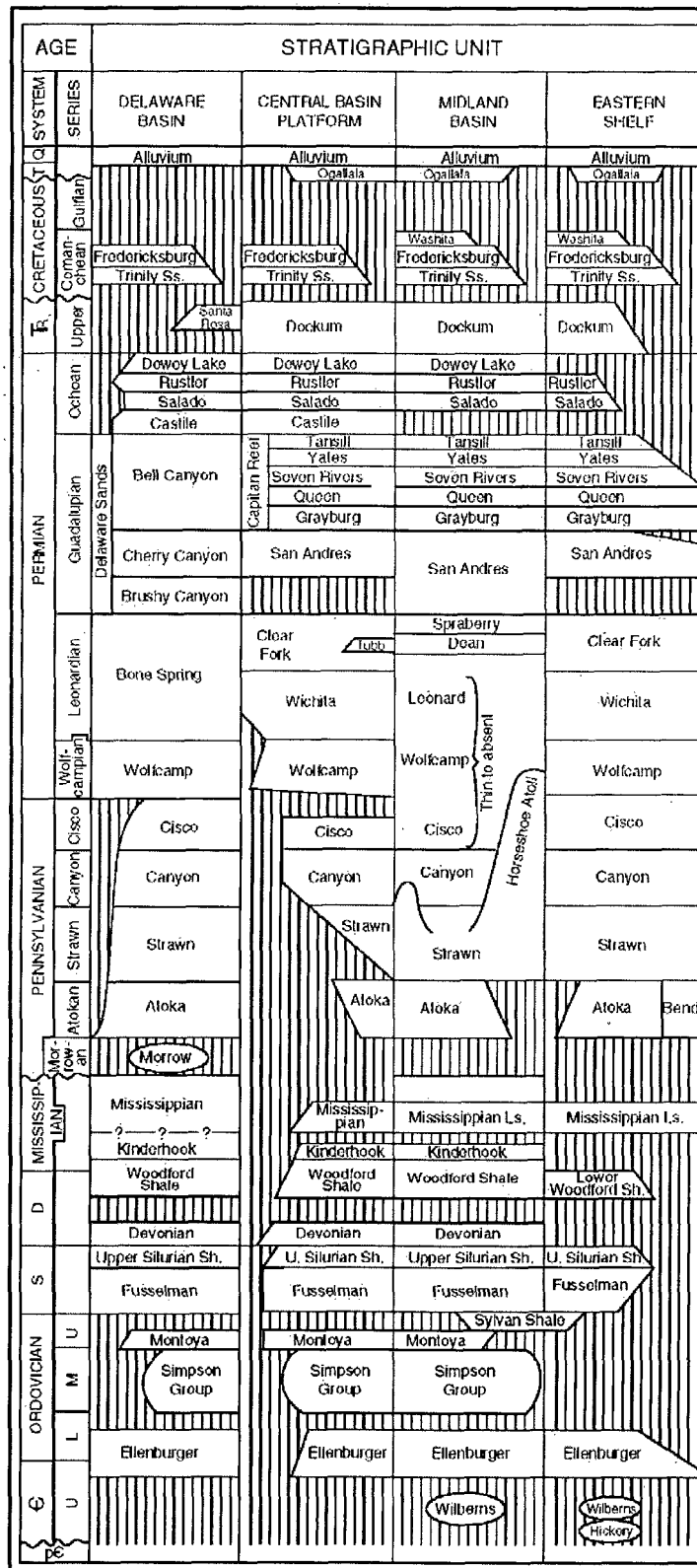


Exhibit 3. Delaware Basin Stratigraphic Chart (Ball 1995)

**Attachment 7**

Public Notice Affidavit and Notice of Application Confirmations

CARLSBAD  
**CURRENT-ARGUS**

**AFFIDAVIT OF PUBLICATION**

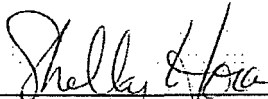
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0001268204

ALL CONSULTING- CARLSBAD  
1718 SOUTH CHEYENNE AVENUE

TULSA OK 74119

I, a legal clerk of the **Carlsbad Current-Argus**, a newspaper published daily at the City of Carlsbad, in said county of Eddy, state of New Mexico and of general paid circulation in said county; that the same is a duly qualified newspaper under the laws of the State wherein legal notices and advertisements may be published; that the printed notice attached hereto was published in the regular and entire edition of said newspaper and not in supplement thereof on the date as follows, to wit:

11/13/18

  
\_\_\_\_\_  
Legal Clerk

Subscribed and sworn before me this  
13th of November 2018.

  
\_\_\_\_\_  
State of WI, County of Brown  
NOTARY PUBLIC

9-19-21  
\_\_\_\_\_  
My Commission Expires

**APPLICATION FOR AUTHORIZATION TO INJECT**

NOTICE IS HEREBY GIVEN: That Blackbuck Resources LLC, 2601 Westheimer Rd., Suite C210, Houston, TX 77098, is requesting that the New Mexico Oil Conservation Division administratively approve the APPLICATION FOR AUTHORIZATION TO INJECT as follows:

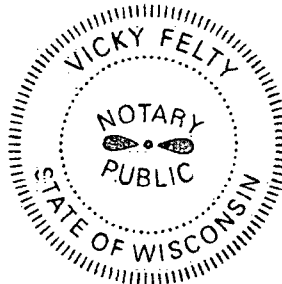
PURPOSE: The intended purpose of the injection well is to dispose of salt water produced from permitted oil and gas wells.

WELL NAME AND LOCATION: Ian SWD Fed 1  
SW ¼ NE ¼, Section 18, Township 24S, Range 31E  
1,505' FNL & 2,444' FEL  
Eddy County, NM

NAME AND DEPTH OF DISPOSAL ZONE:  
Devonian-Silurian (16,250' - 17,915')  
EXPECTED MAXIMUM INJECTION RATE:  
30,000 Bbls/day  
EXPECTED MAXIMUM INJECTION PRESSURE:  
3,250 psi (surface)

Objections or requests for hearing must be filed with the New Mexico Oil Conservation Division within fifteen (15) days. Any objection or request for hearing should be mailed to the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505.

Additional information may be obtained by contacting Samuel Oliver (Blackbuck - Chief Commercial Officer) at 855-432-1400.  
Pub: November 13, 2018 #1268204



Ad#:0001268204  
P O : 0001268204  
# of Affidavits :0.00

| Ian SWD Fed 1 Notice of Application Recipients |                                          |               |       |            |
|------------------------------------------------|------------------------------------------|---------------|-------|------------|
| Entity                                         | Address                                  | City          | State | Zip Code   |
| Landowner                                      |                                          |               |       |            |
| New Mexico BLM                                 | 620 E. Greene St.                        | Carlsbad      | NM    | 88220      |
| OCD District                                   |                                          |               |       |            |
| NMOCD District 2                               | 811 S. First St.                         | Artesia       | NM    | 88210      |
| Leasehold Operators                            |                                          |               |       |            |
| Chesapeake Operating, Inc.                     | P.O. Box 18496                           | Oklahoma City | OK    | 73154-0496 |
| Ambassador Oil Corp.                           | 1220 South St. Francis Dr.               | Santa Fe      | NM    | 87505      |
| Bass Enterprises Production Co.                | 201 Main St.                             | Fort Worth    | TX    | 76102      |
| BOPCO, LP                                      | 6401 Holiday Hill Rd., Bldg 5, Suite 200 | Midland       | TX    | 79707      |
| Charles B. Read                                | P.O. Box 2126                            | Roswell       | NM    | 88202      |
| Chevron USA Inc.                               | P.O. Box 2100                            | Houston       | TX    | 77252      |
| COG Production, LLC                            | 600 W. Illinois Ave.                     | Midland       | TX    | 79701      |
| EOG Resources, Inc.                            | 4000 N. Big Spring, Suite 500            | Midland       | TX    | 79705      |
| EOG Y Resources, Inc.                          | 104 S. 4th Street                        | Artesia       | NM    | 88210      |
| Gila Rough Riders, Inc.                        | P.O. Box 202                             | Gila          | NM    | 88038      |
| Hillin-Simon Prime Exploration, LLC            | P.O. Box 1552                            | Midland       | TX    | 79702      |
| Meridian Oil Inc.                              | P.O. Box 51810                           | Midland       | TX    | 79710      |
| OXY USA Inc.                                   | P.O. Box 27757                           | Houston       | TX    | 77227-7757 |
| P.R. Patton & Associates                       | Petroleum Bldg., Ste 528                 | Roswell       | NM    | 88203      |
| Pogo Producing Co.                             | P.O. Box 10340                           | Midland       | TX    | 79702-7340 |
| Ritchie Federal                                | 911 Old Pecos Trail                      | Santa Fe      | NM    | 87505      |
| Snyder Oil Co.                                 | 801 Cherry St., Unit 45                  | Fort Worth    | TX    | 76102      |
| Sonat Exploration Co.                          | P.O. Box 1513                            | Houston       | TX    | 77251-1513 |
| Sundance Oil Co.                               | 1776 N Lincoln Street                    | Denver        | CO    | 80203      |
| Yates Petroleum Corporation                    | 105 S. Fourth Street                     | Artesia       | NM    | 88210      |

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Artesia NM 88210-2834

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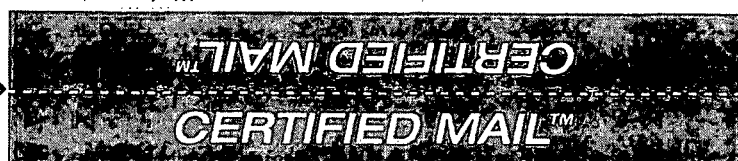


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Denver CO 80203-1022

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Yates Petroleum Corporation  
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Artesia NM 88210-2177