

RECEIVED: 7/26/2018	REVIEWER:	TYPE: SWD	APP NO: PMAM182085428
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ABOVE THIS TABLE FOR OCD DIVISION USE ONLY

**NEW MEXICO OIL CONSERVATION DIVISION**  
 - Geological & 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

<b>Applicant:</b> Delaware Energy LLC	<b>OGRID Number:</b> 331195
<b>Well Name:</b> Forehand Ranch SWD #1	<b>API:</b> Pending
<b>Pool:</b> SWD, Devonian	<b>Pool Code:</b> 96101

**SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED BELOW**

- 1) **TYPE OF APPLICATION:** Check those which apply for [A]
- A. Location – Spacing Unit – Simultaneous Dedication
- ☐ NSL      ☐ NSP (PROJECT AREA)      ☐ NSP (PRORATION UNIT)      ☐ SD
- B. Check one only for [ I ] or [ II ]
- [ I ] Commingling – Storage – Measurement
- ☐ DHC    ☐ CTB    ☐ PLC    ☐ PC    ☐ OLS    ☐ OLM
- [ II ] Injection – Disposal – Pressure Increase – Enhanced Oil Recovery
- ☐ WFX    ☐ PMX    ☒ SWD    ☐ IPI    ☐ EOR    ☐ PPR

**FOR OCD ONLY**

- ☐ Notice Complete

☐ Application Content Complete

- 2) **NOTIFICATION REQUIRED TO:** Check those which apply.
- A. ☒ Offset operators or lease holders
- B. ☐ Royalty, overriding royalty owners, revenue owners
- C. ☒ Application requires published notice
- D. ☒ Notification and/or concurrent approval by SLO
- E. ☐ Notification and/or concurrent approval by BLM
- F. ☒ Surface owner
- G. ☒ For all of the above, proof of notification or publication is attached, and/or,
- H. ☐ No notice required
- 3) **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.**

Sarah Presley

Print or Type Name

Signature

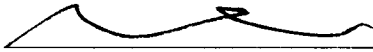
7/23/2018  
Date

432-685-7005

Phone Number

s.presley@delawareenergy.com  
e-mail Address

**APPLICATION FOR AUTHORIZATION TO INJECT**

- I. PURPOSE: \_\_\_\_\_ Secondary Recovery \_\_\_\_\_ Pressure Maintenance XXX Disposal \_\_\_\_\_ Storage  
Application qualifies for administrative approval? XX Yes \_\_\_\_\_ No
- II. OPERATOR: \_\_\_\_\_ Delaware Energy, LLC \_\_\_\_\_  
ADDRESS: \_\_\_\_\_ 405 North Marienfeld, Suite 250, Midland TX 79701 \_\_\_\_\_  
CONTACT PARTY: \_\_\_\_\_ Mike McCurdy \_\_\_\_\_ PHONE: 432-312-5251
- 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 XXXX 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: Mike McCurdy TITLE: Vice-President
- SIGNATURE:  DATE: 07/19/2018
- E-MAIL ADDRESS: m.mccurdy@delawareenergy.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:

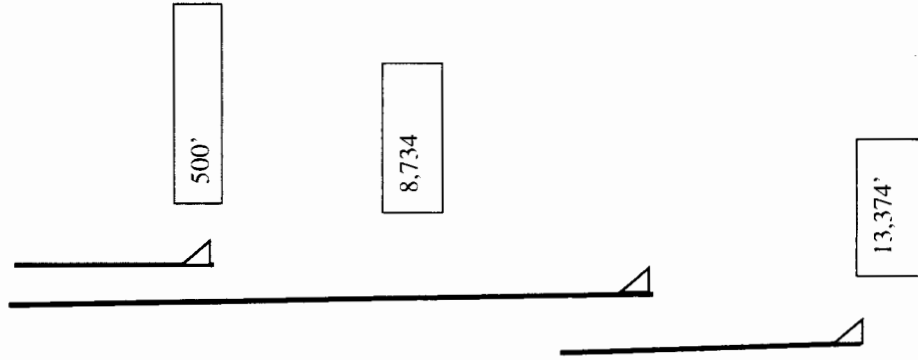
- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates 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.

## INJECTION WELL DATA SHEET

OPERATOR: Delaware Energy, LLCWELL NAME & NUMBER: Forehand Ranch SWD # 1WELL LOCATION: 866' FSL & 1,578' FWL N 5 26S 27E  
FOOTAGE LOCATION UNIT LETTER SECTION TOWNSHIP RANGEWELLBORE SCHEMATIC see attached wellbore sketchWELL CONSTRUCTION DATASurface CasingHole Size: 17.5" Casing Size: 13-3/8", 54.5#Cemented with: 500 sx. or                      ft<sup>3</sup>Top of Cement:                      surface                      Method Determined: Plan to CirculateIntermediate CasingHole Size: 12-1/4" Casing Size: 9-5/8", 47#, L-80Cemented with: 2,500'                      sx. or                      ft<sup>3</sup>Top of Cement:                      surface                      Method Determined: Plan to CirculateProduction CasingHole Size: 8-1/2" Casing Size: 7-5/8", 39#, P-110Cemented with: 650                      sx. or                      ft<sup>3</sup>Top of Cement: Top of Liner                      Method Determined: Plan to Circulate  
to liner topTotal Depth: 14,374'Injection Interval13,374'                      feet to 14,374'  
(OPEN HOLE)

**INJECTION WELL DATA SHEET**

Tubing Size: 5.5" BTC x 5.5" Flush Joint Lining Material: Fiber Glass

Type of Packer: Weatherford Arrow Set IX

Packer Setting Depth: 13,324'

Other Type of Tubing/Casing Seal (if applicable): none

Additional Data

1. Is this a new well drilled for injection? XXXXXX Yes        No  
 If no, for what purpose was the well originally drilled? N/A

2. Name of the Injection Formation: Devonian

3. Name of Field or Pool (if applicable): SWD; Devonian

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. N/A

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: \_\_\_\_\_

Below: none

Next Higher: Delaware 2,034' - 5,509'; Bone Springs 5,509' - 8,734'; Wolfcamp 8,734' - 10,934'; Strawn 10,934' - 11,109',  
 Atoka 11,109' - 11,884'; Morrow 11,884' - 12,959'

**VII.**

**1. Proposed average and maximum daily rate and volume of fluids to be injected;**

Average 15,000-20,000 BWPD, Max 25,000 BWPD

**2. Whether the system is open or closed;**

Open System, Commercial SWD

**3. Proposed average and maximum injection pressure;**

Average 1,500-2,500 PSI, Max 2,675 PSI

**4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,**

Bone Spring, Delaware, and Wolfcamp produced water. No known incompatibility exists with these produced water types and the Devonian. Devonian formation is used as a disposal interval throughout the Delaware Basin for Wolfcamp, Bone Springs, and Delaware produced water. See attached water analysis from Bone Spring, Wolfcamp, and Delaware produced water.

**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.).**

Disposal zone produces water and no hydrocarbons, nearby Devonian test wells have only tested water in DST's. Nearby Top Gun SWD tested Sulphur water.

**\*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.**

The proposed disposal interval is in the Devonian formation 13,374'-14,3745'. Devonian is an impermeable organic Shale at the very top (13,259 ft, Woodford Shale) 100ft thick followed by permeable lime, dolomite, and small amount of shale 1000ft thick. There are no fresh water zones underlying the proposed injection zone. Usable water depth is from surface to +/- 150', the water source is older alluvium (Quaternary). All the fresh water wells in the area have an average depth to water of 20 ft per State Engineer.

**IX. Describe the proposed stimulation program, if any.**

60,000 gallons 20% HCL acid job with packer

**X. Attach appropriate logging and test data on the well**

Mud log will be filed after the well has been drilled. All cased hole and open hole Logs will be filed following drilling operations.

**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.**

Included in the application is a water well sample from section 5 of T26S R27E

**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.**

Delaware Energy, L.L.C. has reviewed and examined available geologic and engineering data in the area of interest for the Goat Ranch SWD #1 and have found no evidence of faults or other hydrologic connections between Devonian disposal zone and the underground sources of drinking water. Furthermore, there exist many impermeable intervals between the injection interval and the fresh ground water from the top of the Devonian Carbonate and the base of the ground water.

Mike McCurdy Vice President 7/19/2018  
Title Date

### III. WELL DATA

**(1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.**

Forehand Ranch SWD #1, Sec. 5-T26S-R27E, 866' FSL & 1,578' FWL, UL N, Eddy County, New Mexico

**(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.**

Casing Size	Setting Depth	Sacks of Cement	Hole Size	Top of Cement	Determined
13-3/8"	500'	500	17-1/2"	Surface	CIRC
9-5/8"	8,734'	2500	12-1/4"	Surface	CIRC
7-5/8"	8,534'-13,374'	650	8-1/2"	Liner Top	CIRC

**(3) A description of the tubing to be used including its size, lining material, and setting depth.**

5-1/2" BTC X 5-1/2" Flush Joint, Internally Fiber Glass Coated Tubing set 50 to 100ft above open hole

**(4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.**

Weatherford Arrow Set 1X injection packer, nickel plated with on/off tool

**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.**

Devonian Formation

Pool Name: SWD (Devonian)

**(2) The injection interval and whether it is perforated or open-hole.**

13,374' to 14,374' (Open hole)

**(3) State if the well was drilled for injection or, if not, the original purpose of the well.**

Well is a planned new drill for SWD

**(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.**

None, well is a planned new drill

**(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.**

Next Higher: Delaware 2,034' – 5,509'; Bone Springs 5,509' - 8,734'; Wolfcamp 8,734' - 10,934'; Strawn 10,934' - 11,109', Atoka 11,109' - 11,884'; Morrow 11,884' – 13,374'

Next Lower: None

District I  
1625 N. French Dr., Hobbs, NM 88240  
Phone: (505) 396-6666 Fax: (505) 396-6779  
District II  
874 N. El Paso St., Artesia, NM 88210  
Phone: (505) 748-1283 Fax: (505) 748-0750  
District III  
1000 Rio Puerco Road, Aztec, NM 87410  
Phone: (505) 344-6779 Fax: (505) 344-6779  
District IV  
1720 S. St. Francis Dr., Santa Fe, NM 87503  
Phone: (505) 476-0460 Fax: (505) 476-3452

State of New Mexico  
Energy, Minerals & Natural Resources Department  
**OIL CONSERVATION DIVISION**  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-102  
Revised August 1, 2011  
Submit one copy to appropriate  
District Office  
☐ AMENDED REPORT

**WELL LOCATION AND ACREAGE DEDICATION PLAT**

<sup>1</sup> API Number		<sup>2</sup> Pool Code <b>96101</b>		<sup>3</sup> Pool Name <b>SWD; DEVONIAN</b>					
<sup>4</sup> Property Code		Property Name <b>FOREHAND RANCH SWD</b>						<sup>5</sup> Well Number <b>1</b>	
<sup>6</sup> OGRID No. <b>371195</b>		<sup>7</sup> Operator Name <b>DELAWARE ENERGY, LLC</b>						<sup>8</sup> Elevation <b>3184'</b>	
<sup>9</sup> Surface Location									
UL or lot no. <b>N</b>	Section <b>5</b>	Township <b>T26S</b>	Range <b>R27E</b>	Lot 1 in <b></b>	Feet from the <b>866</b>	North-South line <b>SOUTH</b>	Feet from the <b>1578</b>	East-West line <b>WEST</b>	County <b>EDDY</b>
<sup>10</sup> Bottom Hole Location If Different From Surface									
UL or lot no.	Section	Township	Range	Lot 1 in	Feet from the	North-South line	Feet from the	East-West line	County
<sup>11</sup> Dedicated Acres	<sup>12</sup> Joint or Infill	<sup>13</sup> Consolidation Code		<sup>14</sup> Order No.					

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

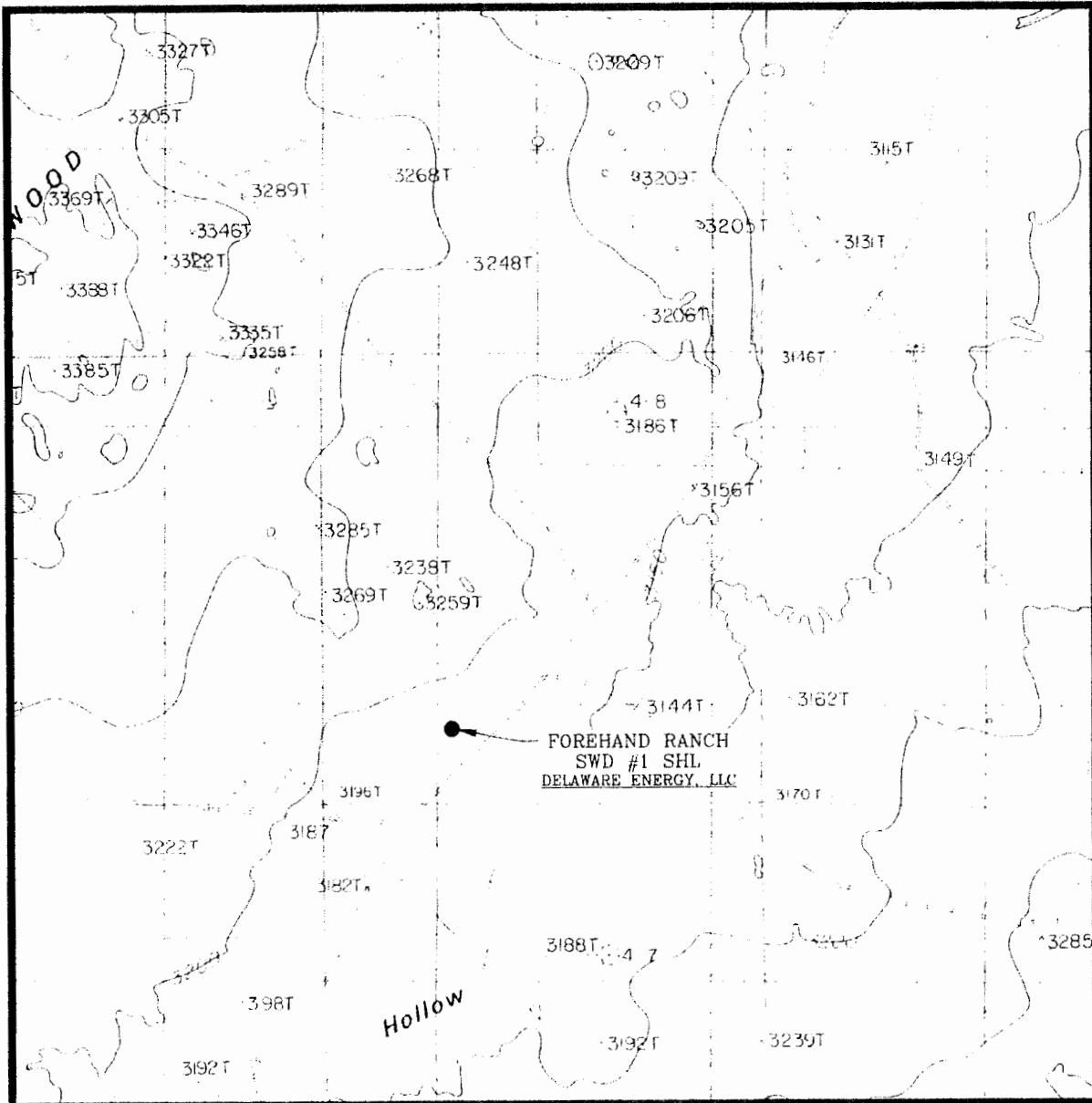
SEC. 31		SEC. 32		T-25-S, R-27-E		SEC. 32		SEC. 33	
SEC. 6		SEC. 5		T-26-S, R-27-E		SEC. 5		SEC. 4	
<p><b>SURFACE HOLE LOCATION</b> NAD 83, SPCS NM EAST X: 577699.83' / Y: 388059.75' LAT: 32.06680167N / LON: 104.21594582W NAD 27, SPCS NM EAST X: 536516.28' / Y: 388002.76' LAT: 32.0668015N / LON: 104.21545150W</p> <p>SHL</p> <p>1578'</p> <p>866'</p>									
SEC. 6		SEC. 5		SEC. 5		SEC. 4		SEC. 9	
SEC. 7		SEC. 8		SEC. 8		SEC. 9		SEC. 9	

**OPERATOR CERTIFICATION**  
I hereby certify that the information shown on this plat is true and correct to the best of my belief and knowledge.  
Signature: *Sarah Presley* Date: **7.19.18**  
**SARAH PRESLEY**  
Printed Name  
E-mail Address: **s.presley@delawareenergy.com**

**SURVEYOR CERTIFICATION**  
I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.  
Date of Survey: **JULY 5, 2018**  
Signature and Seal of Professional Surveyor: *David W. Myers*  
Certificate Number: **DAVID W. MYERS 11403**

1	07/02/2018	DEF
REV.	DATE	BY

# LOCATION VERIFICATION MAP



SEC. 5 TWP. 26-S RGE. 27-E  
 SURVEY: N.M.P.M.  
 COUNTY: EDDY  
 DESCRIPTION: 866' FSL & 1578' FWL  
 ELEVATION: 3184'  
 OPERATOR: DELAWARE ENERGY, LLC  
 LEASE: FOREHAND RANCH  
 U.S.G.S. TOPOGRAPHIC MAP: COTTONWOOD HILLS, N.M.

SCALE: 1" = 2000'  
 CONTOUR INTERVAL = 10'

SHEET 2 OF 2

PREPARED BY:  
 R-SQUARED GLOBAL, LLC  
 1309 LOUISVILLE AVENUE, MONROE, LA 71201  
 318-323-8900 OFFICE  
 JOB No. R3029-01

Sec 22, T25S, R28E

North Permian Basin Region  
P.O. Box 740  
Sundown, TX 79372-0740  
(806) 229-8121  
Lab Team Leader - Sheila 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: Sample #: 534665  
Lease/Platform: PINOCHLE 'BPN' STATE COM Analysis ID #: 106795  
Entity (or well #): 2 H Analysis Cost: \$90.00  
Formation: WELLHEAD  
Sample Point: WELLHEAD

Summary		Analysis of Sample 534665 @ 75 F					
		Anions		mg/l		meq/l	
Sampling Date:	03/10/11	Chloride:	109618.0	3091.92	Sodium:	70275.7	3056.82
Analysis Date:	03/18/11	Bicarbonate:	2135.0	34.99	Magnesium:	195.0	16.04
Analyst:	SANDRA GOMEZ	Carbonate:	0.0	0.0	Calcium:	844.0	42.12
TDS (mg/l or g/m3):	184911.1	Sulfate:	747.0	15.55	Strontium:	220.0	5.02
Density (g/cm3, tonne/m3):	1.113	Phosphate:			Barium:	0.8	0.01
Anion/Cation Ratio:	1	Borate:			Iron:	6.5	0.23
		Silicate:			Potassium:	869.0	22.22
Carbon Dioxide:	0.50 PPM	Hydrogen Sulfide:		0 PPM	Aluminum:		
Oxygen:		pH at time of sampling:		7	Chromium:		
Comments:		pH at time of analysis:			Copper:		
		pH used in Calculation:		7	Lead:		
					Manganese:	0.100	0.0
					Nickel:		

Conditions		Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl										
Temp	Gauge Press.	Calcite CaCO <sub>3</sub>		Gypsum CaSO <sub>4</sub> ·2H <sub>2</sub> O		Anhydrite CaSO <sub>4</sub>		Celestite SrSO <sub>4</sub>		Barite 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	0.56	0.29	1.72
100	0	1.10	208.05	-1.29	0.00	-1.20	0.00	-0.15	0.00	0.35	0.29	2.35
120	0	1.12	224.17	-1.36	0.00	-1.19	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.

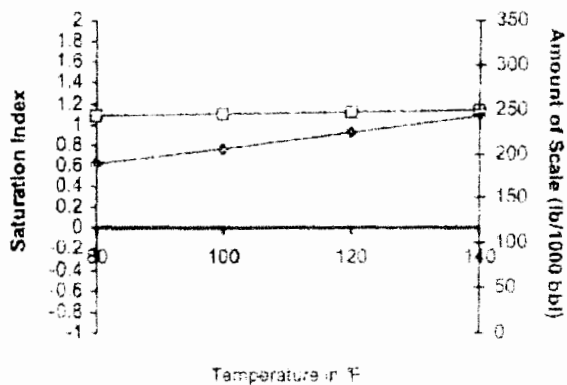
Note 3: The reported CO<sub>2</sub> pressure is actually the calculated CO<sub>2</sub> fugacity. It is usually nearly the same as the CO<sub>2</sub> partial pressure.

# Scale Predictions from Baker Petrolite

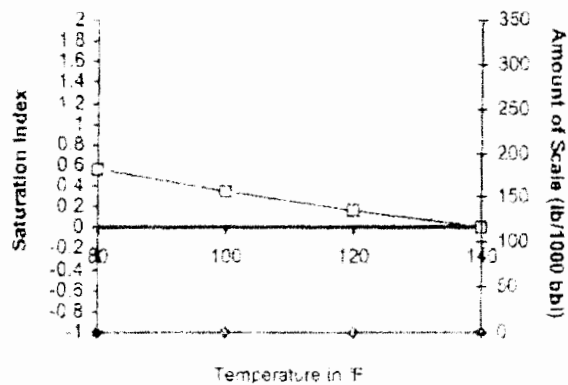
Analysis of Sample 534665 @ 75 °F for

03/18/11

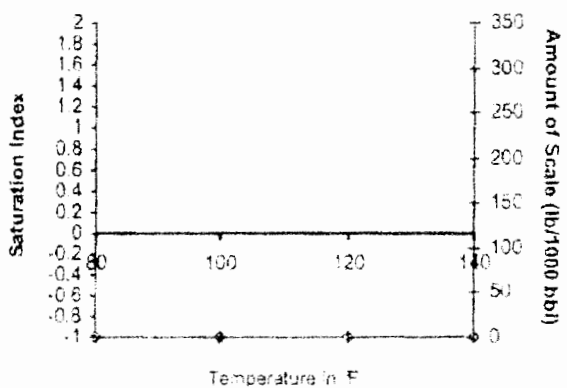
Calcite -  $\text{CaCO}_3$



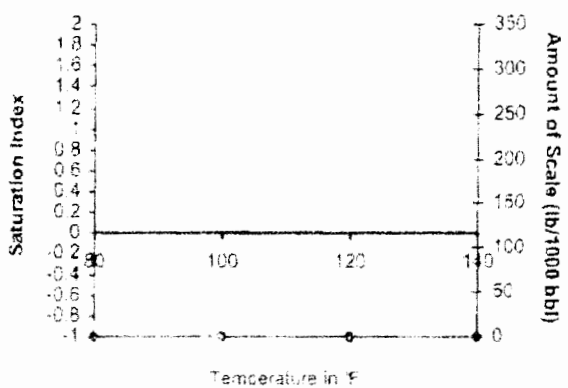
Barite -  $\text{BaSO}_4$



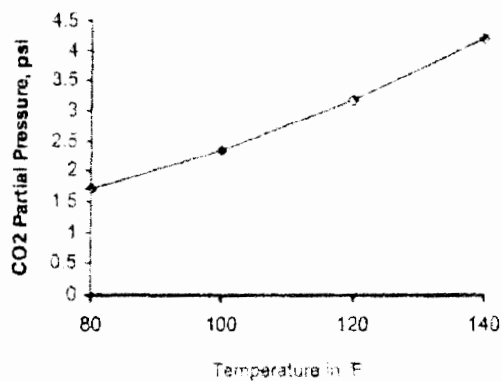
Gypsum -  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$



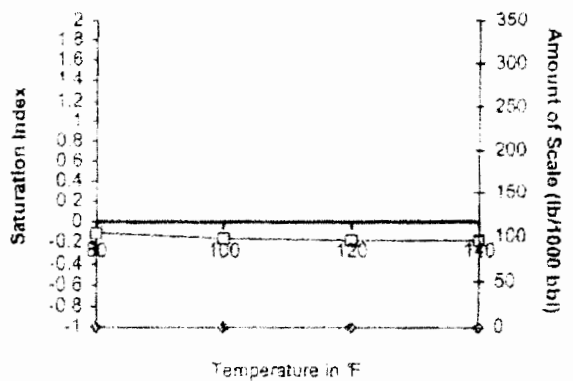
Anhydrite -  $\text{CaSO}_4$



Carbon Dioxide Partial Pressure



Celestite -  $\text{SrSO}_4$



Wolfcamp



**BAKER  
HUGHES**

## 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 L#1*

Company	Well Name	County	State
	BD	Lea	New Mexico

Sample Source

Swab Sample

Sample #

*Eddy*  
1-265-29E  
1

Formation

Depth

Specific Gravity	1.170	SG @ 60 °F	1.172
pH	6.30	Sulfides	Absent
Temperature (°F)	70	Reducing Agents	

### Cations

Sodium (Calc)	in Mg/L	77,962	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



PRODUCTION DEPARTMENT

MILLER CHEMICALS, INC.

Post Office Box 298  
Artesia, N.M. 88211-0298  
(505) 746-1919 Artesia Office  
(505) 392-2893 Hobbs Office  
(505) 746-1918 Fax  
mci@plateautel.net

Delaware Brushy Canyon

## WATER ANALYSIS REPORT

Company :  
Address :  
Lease : LOVING "AIB"  
Well : #15  
Sample Pt. : WELLHEAD

Date : MARCH 17, 2008  
Date Sampled : MARCH 17, 2008  
Analysis No. :

ANALYSIS		mg/L	* meq/L
1. pH	6.0		
2. H2S	0		
3. Specific Gravity	1.070		
4. Total Dissolved Solids		304684.9	
5. Suspended Solids		NR	
6. Dissolved Oxygen		NR	
7. Dissolved CO2		NR	
8. Oil In Water		NR	
9. Phenolphthalein Alkalinity (CaCO3)			
10. Methyl Orange Alkalinity (CaCO3)			
11. Bicarbonate	HCO3	927.0	HCO3 15.2
12. Chloride	Cl	187440.0	Cl 5287.4
13. Sulfate	SO4	500.0	SO4 10.4
14. Calcium	Ca	37200.0	Ca 1856.3
15. Magnesium	Mg	996.3	Mg 82.0
16. Sodium (calculated)	Na	77586.6	Na 3374.8
17. Iron	Fe	35.0	
18. Barium	Ba	NR	
19. Strontium	Sr	NR	
20. Total Hardness (CaCO3)		97000.0	

## PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter	Compound	Equiv wt X meq/L	- mg/L
18561 *Ca <----- *HCO3 15	Ca (HCO3) 2	81.0	15.2 1231
/-----	CaSO4	68.1	10.4 709
821 *Mg <----- *SO4 10	CaCl2	55.5	1830.7 101584
/-----	Mg (HCO3) 2	73.2	
33751 *Na <----- *Cl 5287	MgSO4	60.2	
/-----	MgCl2	47.6	82.0 3902
Saturation Values Dist. Water 20 C	NaHCO3	84.0	
CaCO3 13 mg/L	Na2SO4	71.0	
CaSO4 * 2H2O 2090 mg/L	NaCl	58.4	3374.8 197223
BaSO4 2.4 mg/L			

REMARKS:



DELAWARE  
ENERGY  
SERVICES

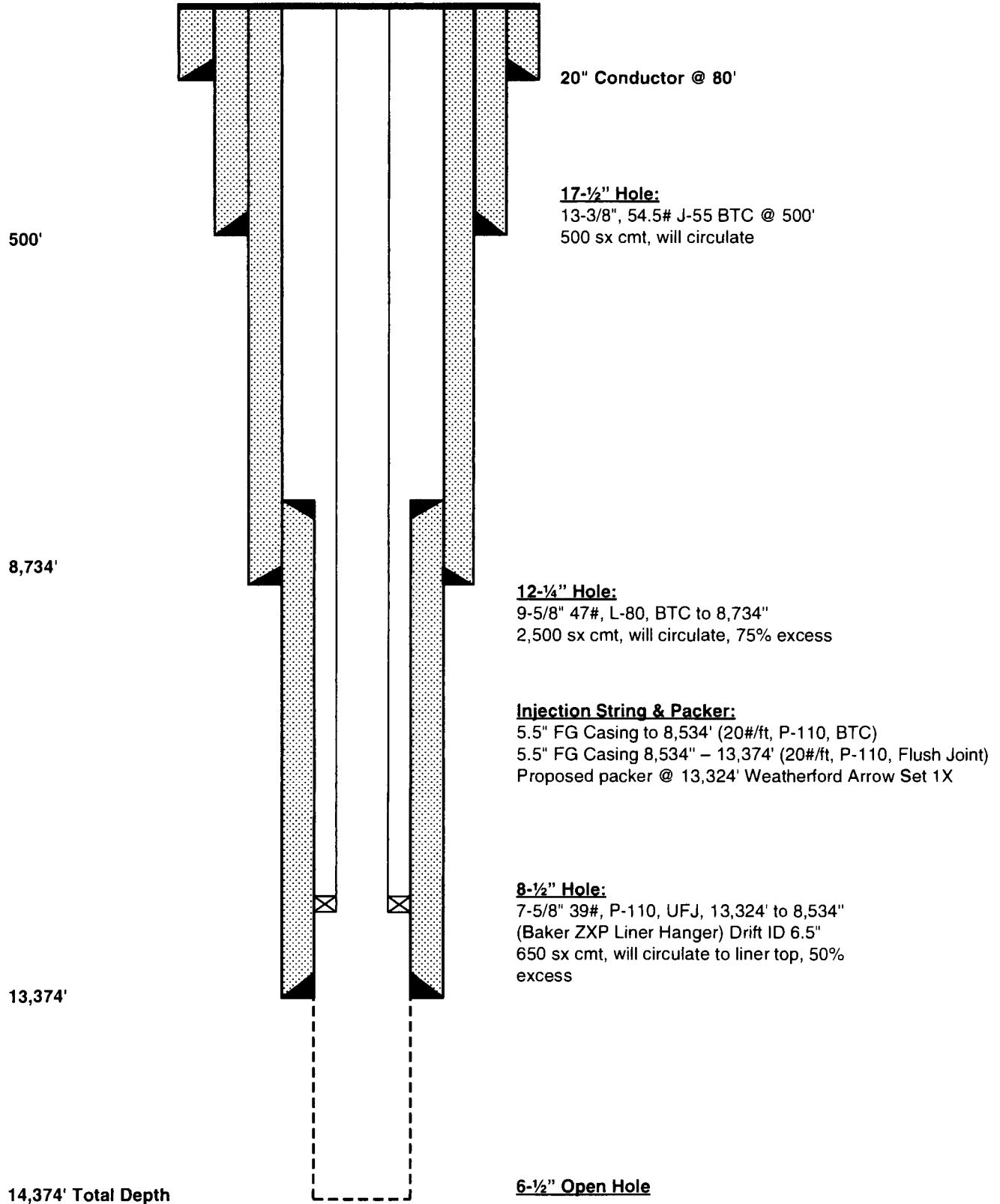
**Forehand Ranch SWD # 1**

API # PENDING  
866' FSL & 1,578' FWL, Sec. 5, T26S, R27E  
EDDY COUNTY, NEW MEXICO

**ELEVATION:**

GL: 3,184'

**PROPOSED WELLBORE**





P.O. Box 3394, Midland, Texas 79702  
Phone (432) 684-4233 Fax (432) 684-4277

207815

**SAMPLE ANALYSIS FORM**

Company	Delaware Energy			Date	07/12/2018
State	New Mexico	County Eddy		Date in Lab	07/17/2018
Lease	Forehand Farms		Well Type	Well	SWD
Sample Date	07/12/2018	Sample Pt	Stock Tank	Sales Rep	Mauricio Cervantes
Number of Yrs Old			Top Perf		
Production					
Fluids:	Oil(bpd)	Gravity API	Color of Oil		
	Water(bpd) N/A	Estimated Chlorides	Water Produced		
	Gas(mcf)	Working Pressure(psi)	Shut in Pressure(psi)		
Well Class and Type Lift:				Iron Count(mg/l)	
Equipment:				Temperature(F)	

**Chemicals in Use**

Product	Amount	Unit	Treatment
---------	--------	------	-----------

Problem:

Location:

Recommendations: No

Details:

ASAP. Need fresh H2O analysis for state permit for a disposal.



P.O. Box 3394, Midland, Texas 79702  
Phone (432) 684-4233 Fax (432) 684-4277

### Water Analysis

Code 207815

#### Client Information

**Delaware Energy**  
**County:** Eddy

**Rep:** Mauricio  
Cervantes

#### Sample Information

**Lease/Well:** Forehand Farms/SWD

**Sample Point:** Stock Tank

**Date Sampled:** 07/12/2018

**Date Reported:** 07/12/2018

### Results

#### Cations

Ion	Concentration(mg/L)
Barium (as Ba)	0
Calcium (as Ca)	710
Iron (as Fe)	0
Sodium (as Na)	10
Magnesium (as Mg)	0

#### Other Measurements

Measurement	Value
pH	8.02
SG	1.003
Turbidity	9
CO <sub>2</sub>	
Total Dissolved Solids	2455.000

#### Anions

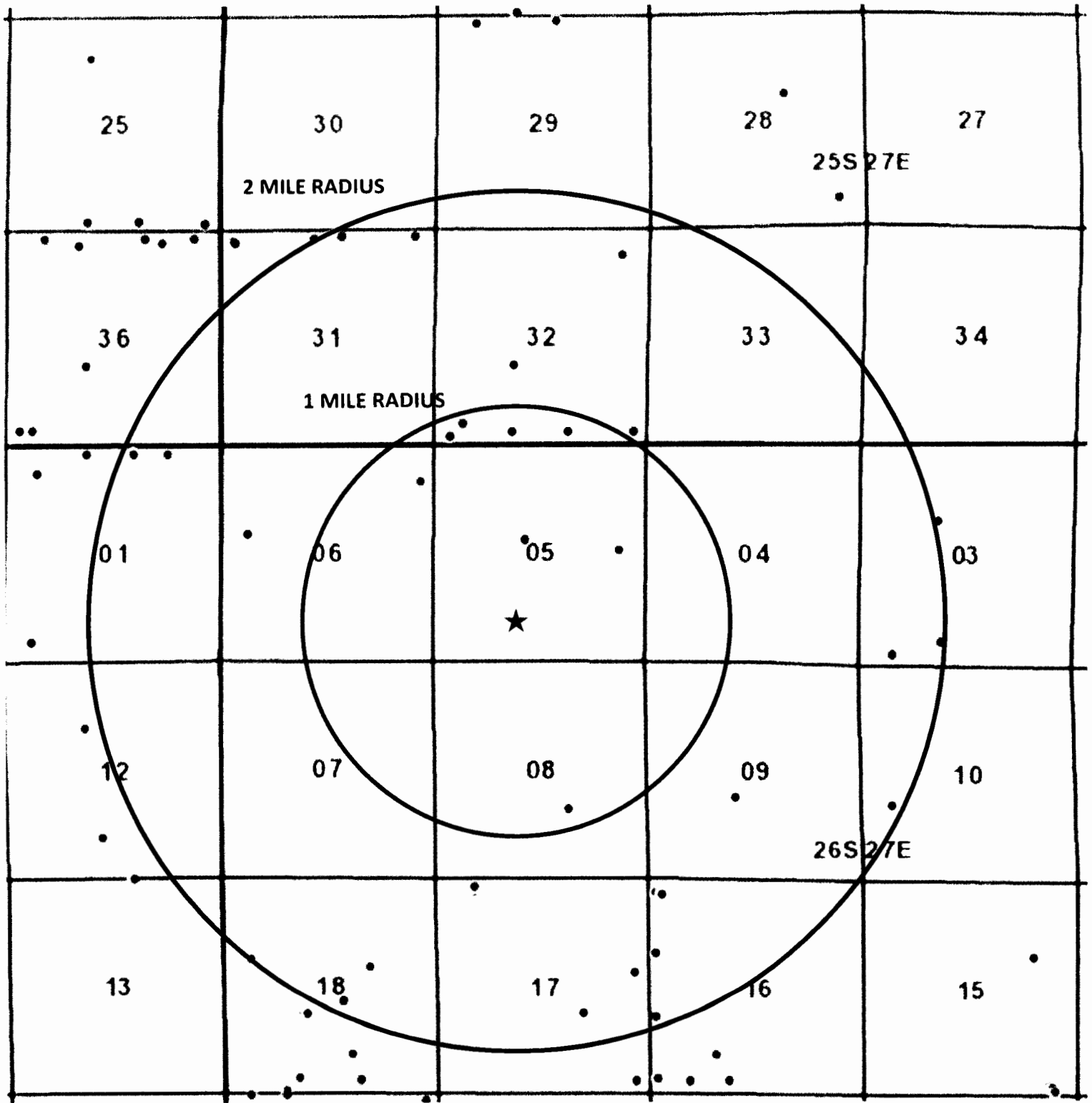
Ion	Concentration(mg/L)
Chlorides (as Cl)	330
Sulfate (as SO <sub>4</sub> )	1088
Carbonate (as CO <sub>3</sub> )	0
Bicarbonates (as HCO <sub>3</sub> )	317
Sulfide (as S <sub>2</sub> -)	0

### Scaling Indices

Temp(F)	CaCO <sub>3</sub>	CaSO <sub>4</sub> *2H <sub>2</sub> O	CaSO <sub>4</sub>	BaSO <sub>4</sub>
80	1.8051	0.0000	0.0000	-28.0424
120	2.1464	0.0000	0.0000	-28.2549
160	2.5427	0.0000	0.0000	-28.3814
200	2.9026	0.0000	0.0000	-28.4357
250	3.2307	0.0000	0.0000	-28.3973

Low = < 0.200, Moderate = 0.200-0.999, High = > 1.00

### Comments

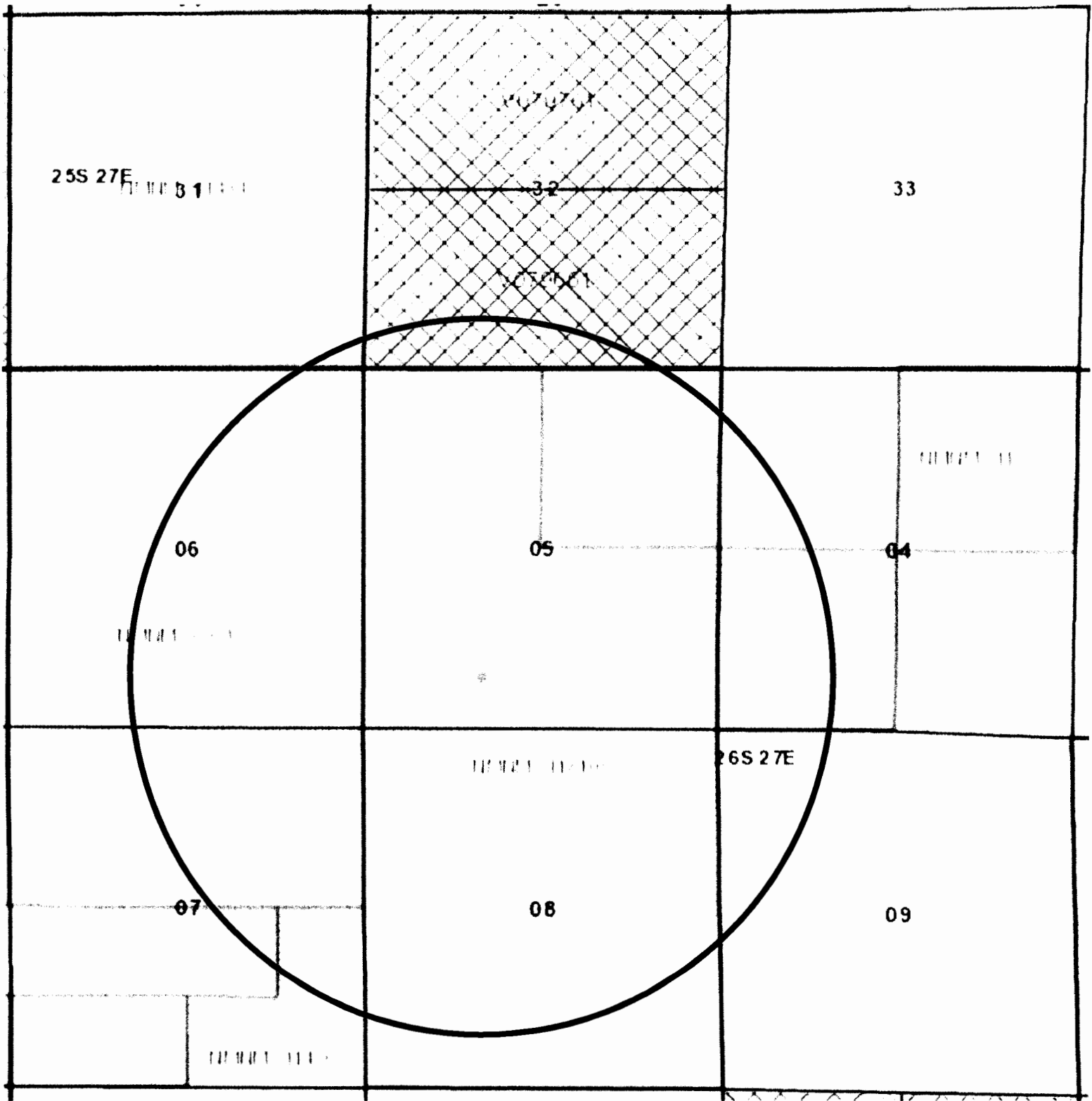


WELLS - ONE MILE RADIUS

NO WELLS PENETRATE THE DEVONIAN FORMATION IN THE AOR

SECTION 5-T26S-R27E

★ Forehand Ranch SWD #1  
(Proposed Location)  
Delaware Energy, LLC



### LEASES – ONE MILE RADIUS

#### SECTION 31-T25S-R27E

- FEDERAL

#### SECTION 32-T25S-R27E

- STATE

#### SECTION 4-T26S-R27E

- FEDERAL & FEE

#### SECTION 5, 6 & 8-T26S-R27E

- FEDERAL

#### SECTION 7-T26S-R27E

- FEE

#### SECTION 9-T26S-R27E

- FEE

**SECTION 31-T25S-R27E**

- The Allar Company  
735 Elm Street  
Graham, TX 76450

**SECTION 32-T25S-R27E**

- Chevron USA Inc.  
6301 Deauville Blvd.  
Midland, TX 79706

**SECTION 4-T26S-R27E**

- COG Operating, LLC  
600 W. Illinois Ave.  
Midland, TX 79701
- EOG Resources, LLC  
5509 Champions Dr.  
Midland, TX 79706
- Three Rivers Operating, LLC  
10716 TX-191 #9  
Midland, TX 79707

**SECTION 5-T26S-R27E**

- Chevron USA Inc.  
6301 Deauville Blvd.  
Midland, TX 79706
- COG Operating, LLC  
600 W. Illinois Ave.  
Midland, TX 79701
- EOG Resources, LLC  
5509 Champions Dr.  
Midland, TX 79706

**SECTION 5-T26S-R27E**

- OXY Permian  
6001 Deauville Blvd  
Midland, TX 79706

**SECTION 7-T26S-R27E**

- EOG Resources, LLC  
5509 Champions Dr.  
Midland, TX 79706
- COG Operating, LLC  
600 W. Illinois Ave.  
Midland, TX 79701

**SECTION 8-T26S-R27E**

- Chevron USA Inc.  
6301 Deauville Blvd.  
Midland, TX 79706

**SECTION 9-T26S-R27E**

- Pioneer Natural Resources  
5205 N. O'Connor Blvd., Suite 200  
Irving, TX 75039

**Delaware Energy, L.L.C.**  
405 N. Marienfeld, Suite 200  
Midland, TX 79701  
Office: (432) 685-7005

July 19, 2018

**Surface Owner / Offset Operators**

Re: Notification of Application for Authorization to Inject  
Forehand Ranch SWD #1 Well

Ladies and Gentlemen:

Delaware Energy, LLC is seeking administrative approval to utilize the proposed Forehand Ranch SWD #1 as a commercial Salt Water Disposal well. As required by the New Mexico Oil Conservation Division Rules, we are notifying you of the following proposed salt water disposal well. This letter is a notice only. No action is required unless you have questions or objections.

<u>Well:</u>	Forehand Ranch SWD #1
<u>Proposed Disposal Zone:</u>	Devonian Formation (from 13,374' - 14,374')
<u>Location:</u>	866' FSL & 1,578' FWL, UL N, Sec. 5, T26S, R27E, Eddy Co., NM
<u>Applicants Name:</u>	Delaware Energy, L.L.C.
<u>Applicants Address:</u>	405 N. Marienfeld, Suite 200, Midland, TX 79701

This application for water disposal well will be filed with the New Mexico Oil Conservation Division. If they determine the application complies with the applicable regulations, then it will be approved. The New Mexico Conservation Division address is 1220 South St. Francis Dr., Santa Fe, NM 87505. And their phone number is 505-476-3460.

Please call Mike McCurdy with Delaware Energy, LLC if you have any questions at 432-685-7005.

Sincerely,



Sarah Presley

## DISTRIBUTION LIST

### Surface Owner:

Forehand Ranches, Inc.  
P.O. Box 5373  
Carlsbad, NM 88221

### Offset Operators/Leasehold Owners:

The Allar Company  
735 Elm Street  
Graham, TX 76450

Chevron USA Inc.  
6301 Deauville Blvd.  
Midland, TX 79706

COG Operating, LLC  
600 W. Illinois  
Midland, TX 79701

EOG Resources, Inc  
5509 Champions Dr.  
Midland, TX 79706

Three Rivers Operating, LLC  
10716 TX-191 #9  
Midland, TX 79707

OXY Permian  
6001 Deauville Blvd.  
Midland, TX 79706

Pioneer Natural Resources  
5205 N. O'Connor Blvd., Suite 200  
Irving, TX 75039

State of New Mexico Oil Conservation Division  
District II  
811 S. First St.  
Artesia, NM 88210

State of New Mexico Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

7017 2620 0000 8001 0532  
7017 2620 0000 8001 0471  
7017 2620 0000 8001 0518

Forehand Ranch  
SWD#1

Oxy Permian  
6001 Deauville Blvd.  
Midland TX 79706

U.S. Postal Service™  
**CERTIFIED MAIL® RECEIPT**  
Domestic Mail Only

PS Form 3800, April 2015 PSN 7530-02-000-9047

Forehand Ranch  
SWD#1

Forehand Ranches, Inc  
P.O. Box 5373  
Carlsbad, NM 88221

U.S. Postal Service™  
**CERTIFIED MAIL® RECEIPT**  
Domestic Mail Only

For delivery information, visit our website at [www.usps.com](http://www.usps.com)®  
MIDLAND, TX 79705

Forehand Ranch  
SWD#1

EOG Resources, Inc.  
5509 Champions Drive  
Midland Tx 79706

Forehand Ranch  
SWD#1

Chevron USA Inc.  
6301 Deauville Blvd.  
Midland Tx, 79706

U.S. Postal Service™  
**CERTIFIED MAIL® RECEIPT**  
Domestic Mail Only

PS Form 3800, April 2015 PSN 7530-02-000-9047

Forehand Ranch  
SWD#1

COG Operating, LLC  
600 W. Illinois  
Midland, TX 79701

U.S. Postal Service™  
**CERTIFIED MAIL® RECEIPT**  
Domestic Mail Only

For delivery information, visit our website at [www.usps.com](http://www.usps.com)®  
IRVING, TX 75039

Forehand Ranch  
SWD#1

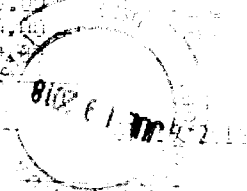
Pioneer Natural Resources  
5205 N. O'Connor Blvd. Suite 200  
Irving, Tx 75039

7017 2620 0000 8001 0495

**U.S. Postal Service™**  
**CERTIFIED MAIL® RECEIPT**  
Domestic Mail Only

For delivery information, visit our website at [www.usps.com](http://www.usps.com)  
GRAHAM, TX 76450

Forehand Ranch  
SWD #1



The Atlar Company  
735 Elm Street  
Graham, TX 76450

7017 2620 0000 8001 0525

**U.S. Postal Service™**  
**CERTIFIED MAIL® RECEIPT**  
Domestic Mail Only

For delivery information, visit our website at [www.usps.com](http://www.usps.com)  
MIDLAND, TX 79707

Forehand Ranch  
SWD #1



Three Rivers Operating, Inc.  
10716 TX-191 #9  
Midland, TX 79706

# CARLSBAD CURRENT-ARGUS

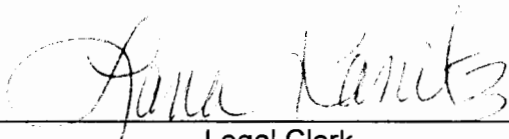
## AFFIDAVIT OF PUBLICATION

Ad No.  
0001254413

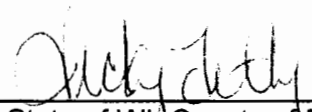
DELAWARE ENERGY, L.L.C.  
405 N. MARIENFELD  
SUITE 250  
MIDLAND TX 79701

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:

07/13/18

  
Legal Clerk

Subscribed and sworn before me this  
16th of July 2018.

  
State of WI, County of Brown  
NOTARY PUBLIC

9-19-21  
My Commission Expires

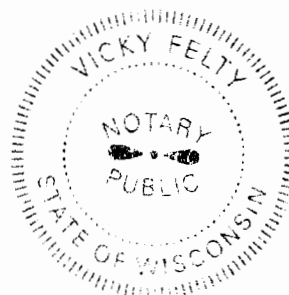
## LEGAL NOTICE

Delaware Energy, L.L.C., 405 N. Marienfeld St. Suite 250, Midland, TX 79701, has filed a form C-108 (Application for Authorization to Inject) with the Oil Conservation Division seeking administrative approval to drill the Forehand Ranch SWD #1 as a Commercial Salt Water Disposal well.

The Forehand Ranch SWD #1 is located at 866' FSL and 1,578' FWL, Unit Letter N, Section 5, Township 26 South, Range 27 East, Eddy County, New Mexico. The well will dispose of water produced from oil and gas wells into the Devonian Formation from 13,374' to 14,374' at a maximum rate of 25,000 barrels of water per day at a maximum pressure of 2,675 psi.

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.

Additional information can be obtained by contacting Delaware Energy, L.L.C., at (432) 685-7005.  
July 13, 2018



**Forehand Ranch SWD #1**  
**Location: Sec. 5, T-26S, R-27E, UL N**

**Estimated Pre-Drill Formation Tops**

Top of Salt	1,100'
Base Salt	1,709'
Lamar	1,984'
Delaware – Bell Canyon	2,034'
Cherry Canyon	2,934'
Brushy Canyon	3,984'
Bone Spring	5,509'
Dean	8,334'
Wolfcamp	8,734'
Strawn	10,934'
Atoka	11,109'
Morrow	11,884'
Mississippian	12,959'
Woodford	13,259'
Devonian	13,374'

## Statement Regarding Seismicity and Well Location (Forehand SWD #1)

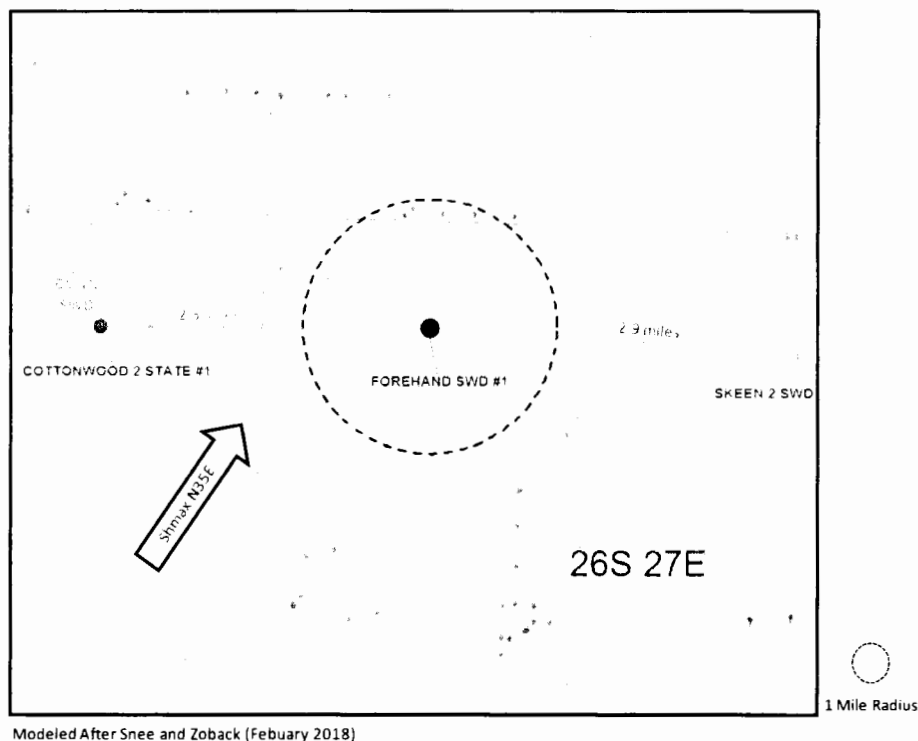
Historically, the area near the proposed Forehand SWD #1 has not seen any major seismic activity. There have been two seismic events (as per public data available on the USGS database) in the area. All events are over 17 miles from the proposed SWD location. The closest activity (17.6 miles to the NNE) measured 3.9 on November 24, 1978

Delaware Energy does not own 2D or 3D seismic data near the proposed SWD location therefore the fault interpretations are based on data obtained from the USGS New Mexico Faults Database (2005) and other published data. Based on these sources the closest faults would be approximately 8.0 miles west, 6.7 miles northeast, and 12.0 miles northwest of the location. A recent technical paper written by Snee and Zoback, "State of Stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity", was published in the February 2018 edition of The Leading Edge. The study evaluates the strike-slip probability of known faults using FSP analysis. The study predicts that the NW-SE trending faults SW and NE of the location (green) should have a very low probability of being critically stressed resulting in an induced seismicity event. The SW-NE trending fault NW and furthest from the location (orange) would have a higher probability of being critically stressed, resulting in potential slip, due to the relationship of the strike of the fault and the regional Shmax orientation (approx. N 35 deg E) in the area. The exact position of this fault relative to the proposed location, and depth of the target formation, is unknown. Risk of contact with this fault should be reduced due to the distance of the proposed SWD well from the fault (12.0 miles).

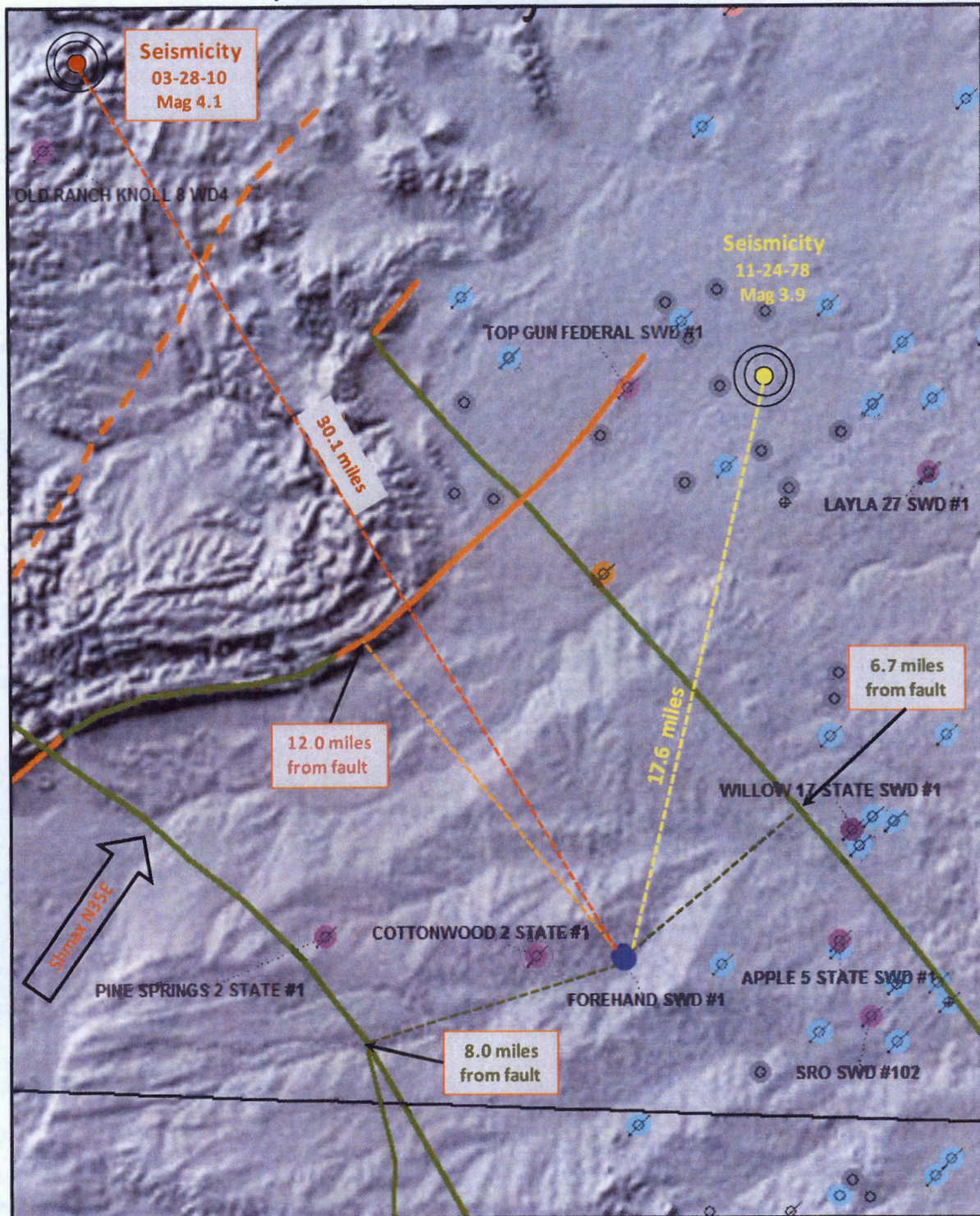
The proposed Forehand SWD #1 location is located 2.5 miles away from the nearest active Devonian SWD well and 2.9 miles from the nearest active Delaware SWD well (see map below). The well should meet current OCD and Industry recommended practices.

Kevin J. Schepel  
Petrophysical Advisor  
[kevin.schepel@att.net](mailto:kevin.schepel@att.net)  
214-212-6540

Well Activity and Closest SWD



## Proximity to Historic Earthquake Activity and Faults



Modeled After Snee and Zoback (February 2018)

Devonian SWD

Delaware SWD

Proposed Location

Permits



USGS Earthquake

Low Fault Slip Potential

Higher Fault Slip Potential

Data and Interpretation Disclosure - Although care has been taken to ensure that these data are up to date and accurate, this information and data is being providing as is. The data are what is believed to be the best public data available based on published documents, reports, and information available through the USGS. The user assumes all responsibility and risk for use of the data and interpretations. Users of the data agree not to misuse, add to without permission, or misrepresent the data provided in any way. In no event will the provider of this document be liable to any party for any direct, indirect, incidental, consequential, special or exemplary damages, or lost profit resulting from any use or misuse of this data. Additionally, provider is not liable for any inaccurate data. No person, entity, or user shall use the information in a manner that is in violation of any federal, state, or local law or regulation.

**NOTICE OF CONFIDENTIALITY RIGHTS: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OF THE FOLLOWING INFORMATION FROM THIS INSTRUMENT BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORDS: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVER'S LICENSE NUMBER.**

**MEMORANDUM OF SALT WATER DISPOSAL AGREEMENT**

THE STATE OF NEW MEXICO       §  
  §       KNOW ALL MEN BY THESE PRESENTS:  
COUNTY OF EDDY                   §

This Memorandum of Salt Water Disposal Agreement is made and entered into this 19 day of June, 2018, between Forehand Ranches Inc. whose mailing address is P.O. Box 5373, Carlsbad, New Mexico 88221 ("Lessor"), and **DELAWARE ENERGY, LLC**, whose address is 405 North Marienfeld Street, Suite 250, Midland, Texas 79701 ("Lessee"):

**WITNESSETH:**

Lessor and Lessee have this day entered into an exclusive Salt Water Disposal Agreement, dated effective as of the date first-written above, covering the following described lands in **Eddy County**, New Mexico, to-wit:

**Section 5 of Township 26 South, Range 27 East**

Said Salt Water Disposal Agreement, subject to certain termination provisions, contains a primary term of five (5) years and shall remain in force as long thereafter, subject to the further conditions and limitations stated in the terms and provisions of said Salt Water Disposal Agreement.

Lessor and Lessee are executing this Memorandum of Salt Water Disposal Agreement for the purpose of placing the same of record in Eddy County, New Mexico, and in order to constitute constructive notice of said Salt Water Disposal Agreement in lieu of recording of said Salt Water Disposal Agreement in its entirety. A full and complete copy of said Salt Water Disposal Agreement will be maintained in the office of both Lessor and Lessee at the address shown above.

DELAWARE ENERGY  
405 N MARIENFELD ST STE 200  
MIDLAND, TX 79701

Reception: 1811013 Book: 1110 Page: 0886 Pages: 2


Recorded: 06/25/2018 02:18 PM Fee: \$25.00

1 Eddy County, New Mexico - Robin Van Natta, County Clerk



IN WITNESS WHEREOF, this Memorandum of Salt Water Disposal Agreement is executed as of the day, month and year first hereinabove written.

LESSOR: Forehand Ranches Inc.

  
By : Mark L. Forehand

#### ACKNOWLEDGMENTS

STATE OF New Mexico

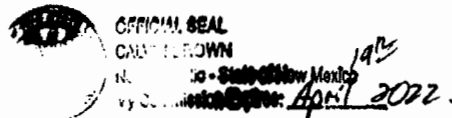
§

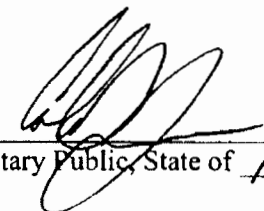
COUNTY OF Eddy

§

§

This instrument was acknowledged before me on the 19 of June, 2018 by Mark L. Forehand, on behalf of Forehand Ranches Inc. in the capacity herein stated.



  
Notary Public, State of New Mexico

AFTER RECORDING, RETURN TO:

DELAWARE ENERGY  
405 N. Marienfeld, Suite 200  
Midland, TX 79701 CS

10-2157-0001

**Delaware Energy, LLC**  
**Application for Injection/SWD**  
**Forehand Ranch SWD #1**

UL N, Sec. 5, T-26-S, R-27-E, 866' FSL & 1578' FWL, Eddy Co., NM

July 23, 2018

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**Contents:**

1. Administrative Application Checklist
2. Form C-108: Application for Authority to Inject
3. Form C-108 Additional Questions Answered
4. Form C-102
5. Chemical Analysis of Bone Spring Formation Water Sample
6. Chemical Analysis of Wolfcamp Formation Water Sample
7. Chemical Analysis of Delaware Formation Water Sample
8. Planned wellbore diagram for the Forehand Ranch SWD #1
9. ~~Tabular Data on All Wells of Public Record within the Area of Review which Penetrate the Proposed Injection Zone~~ (No applicable wells)
10. Water Well Samples taken for the Forehand Ranch SWD FW well (Sec. 5, T26S, R27E)
11. Map Identifying all Wells and Leases within Two Miles of Any Proposed Injection Well with a One Mile Radius Circle Drawn Around the Proposed Injection Well
12. Sample of Letter Sent with This Application Packet to Owner of Surface of the Land on Which the Well is to be Located and to each Leasehold Operator within One Mile of the Well Location
13. Certified Mailers
14. Affidavit of Publication of Legal Notice that was run as required in the Carlsbad Current-ARGUS
15. Formation Tops
16. Seismicity Assessment
17. Memorandum of Salt Water Disposal Agreement