SWD

Initial

Application

Received: 09/23/19

RECEIVED: 9/23/19	REVIEWER:		APP NO: pDM1926957412
9/23/19		ABOVE THIS TABLE FOR OCD DIVISION USE C	•
1	- Geologica	OIL CONSERVATION I & Engineering Bure ncis Drive, Santa Fe, I	eau –
		TIVE APPLICATION C	
		DMINISTRATIVE APPLICATIONS FOR IRE PROCESSING AT THE DIVISION	OR EXCEPTIONS TO DIVISION RULES AND N LEVEL IN SANTA FE
Applicant: Well Name:			OGRID Number: API:
Pool:			Pool Code:
 TYPE OF APPLICATIO A. Location – Span □NSL 	DN: Check those wh cing Unit – Simultar		
 ☐ DHC [II] Injection – ☐ WFX 2) NOTIFICATION REOU A. ☐ Offset opera B. ☐ Royalty, ove C. ☐ Application D. ☐ Notification E. ☐ Notification F. ☐ Surface own 	ng – Storage – Mea CTB PLC Disposal – Pressure PMX SWE JIRED TO: Check the ators or lease holde erriding royalty own requires published and/or concurrent and/or concurrent her e above, proof of n	E Increase – Enhanced D ☐IPI ☐EOR Ose which apply. Pers Ners, revenue owners I notice t approval by SLO t approval by BLM	OLM Oil Recovery PPR FOR OCD ONLY Notice Complete Application Content Complete
3) CERTIFICATION : her	reby certify that the	e information submitte	ed with this application for

3) CERTIFICATION: I nereby 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.

Print or Type Name

Date

Phone Number

Signature

e-mail Address



September 23, 2019

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

Subject: Select Energy Services – Jerrah 3 Federal SWD #1 Application for Authorization to Inject

To Whom It May Concern,

On behalf of Select Energy Services (Select), ALL Consulting, LLC (ALL) is submitting the enclosed Application for Authorization to Inject for the Jerrah 3 Federal SWD #1, a proposed salt water disposal well, in Lea County, NM.

Should you have any questions regarding the enclosed application, please contact Nate Alleman at (918) 382-7581 or nalleman@all-llc.com.

Sincerely, ALL Consulting

Nate Alleman Sr. Regulatory Specialist

STATE OF NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

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

APPLICATION FOR AUTHORIZATION TO INJECT

I.	PURPOSE: Secondary Recovery Pressure Maintenance X Disposal Storage Application qualifies for administrative approval? Yes No
II.	OPERATOR: Select Energy Services
	ADDRESS: 1820 N I-35, Gainesville, TX 76240
	CONTACT PARTY RJ MetzlerPHONE: (940)-665-7000
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?YesNo If yes, give the Division order number authorizing the project:No
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:
	 Proposed average and maximum daily rate and volume of fluids to be injected; Whether the system is open or closed; Proposed average and maximum injection pressure; Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and, 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.
*Х.	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: Nate Alleman TITLE: Regulatory Specialist - ALL Consulting
	SIGNATURE: <u>Nother Allera</u> DATE: <u>09/23/2019</u>
	E-MAIL ADDRESS:nalleman@all-llc.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.

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: Jerrah 3 Federal SWD #1

III – Well Data (The Wellbore Diagram is included as Attachment 1) A.

(1) General Well Information:

Operator: Select Energy Services (OGRID No. 289068) Lease Name & Well Number: Jerrah 3 Federal SWD #1 Location Footage Calls: 1,638' FSL & 1,992' FEL Legal Location: Unit Letter J, S28 T23S R32E Ground Elevation: 3,667' Proposed Injection Interval: 16,948' – 18,318' County: Lea

(2) Casing Information:

Туре	Hole Size	Casing Size	Casing Weight	Setting Depth	Sacks of Cement	Estimated TOC	Method Determined
Surface	24"	20"	133.0 lb/ft	1,235'	1,255	Surface	Circulation
Intermediate 1	14-3/4"	13-3/8"	68.0 lb/ft	4,840'	1,080	Surface	Circulation
Intermediate 2	12-1/4"	9-5/8"	53.5 lb/ft	13,910'	4,615	Surface	Circulation
Liner	8-1/2"	7-5/8"	39.0 lb/ft	16,948'	265	13,710'	CBL

(3) Tubing Information:

5.5" (composite weight string) of fiberglass-coated tubing with setting depth of 16,928'

(4) Packer Information: Baker SC-2 or equivalent packer set at 16,928'

В.

- (1) Injection Formation Name: Devonian and Silurian-Fusselman formations Pool Name: SWD; DEVONIAN - SILURIAN Pool Code: 97869
- (2) Injection Interval: Open-hole injection between 16,948' 18,318'
- (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 (4,840')
 - Bone Springs (8,655')
 - Wolfcamp (12,175')
 - Atoka (14,060')
 - Morrow (14,810')

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)
- 1-mile Well Detail List
- Potash Lease Map

VI – AOR Well List

There are no wells within the 1-mile AOR that 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: 3,390 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 is a non-productive zone known to be compatible with formation water from the Wolfcamp and Bone Springs formations. Water analyses from the Devonian-Silurian formation in the area are included in *Attachment 4*.

VIII – Geologic Description

The proposed injection interval includes the Devonian and Silurian-Fusselman formations from 16,948' – 18,318' 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 1,210 feet. Water well depths in the area range from approximately 380 – 713 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 Hobbs News-Sun 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*.

DISTRICT I 1625 N French Dr., 16bha, NN 88240 Phone: (573) 393-6161 Fax: (573) 393-0720 DISTRICT II 811 S, Fran SL, Arania, NM 88210 Phone: (573) 746-1205 Fax: (575) 748-9720 DISTRICT III 1000 Eto Brasan Rd, Adar, NM 87410 Phone: (503) 33-61717 Fax: (503) 33-6170 DISTRICT IV 1220 S, St. Francis D., Santa Fa, NM 87505 Phone: (503) 476-3460 Fax: (505) 476-3462

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

Form C-102 Revised August 1, 2011

Keviseu August 1, 201

Submit one copy to appropriate District Office

AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

A	API Number			Pool Code 97869			Pool N SWD; DEVONIA							
Ргорепту С	ode			07000	Property Name Well Number									
				JER	RAH 3 FEDER	AL SWD		#1						
OGRID	No				Operator Name			Elevatio	วก					
28906	8		SELECT ENERGY SERVICES, LLC 3666.96'											
			Surface Location											
UL or lot no	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County					
J	28	23 S	32 E		1638	SOUTH	1992	EAST	LEA					
			Bott	om Hole I	Location If Diffe	erent From Surfac	e							
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	eet from the North/South line Feet from the East/West line County								
Dedicated Acres	Joint or	Infill	Consolidated Co	de Orde	r 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.

	OPERATOR CERTIFICATION I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organisation. either owns a working interest or unleased minimal interest in the land including the proposed bottom hole location pursuant to a contract with an owner of such a mineral or working interest, or to voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. Nate Alleman PriMTINAMATIC nalleman@all-llc.com
JERRAH 3 FEDERAL SWD #1 SHL NMSP-E (NAD 83) Y = 463601.71' N X = 744035.00' E LAT.= 32.272813° LONG.= -103.677502°	E 1/4 COR SEC 28 NMSP-E (NAD 27) Y = 464564.50' N X = 704837.09' E 1992' 1992' 1992' NATIONAL CONSTRUCTION I hereby certify that the well location shown on the second control survey reperivision, and that is same to true and correct to the best of my belief AUGUST 15, 2019 Date of Survey Signature and Seal of Portestional Survey of Survey Signature and Seal of MEXICO
NMSP-E (NAD 27) Y = 463542.40' N X = 702851 43' E LAT.= 32.272689° LONG.= -103.677019° S 1/4 COR SEC 28 NMSP-E (NAD 27) Y = 461898.03' N X = 702213 25' E	SE COR SEC 28 NMSP-E (NAD 27) Y = 461923.56 N X = 704854.76 E Job No.: SEL. 190001 TIM C. PAPPAS, NM P LS. NO.21209

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
- Potash Lease Map

Attachment 3: Source Water Analyses

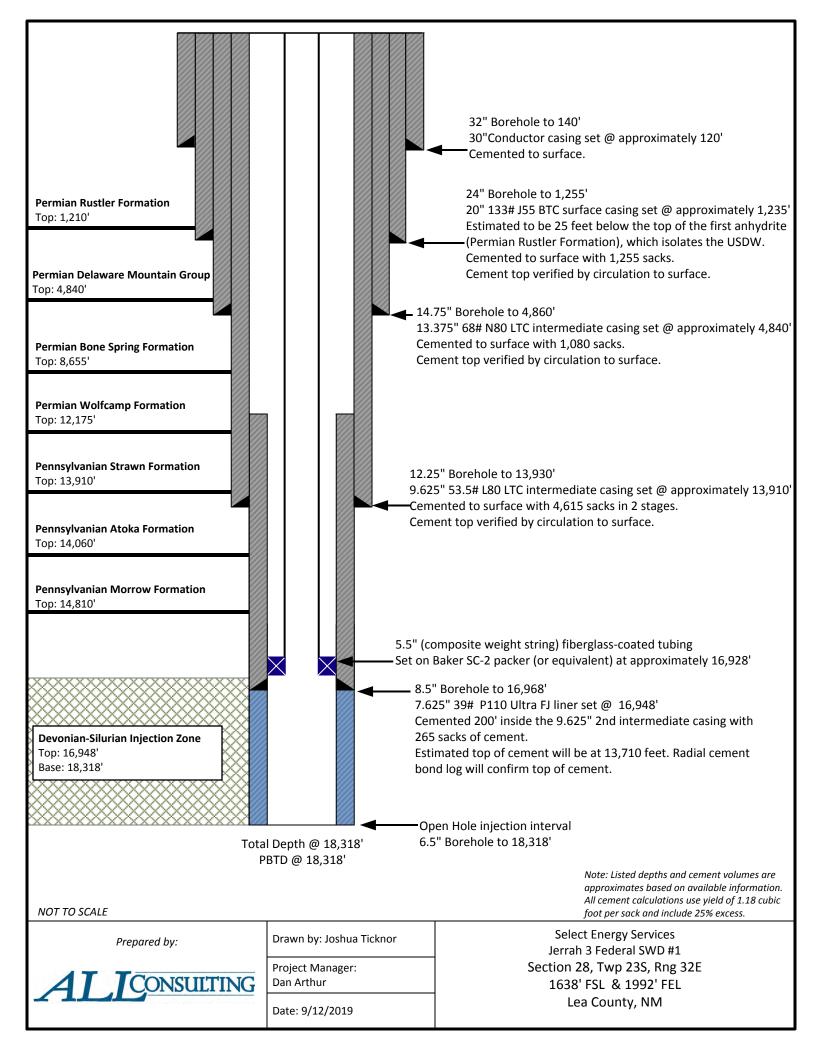
Attachment 4: Injection Formation Water Analyses

Attachment 5: Water Well Map and Well Data

Attachment 6: Induced Seismicity Assessment Letter

Attachment 7: Public Notice Affidavit and Notice of Application Confirmations

Wellbore Diagram



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.

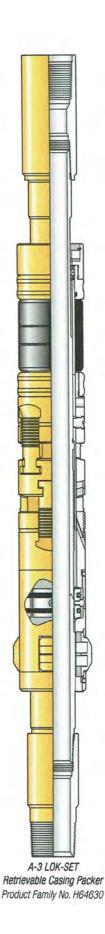
Advantages

- 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.



	Casing				Packer		
0	D	Weight *	Size	Norr	ID	Max 0 Ring	
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	144.3	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
		18.8	41A4	1 500	38.1	3.423	112.4
		13.5-17.7	41B	1.500	30.1	3.578	90.9
4-1/2	114.3	11.6-13.5	43A2	1 070	50.0	3.786	96.2
		9.5-10.5	43A4	1.978	50.2	3.786	96.2
		15-18	43B		50.0	4.140	105.2
5	127.0	11.5-15	43C	1.978	50.2	4.265	108.3
		26	43C	1		4.265	108.3
		20-23	45A2	1		4.515	114.7
5-1/2	139.7	15.5-20	45A4	1.978	50.2	4.656	118.3
		13-15.5	45B	1		4.796	121.8
		26	45B			4.796	121.8
6	152.4	20-23	45C	1.978	50.2	5.078	129.0
U	TOL.T	15-18	45D	-		5.171	131.
		34	45E			5.421	137.
		24-32	45F	1.978	50.2	5.499	139.
6-5/8	168.3	24	47A2	2.441	62.0	5.671	144.
0 010	100.0	17-24	45G	1.978	50.2	5.796	147.
		17-20	47A4	2.441	62.0	5.827	148.
		38	47A2			5.671	144.
		32-35	47A4	1		5.827	148.
7	177.8	26-29	47B2	2.441	62.0	5.983	152.
		23-26	47B4			6.093	154.
		17-20	47C2	1		6.281	159.
		33.7-39	47C4			6.468	164.
7-5/8	193.7	24-29.7	47D2	2.441	62.0	6.687	169.
	-	20-24	47D4			6.827	173.
		44-49	49A2			7.327	186.
8-5/8	219.1	32-40	49A4	3.500	88.9	7.546	191.
		20-28	49B		1	7.796	198.
		47-53.5	51A2			8.234	209.
9-5/8	244.5	40-47	51A4	3.500	88.9	8.452	214.
		29.3-36	51B			8.608	218.

SPECIFICATION GUIDES A-3TH LOK-SET Retrievable Casing Packer, Product Family No. H64630

AL-2[™] Large Bore LOK-SET Retrievable Casing Packer Product Family No. H64628

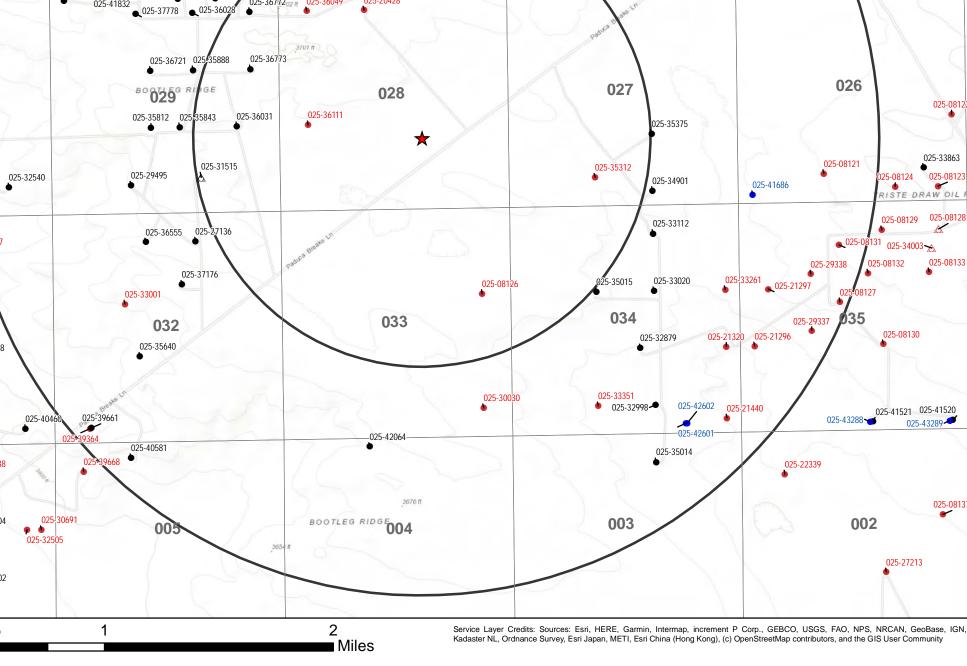
Cas	ing				Pac	cker			
0	D	Weight *	Size	Non	n ID	Max Gage Ring OD		Max Dia Compressed	
in.	mm	lb/ft		in.	mm	in.	mm	in.	mm
		20	45A2 x 2-3/8			4.562	115.9	4.592	116.6
5-1/2	139.7	15.5-17	45A4 x 2-3/8	2.375	60.3	4.656	118.3	4.750	120.7
		13	45B x 2-3/8			4.796	121.8	4.902	124.5
6	152.4	26	45B x 2-3/8	2.375	60.3	4.796	121.8	4.902	124.5

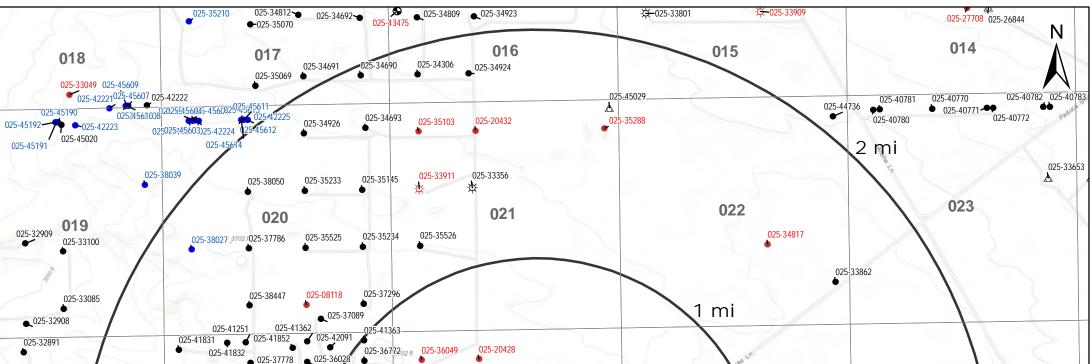
 When selecting a packer for a casing weight common to two weight ranges (same OD), choose the packer size shown for the lighter of the two weight ranges. Example: for 7-in. (177.8 mm) OD 26 lb/ft casing use packer size 47B4. Under certain circumstances the other packer size may be run, such as when running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

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

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
- Potash Lease Map





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025-32397

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025-0812

025-08133

025-0813

Legend

- * Proposed SWD
- Miscellaneous (1) •
- Gas, Active (2) ☆
- Gas, Plugged (2) ₩.
- Oil, Active (93)
- Oil, New (28)
- Oil, Plugged (41)
- Salt Water Injection, Active (6) Δ
- Salt Water Injection, Plugged (2) Δ

O&G Wells Area of Review

JERRAH 3 FEDERAL SWD #1 Lea County, New Mexico

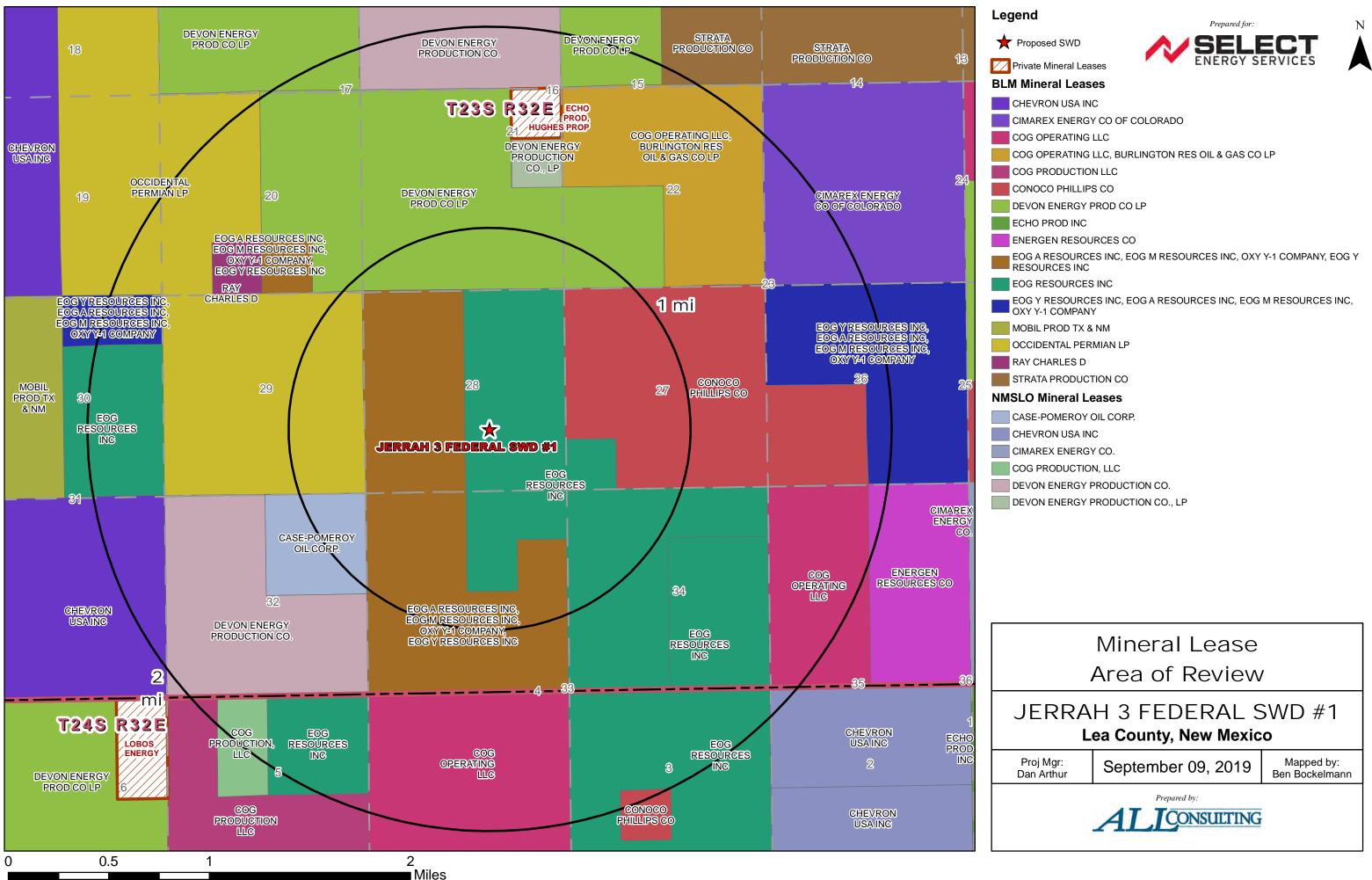
Proj Mgr: Dan Arthur

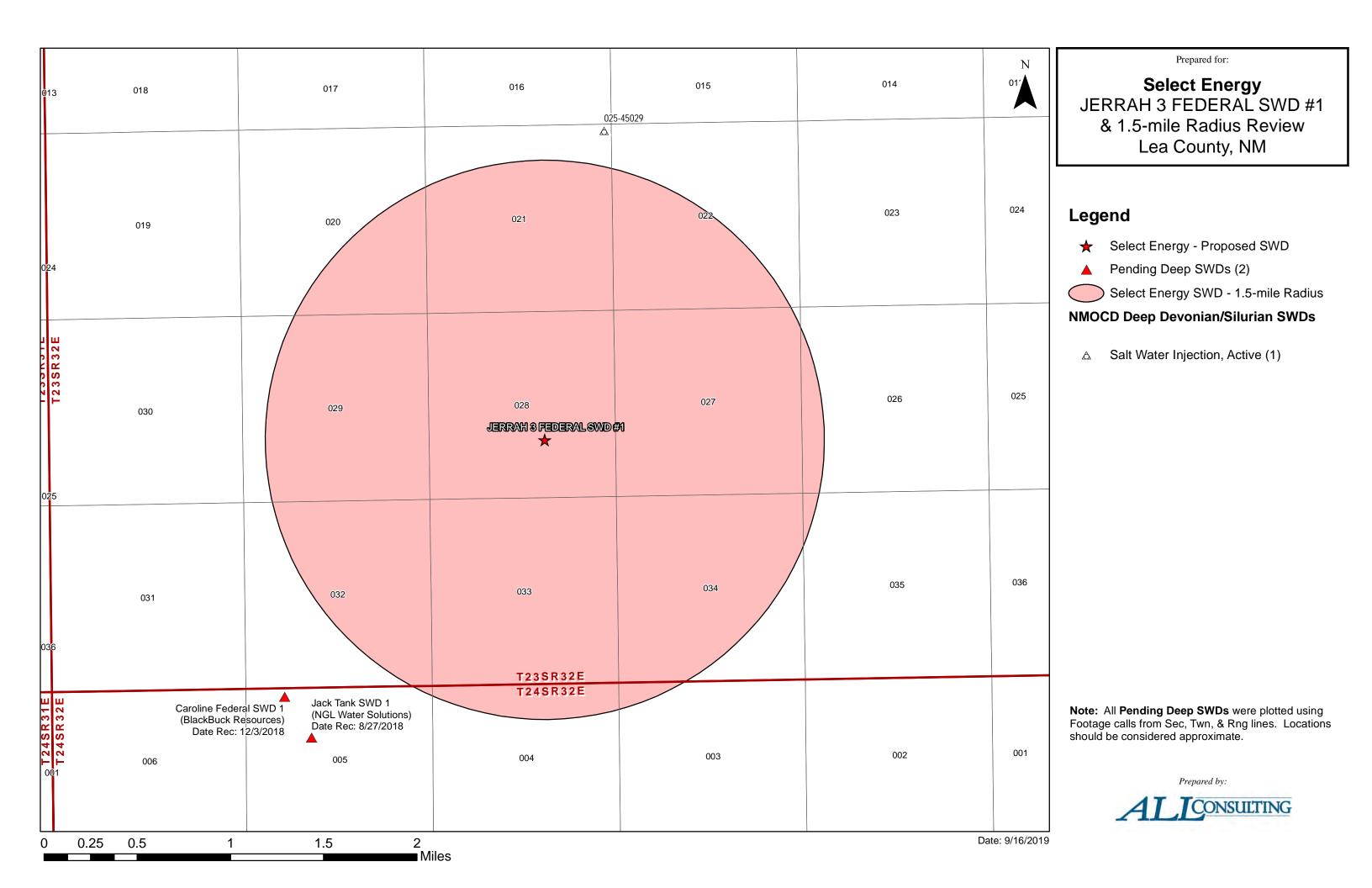
August 29, 2019

Mapped by: Ben Bockelmann

Prepared by:







Well Name	Well Name API# Well Type Operator S		Spud Date	Location (Sec., Tn., Rng.)	Total Vertical Depth (feet)	Penetrate Inj. Zone?	
CORSAIR 27 FEDERAL #002	30-025-35312	Plugged	ECHO PRODUCTION INC	1/18/2001	N-27-23S-32E	Plugged (8980)	No
JAMES FEDERAL #001	30-025-31515	S	HARVARD PETROLEUM COMPANY, LLC	8/31/1983	O-29-23S-32E	15920	No
JAMES FEDERAL #010	30-025-36772	0	HARVARD PETROLEUM COMPANY, LLC	8/29/2004	A-29-23S-32E	8645	No
JAMES FEDERAL #009	30-025-36031	0	HARVARD PETROLEUM COMPANY, LLC	10/31/2002	I-29-23S-32E	8657	No
JAMES FEDERAL #011	30-025-36773	0	HARVARD PETROLEUM COMPANY, LLC	12/1/2004	H-29-23S-32E	8639	No
CONTINENTAL APJ FEDERAL #006	30-025-36111	Plugged	EOG Y RESOURCES, INC.	4/30/2003	L-28-23S-32E	Plugged (8750)	No
CONTINENTAL APJ FEDERAL #003	30-025-36049	Plugged	EOG Y RESOURCES, INC.	1/3/2003	D-28-23S-32E	Plugged (8750)	No
CONTINENTAL APJ FEDERAL #001	30-025-20428	Plugged	EOG Y RESOURCES, INC.	8/25/1995	C-28-23S-32E	Plugged (10050)	No
PRE-ONGARD WELL #001	30-025-08126	Plugged	PRE-ONGARD WELL OPERATOR (Curtis Hankamer)	9/1/1962	H-33-23S-32E	Plugged (4990)	No
JAMES FEDERAL #022H	30-025-41363	0	CIMAREX ENERGY CO.	8/29/2014	A-29-23S-32E	9456	No

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010	011	012	-007	008	009	010	011		007	008	009	010	011	012	007	008	009	010-	-011	012	007	N; 009 ∫
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Legend



★ Proposed SWD

Potash Leases

Ore Type - Measured

Ore Type - Indicated

Ore Type - Inferred

KPLA

SOPA

Drill Islands

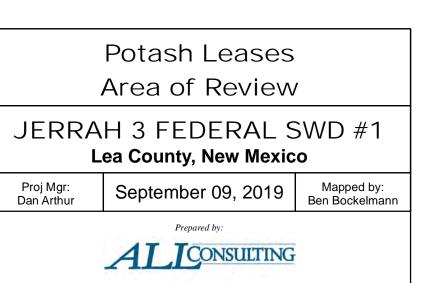
Status

Approved

Denied

Nominated

Withdrawn



Source Water Analyses

API	SECTION	TOWNSHIP	RANGE	FORMATION	tds mgL	chloride mgL	bicarbonate mgL	sulfate mgL
3002502424	11	205	34E	BONE SPRING	29436	16720	634	1142
3002502427	12	205	34E	BONE SPRING	15429			
3002502427	12	205	34E	BONE SPRING	180701	108300	1016	670
3002502429	12	205	34E	BONE SPRING	202606	118100	5196	992
3002502429	12	205	34E	BONE SPRING	121800			
3002502431	12	205	34E	BONE SPRING	147229	89640	108	1038
3002531696	2	205	34E	DELAWARE	152064	102148	404	691
3002532105	2	205	34E	DELAWARE	296822	215237	143	294
3002532466	2	205	34E	DELAWARE	340838	245270	229	147
3002502427	12	205	34E	DELAWARE	214787	132700	208	1816
3002502431	12	205	34E	DEVONIAN	33414	18570	227	1961
3002502432	13	205	34E	DEVONIAN	45778	26440	1145	729
3002501912	16	165	34E	WOLFCAMP	164004	102500	4204	1249
3002501922	20	165	34E	WOLFCAMP	104541	64290	280	541
3002501922	20	165	34E	WOLFCAMP	104033	64080	268	515
3002501922	20	165	34E	WOLFCAMP	105175	65570	207	192
3002501925	21	165	34E	WOLFCAMP	86355	51800	610	665
3002501928	21	165	34E	WOLFCAMP	119102	73300	227	454
3002501928	21	165	34E	WOLFCAMP	35422	19170	979	1949
3002501930	22	165	34E	WOLFCAMP	30015	14800	750	3300
3002501931	22	16S	34E	WOLFCAMP	87680	53000	301	681
3002501933	28	165	34E	WOLFCAMP	59960	35100	515	1500
3002501933	28	165	34E	WOLFCAMP	60309	35350	586	1297
3002501940	30	165	34E	WOLFCAMP	82422	49890	361	787
3002501944	30	165	34E	WOLFCAMP	83960	51410	418	641
3002520222	27	165	34E	WOLFCAMP	85457	51020	544	1201
3001542895	2	235	31E	WOLFCAMP	119472	73173		1036

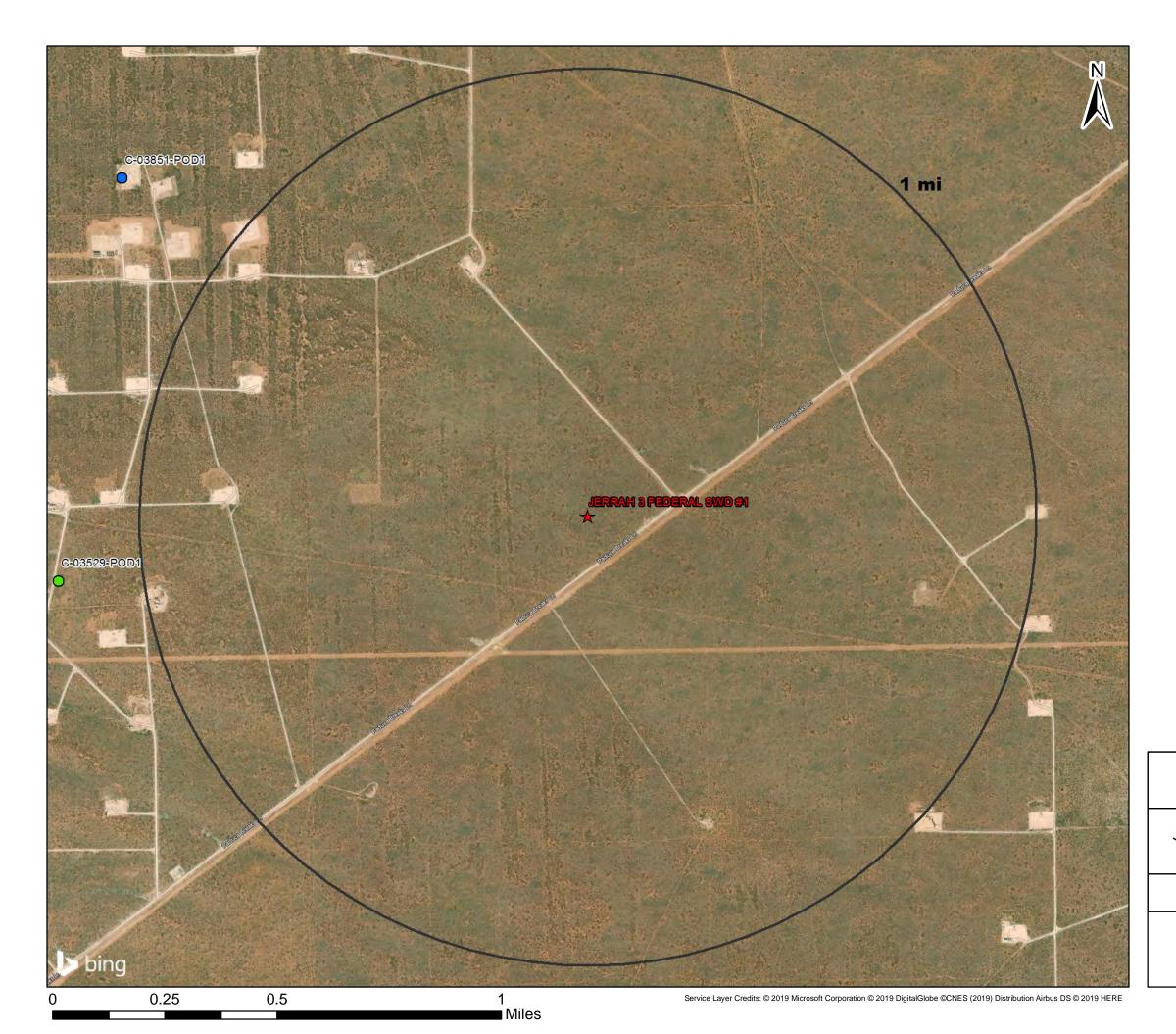
PRDUCED WATER FROM BONE SPRING, DELAWARE, DEVONIAN, WOLFCAMP

EXHIBIT F

Injection Formation Water Analyses

						h	njectio	n Forn	nation	Water	Analys	sis							
	Select Energy Services - Devonian , Fusselman & Silurian formations																		
Wellname API Latitude Longitude Section Township Range Unit ftgns ftgew County State company Field Formation Depth tds_mgL chloride_mgL bicarbonate_mgL sulfate_mgL											sulfate_mgL								
FARNSWORTH FEDERAL #006	3002511950	32.0777245	-103.162468	4	26S	37E	А	660N	990E	LEA	NM		CROSBY	DEVONIAN		31,931	20,450	302	591
ARNOTT RAMSAY NCT-B #003	3002511863	32.0922279	-103.1784439	32	25S	37E	А	660N	660E	LEA	NM		CROSBY	DEVONIAN	8797		100,382	476	
STATE NJ A #001	3002511398	32.1647491	-103.1273346	2	25S	37E	А	663N	660E	LEA	NM		JUSTIS NORTH	DEVONIAN		105,350	59,300	660	4,950
COPPER #001	3002511818	32.0994835	-103.1656723	28	25S	37E	J	1980S	1981E	LEA	NM		CROSBY	DEVONIAN		27,506	15,270	1,089	1,079
ARNOTT RAMSAY NCT-B #003	3002511863	32.0922279	-103.1784439	32	25S	37E	А	660N	660E	LEA	NM		CROSBY	DEVONIAN		158,761			
BELL LAKE UNIT #006	3002508483	32.3282585	-103.507103	6	235	34E	0	660S	1980E	LEA	NM		BELL LAKE NORTH	DEVONIAN		71,078	42,200	500	1,000
CLINE FEDERAL #001	3002510717	32.3025551	-103.1358261	14	235	37E	K	1980S	1980W	LEA	NM		CLINE	DEVONIAN		118,979	71,280	462	2,593
E C HILL B FEDERAL #001	3002510945	32.2658463	-103.1443634	34	235	37E	А	810N	660E	LEA	NM		TEAGUE	DEVONIAN		112,959	67,390	288	2,765
E C HILL D FEDERAL #001	3002510947	32.2622147	-103.1443634	34	235	37E	Н	2131N	660E	LEA	NM		TEAGUE	DEVONIAN		35,639			
E C HILL D FEDERAL #004	3002510950	32.2653503	-103.1443634	34	235	37E	А	990N	660E	LEA	NM		TEAGUE	DEVONIAN		236,252	147,000	129	781
ANTELOPE RIDGE UNIT #003	3002521082	32.2593155	-103.4610748	34	235	34E	K	1980S	1650W	LEA	NM		ANTELOPE RIDGE	DEVONIAN		80,187	47,900	476	900
REMUDA BASIN UNIT #001	3001503691	32.2886238	-103.9360428	24	235	29E	J	1980S	1980E	EDDY	NM		REMUDA	DEVONIAN		64,582	37,500	610	1,700
REMUDA BASIN UNIT #001	3001503691	32.2886238	-103.9360428	24	235	29E	J	1980S	1980E	EDDY	NM		REMUDA	DEVONIAN		56,922	29,000	1,740	4,980
STATE B COM #001	3002509716	32.1794052	-103.2212524	36	24S	36E	С	600N	1880W	LEA	NM		CUSTER	DEVONIAN		176,234	107,400	128	1,004
WHITE CITY PENN GAS COM UNIT 1 #001	3001500408	32.1937523	-104.3088455	29	24S	26E	А	660N	660E	EDDY	NM			DEVONIAN			10,120	653	1,336
BIG EDDY UT #001	3001502475	32.4421539	-104.042305	36	21S	28E	С	660N	1980W	EDDY	NM			DEVONIAN		16,223	7,000	1,030	2,290
BIG EDDY UT #001	3001502475	32.4421539	-104.042305	36	21S	28E	С	660N	1980W	EDDY	NM			DEVONIAN		19,941	10,700	640	1,130
Source:	Source: http://gotech.nmt.edu/gotech/Water/producedwater.aspx																		

Water Well Map and Well Data



Legend

★ Proposed SWD

NMOSE PODs

Status

- Active (1)
- Pending (1)
- Change Location of Well (0)
- Capped (0)
- Plugged (0)
- Incomplete (0)
- Unknown (0)

Water Wells Area of Review

JERRAH 3 FEDERAL SWD #1 Lea County, New Mexico

Proj Mgr: Dan Arthur

September 03, 2019

Mapped by: Ben Bockelmann

Prepared by:



	Water Well Sampling Rationale												
	Select Energy Services - Jerrah 3 Federal SWD #1												
SWD	SWD Water Wells Owner Available Contact Information Use Sampling Required Notes												
Note: No water wells	ote: No water wells are present within 1 mile of the proposed SWD location.												

Induced Seismicity Assessment Letter



September 17, 2019

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 Jerrah 3 Federal SWD #1

Dear Mr. Goetze,

This letter provides information regarding the seismic potential associated with injection operations associated with Select Energy Services, LLC (Select), proposed Jerrah 3 Federal SWD #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 1,638 FSL & 1,992 FEL of Section 28, in T23-S and R32-E of Lea County, New Mexico. Historically, the Eddy and Lea Counties area has experienced very limited recorded seismic activity (per the U.S. Geological Survey [USGS] earthquake catalog database). There has been one known seismic events located within a 25-mile radius of the proposed Subject Well. The closest recorded seismic event was a M2.9 that occurred on December 4th, 1984, and was located approximately 7.1 miles southeast 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 1.7 miles to the north (See Exhibit 1).

Select 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 9.4 miles east 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 Ellenberger 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

1 dullo

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." <u>http://www.beg.utexas.edu/resprog/permianbasin/PBGSP_members/writ_synth/Simpson.pdf</u> (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. <u>https://earthquake.usgs.gov/earthquakes/search/</u> (accessed June 14, 2018).

Exhibits

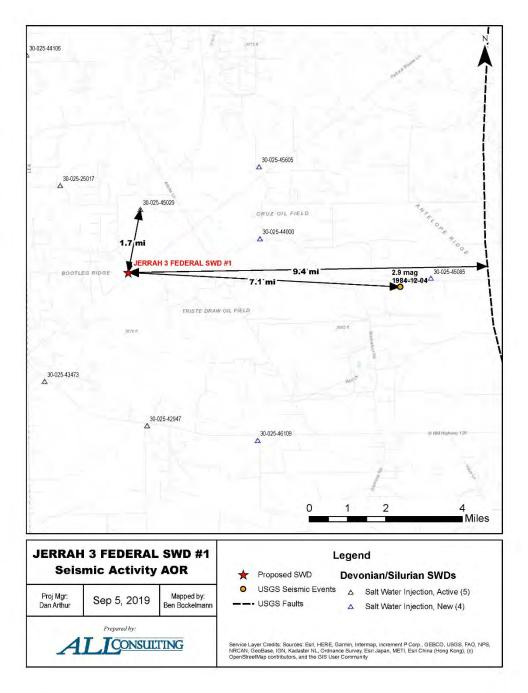


Exhibit 1. Map Showing the Distances from Known and Inferred Faults, Seismic Event, and Closest Deep Injection Well

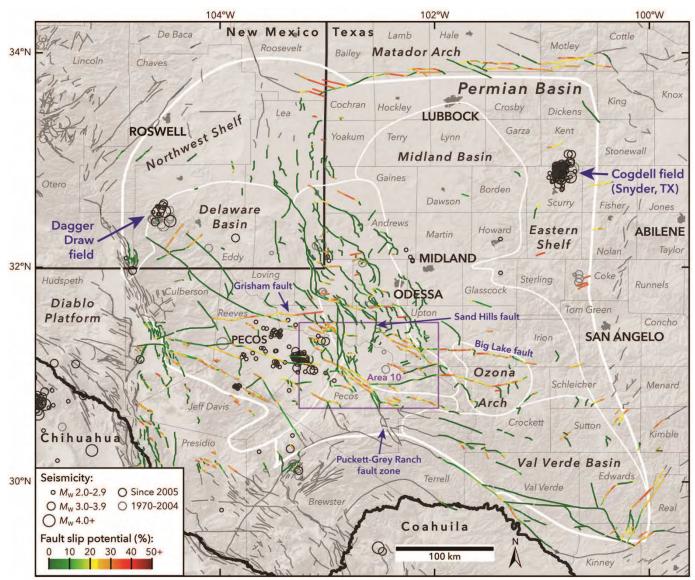


Exhibit 2. Results of the Snee and Zoback (2018) Probabilistic FSP Analysis Across the Permian Basin

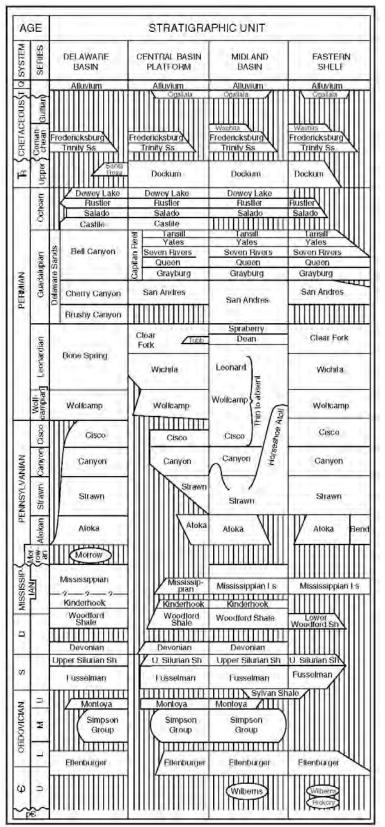


Exhibit 3. Delaware Basin Stratigraphic Chart (Ball 1995)

Public Notice Affidavit and Notice of Application Confirmations

Affidavit of Publication

STATE OF NEW MEXICO COUNTY OF LEA

I, Daniel Russell, Publisher of the Hobbs News-Sun, a newspaper published at Hobbs, New Mexico, solemnly swear that the clipping attached hereto was published in the regular and entire issue of said newspaper, and not a supplement thereof for a period of 1 issue(s).

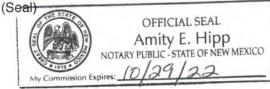
> Beginning with the issue dated September 01, 2019 and ending with the issue dated September 01, 2019.

Publisher

Sworn and subscribed to before me this 1st day of September 2019.

Circulation Clerk

My commission expires October 29, 2022



This newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Laws of 1937 and payment of fees for said 67115320

DANIEL ARTHUR ALL CONSULTING 1718 S. CHEYENNE AVE. TULSA, OK 74119 00232852

NOTICE IS HEREBY GIVEN: That Select Energy Services, 1820 N I-35, Gainesville, TX 76240, is requesting that the New Mexico Oil Conservation Division administratively approve the APPLICATION FOR AUTHORIZATION TO INJECT as follows:

LEGAL NOTICE SEPTEMBER 1, 2019

APPLICATION FOR AUTHORIZATION TO INJECT

LEGAL

LEGAL

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: Jerrah 3 Federal SWD #1 Located 24.57 miles east of Loving. NM NW ¼ SE ¼, Section 28, Township 23S, Range 32E 1.638' FSL & 1.992' FEL Lea County. NM

NAME AND DEPTH OF DISPOSAL ZONE: Devonian-Silurian (16,948 - 18,318) EXPECTED MAXIMUM INJECTION RATE: 30,000 Bbls/day

Bbis/day EXPECTED MAXIMUM INJECTION PRESSURE: 3,389 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 Nate Alleman at 918-382-7581. #34655

Jerrah 3 Federal SWD #1 - Notice of Application Recipients				
Entity	Address	City	State	Zip Code
	Land & Mineral Owner			
New Mexico BLM	620 Greene St.	Carlsbad	NM	88220
	OCD District			
NMOCD District 1	1625 N. French Drive	Hobbs	NM	88240
	Leasehold Operators			
Case-Pomeroy Oil Corporation (CASE-POMEROY OIL CORP.)	16666 Northcase Dr., Suite 475	Houston	тх	77060
Cimarex Energy Company (CIMAREX ENERGY CO.)	600 N. Marienfeld St., Suite 600	Midland	ТΧ	79701
Commision of Public Lands - State Land Office	310 Old Santa Fe Trail	Santa Fe	NM	87501
ConocoPhillips Company (CONOCO PHILLIPS CO)	P.O. Box 7500	Bartlesville	ОК	79705
Devon Devon Energy Production Company, LP (DEVON ENERGY PROD CO LP)	333 W. Sheridan Ave.	Oklahoma City	ОК	73102
EOG A Resources, Inc. (EOG A RESOURCES INC)	P.O. Box 900	Artesia	NM	88211
EOG M Resources, Inc. (EOG M RESOURCES INC)	P.O. Box 840	Artesia	NM	88211
EOG Resources, Inc. (EOG RESOURCES INC)	104 S. 4th Street	Artesia	NM	88210
EOG Y Resources, Inc. (EOG Y RESOURCES INC)	104 S. 4th Street	Artesia	NM	88210
Harvard Petroleum Company, LLC	200 E. Second St.	Roswell	NM	88202
Occidental Permian, LP (OCCIDENTAL PERMIAN LP)	5 Greenway Plaza, Suite 110	Houston	ТΧ	77046
OXY Y-1 Company	P.O. Box 27570	Houston	ТΧ	77227

Notes: The table above shows the Entities who were identified as parties of interest requiring notification on either the 1-mile well detail list (Attachment 2) or on the 2-mile Mineral Lease Map (Attachment 2). The names listed above in parenthesis, are the abbreviated entity names used on either the 1-mile well detail list (Attachment 2) or on the 2-mile Mineral Lease Map (Attachment 2).

Place label at top of the center of the envelope and fold at dotted line.

4

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Case-Pomeroy Oil Corporation 16666 Northchase Dr., Suite 475 Houston TX 77060-6014

600 N. Marienfeld St., Suite 600

Midland TX 79701-4405





P.O. Box 900 Artesia NM 88211-0900

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Artesia NM 88211-0840





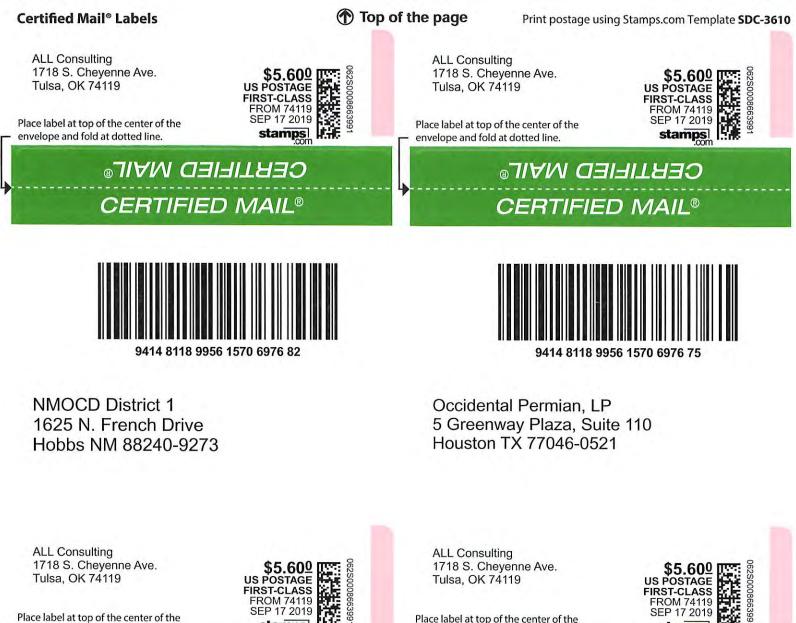
9414 8118 9956 1570 6979 58

Harvard Petroleum Company, LLC 200 E. Second St. Roswell NM 88201-6212 New Mexico BLM 620 E Greene St. Carlsbad NM 88220-6292

9414 8118 9956 1570 6979 03

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