

8/29/2018
 8/27/2018
 PMAM18239 3087-2

DATE	SUSPENSE	ENGINEER	LOGGED IN	TYPE	APP NO.
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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 _____

- SWD
 - Solaris Water
 midstream
 371643
 - Way
 - Powderhorn
 SWD #1
 30-025 pending
 Pool
 - Deviation -
 S. Union
 97865

- [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.

J. Daniel Arthur, P.E., SPEC		Consulting Engineer - ALL Consulting	08/16/2018
Print or Type Name	Signature	Title	Date
		darthur@all-llc.co,	
		e-mail Address	

August 16, 2018

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

Subject: Solaris – Powderhorn SWD #1 – Application for Authorization to Inject

To Whom It May Concern,

On behalf of Solaris Water Midstream, LLC (Solaris), ALL Consulting, LLC (ALL) is submitting the enclosed Application for Authorization to Inject for the Powderhorn 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
Project Manager

APPLICATION FOR AUTHORIZATION TO INJECT

- I. PURPOSE: _____ Secondary Recovery _____ Pressure Maintenance Disposal _____ Storage
Application qualifies for administrative approval? Yes _____ No
- II. OPERATOR: Solaris Water Midstream, LLC
ADDRESS: 9811 Katy Freeway, Suite 900, Houston, TX 77024
CONTACT PARTY: Bonnie Atwater PHONE: 432-203-9020
- 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 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: Bonnie Atwater TITLE: Reg Tech

SIGNATURE: Bonnie Atwater DATE: 8.2.18

E-MAIL ADDRESS: bonnie.atwater@solaris.midstream.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: Powderhorn SWD #1

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

A.

(1) General Well Information:

Operator: Solaris Water Midstream, LLC

Lease Name & Well Number: Powderhorn SWD #1

Well Footage: 466' FSL & 430' FEL

Location: S13 T25S R34E

(2) Casing Information:

Type	Hole Size	Casing Size	Casing Weight	Setting Depth	Sacks of Cement	Estimated TOC	Method Determined
Surface	24"	20"	94.0 lb/ft	965'	1,230	Surface	Circulation
Intermediate 1	17-1/2"	13-3/8"	54.5 lb/ft	5,460'	3,215	Surface	Circulation
Intermediate 2	12-1/4"	9-5/8"	53.50 lb/ft	12,850'	3,410	Surface	Circulation
Liner	8-1/2"	7-5/8"	39 lb/ft	18,470'	370	12,650'(TOL)	CBL

(3) Tubing Information:

5-1/2" (23#) Internal Plastic Coated Tubing swedged down to 5" (18#) with setting depth of 18,450'

(4) Packer Information: Lok-set or equivalent packer set at 18,450'

B.

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

(2) Injection Interval: Open-hole injection between 18,470 – 19,990

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

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

(5) Overlying Oil and Gas Zones:

- Delaware (5,460')
- Bone Springs (9,560')
- Wolfcamp (12,115')
- Atoka (14,575')
- Morrow (15,290')

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

V – Well and Lease Maps

A well map and lease map are included in **Attachment 2**.

VI – AOR Well List

A list of the wells within the 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:** 3,694 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 well will be injecting water into the Devonian and Silurian-Fusselman formations which is known to be compatible with formation water from the Wolfcamp and Bone Springs formations. Water analyses from the Silurian-Fusselman could not be located; however, water analysis 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 18,470 – 19,990 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 940 feet. Water well depths in the area range from 185 - 282 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 the AOR of the proposed SWD location. A list of recipients, as well as confirmation of mailing, are included in **Attachment 7**.

Attachments

Attachment 1: Wellbore Diagram

Attachment 2: Area of Review Well Map, Lease Map, and Well Details

Attachment 3: Source Water Analyses

Attachment 4: Injection Formation Water Analyses

Attachment 5: Water Well Map

Attachment 6: Induced Seismicity Assessment Letter

Attachment 7: Public Notice Affidavit and Notice of Application Confirmations

Attachment 1
Wellbore Diagram

SURFACE ELEVATION 3,362' TOTAL DEPTH 20,090'

MUD LOGGING E LOGGING/ DIRECTIONAL	CASING SIZE (IN.) CEMENT (SACKS)	RKB DRILL DEPTH MD TVD	BOPE	FORMATION	HOLE SIZE (IN.)	MUD WT.	FRAC GRAD	TUBING
GRND LEVEL	RKB	32						
	GL ELEV.	3,362						
	30" GROUT TO SURFACE	120 / 120	OPEN		32"	8.8		
	20" 94# J55 BTC	940		PERMIAN RUSTLER FM	24"	8.4		
	1,230 SACKS, CEMENTED TO SURFACE	965 / 965	26-3/4"-3M ANNULAR/DIVERTER			8.4		
MUD LOGGING TO BEGIN AT 2500'					17 1/2"	9.5 to 10.0		5 1/2" (23#) IPC TUBING
	13 3/8" 54.5# J-55	5,460		PERMIAN DELAWARE MTN. GROUP				
	3,215 SACKS, CEMENTED TO SURFACE	5,460 / 5,460	21-3/4" -5M ANNULAR			10.0		
DV TOOL AT ±3,300'IN 9 5/8" OPEN HOLE, ECP BELOW			21-3/4" -5M BOP			9.4		
		9,560		PERMIAN BONE SPRING FM.	12 1/4"	9.4 to 10.0		
		12,115		PERMIAN WOLFCAMP FM.				
	TOL	12,650 / 12,650						
	9 5/8" 53.5# P110 BTC	12,850 / 12,850	13-5/8" -10M ANNULAR			10.0		
	3,410 SACKS, CEMENTED TO SURFACE IN TWO STAGES		13-5/8" -10M BOP	PENNSYLVANIAN STRAWN FM.		12.5		
		14,375						
		14,575		PENNSYLVANIAN ATOKA FM.	8 1/2"	12.5 to 14.6		
		15,290		PENNSYLVANIAN MORROW FM.				
	7 5/8" 39# P110, ST-L	18,470		DEVONIAN				
	370 SACKS, EST. TOC 12,650' BACK UP INTO THE 9 5/8" CASING (VERIFIED WITH RADIAL CEMENT BOND LOG)	18,470 / 18,470	13-5/8" -10M ANNULAR			14.6		
			13-5/8" -10M BOP					18,450'
RUN #1 GR/NEUTRON USIT/CBL	20,300 - 0 DUAL 0"	19,990	13-5/8" -10M ANNULAR	Base of FUSSELMAN FM	6 1/2"	9.0		
		18,470 - 0	13-5/8" -10M BOP					
		TD 20,090 / 20,090						

POWDERHORN SWD #1

SECTION 13 T-25-S, R-34-E
466' FSL & 430' FEL
LEA COUNTY, NEW MEXICO

PN # 1680.NM.00

JUNE 2018



ALLCONSULTING
GOVERNMENT RELATIONS - ENERGY - PLANNING - TECHNOLOGY
ENGINEERING - ENVIRONMENTAL

© 2018 ALL Consulting, LLC

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.

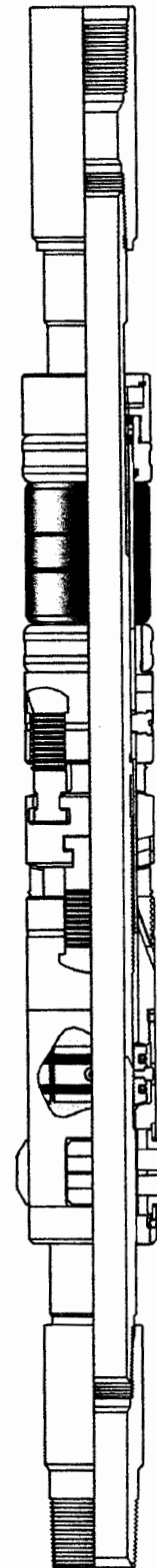
Advantages

- 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

Retrievable Packer Systems

SPECIFICATION GUIDES

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

Casing			Packer				
OD		Weight • lb/ft	Size	Nom ID		Max Gage Ring OD	
in.	mm			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
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	1.978	50.2	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
		17-20	47A4	2.441	62.0	5.827	148.0
7	177.8	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

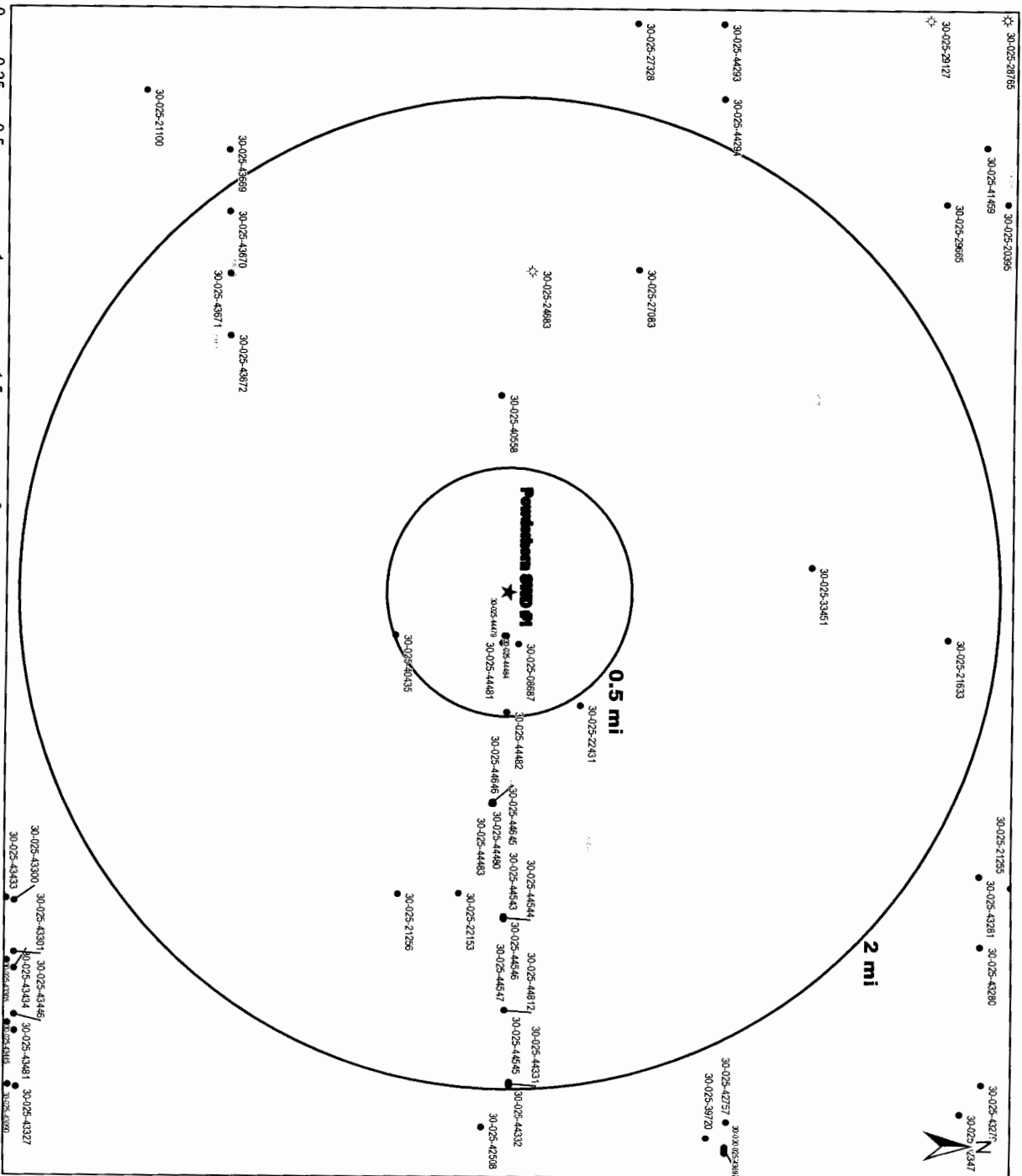
AL-2™ Large Bore LOK-SET Retrievable Casing Packer Product Family No. H64628

Casing			Packer						
OD		Weight • lb/ft	Size	Nom ID		Max Gage Ring OD		Max Diameter of Compressed Drag Block	
in.	mm			in.	mm	in.	mm	in.	mm
5-1/2	139.7	20	45A2 x 2-3/8	2.375	60.3	4.562	115.9	4.592	116.6
		15.5-17	45A4 x 2-3/8			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.

Attachment 2

Area of Review Well Map, Lease Map, and Well Details



Service Layer Credit: Service: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeBCAS, IGN, Swisstopo, MTK, OpenStreetMap, Esri, Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox, Mapbox, © OpenStreetMap contributors, and the GIS User Community

- Legend**
- ★ Proposed SWD
 - ☆ Gas, Active (1)
 - ☆ Gas, Plugged (2)
 - Oil, Active (7)
 - Oil, New (38)
 - Oil, Plugged (13)



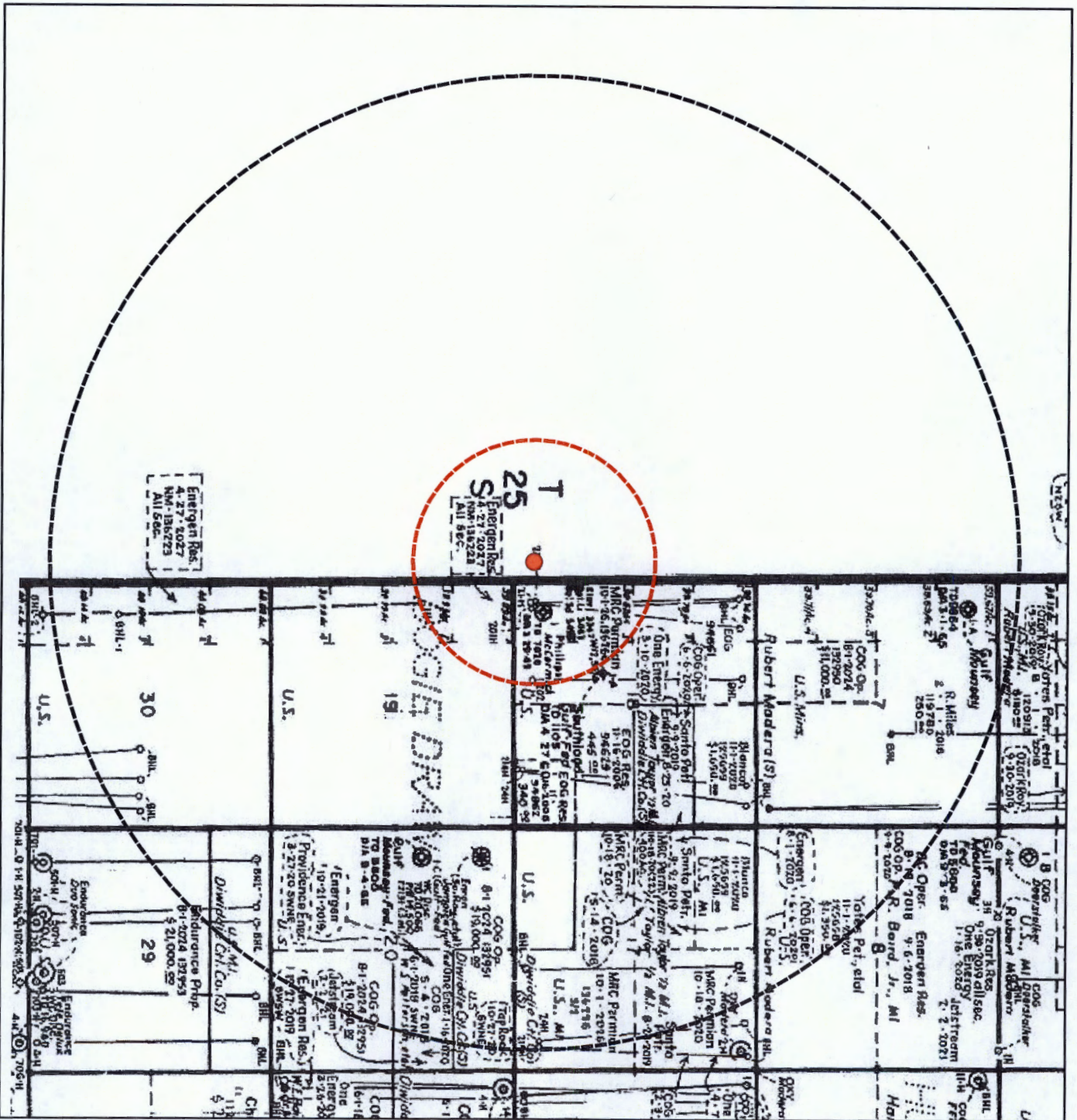
O&G Wells Area of Review		
Powderhorn SWD #1		
Lea, New Mexico		
Proj Mgr: Dan Arthur	July 25, 2018	Mapped by: Ben Blockemian
Prepared by: ALICONSULTING		



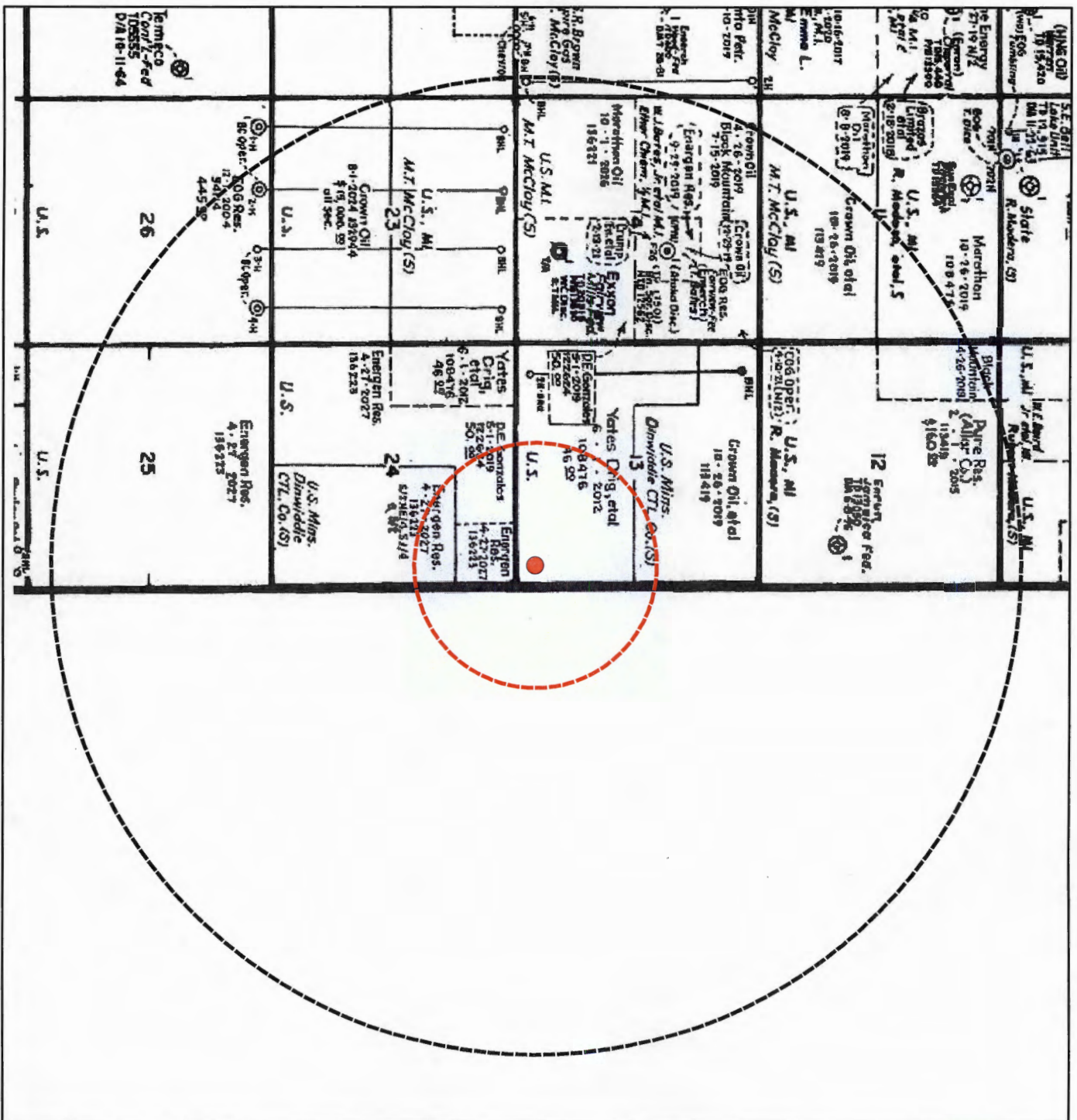
Legend

- Proposed SWD
- 1/2 - mile Radius
- 2 - mile Radius

Powderhorn SWD #1		
Offset Leases		
Lea County, NM		
Proj Mgr: JDA	July 26, 2018	Mapped by: BJB



Map 1 of 2 (East)



- Legend**
- Proposed SWD
 - 1/2 - mile Radius
 - 2 - mile Radius

Powderhorn SWD #1		
Offset Leases		
Lea County, NM		
Proj Mgr: JDA	July 26, 2018	Mapped by: BJB

Prepared by:
ALL CONSULTING

Map 2 of 2 (West)

AOR Tabulation for Powderhorn SWD #1 (Top of Injection Interval: 18,470')

Well Name	API#	Well Type	Operator	Spud Date	Location (Sec., Tn., Rng.)	Footage Location	Total Depth	Penetrate Inj. Zone?
PITCHBLEND 19 FEDERAL COM #001	30-025-40435	O	EOG RESOURCES INC	4/17/2012	2-19-255-35E	1980 FNL 440 FWL	9650	No
BIGGERS FEDERAL #021H	30-025-44479	O	MATADOR PRODUCTION COMPANY	To Be Drilled	4-18-255-35E	357 FSL 493 FWL	9264	No
BIGGERS FEDERAL #202H	30-025-44482	O	MATADOR PRODUCTION COMPANY	To Be Drilled	N-18-255-35E	390 FSL 2112 FWL	12616	No
BIGGERS FEDERAL #215H	30-025-44484	O	MATADOR PRODUCTION COMPANY	To Be Drilled	4-18-255-35E	387 FSL 498 FWL	12163	No
MCCORMICK WELL #001	30-025-08687	P&A	PHILLIPS PETROLEUM COMPANY	2/2/1949	4-18-255-35E	660 FSL 659 FWL	7020	No
GULF-FEDERAL "A" WELL #001	30-025-22431	P&A	SOUTHLAND ROYALTY COMPANY	2/17/1968	K-18-255-35E	1980 FSL 1980 FWL	1105	No

Notes:

(1) No wells within the 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 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	77,982	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 - 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:	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	3091.92	Sodium:	70275.7	3056.82
Analyst:	SANDRA GOMEZ	Bicarbonate:	2135.0	34.99	Magnesium:	195.0	16.04
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
Carbon Dioxide:	0.50 PPM	Borate:			Iron:	6.5	0.23
Oxygen:		Silicate:			Potassium:	889.0	22.22
Comments:		Hydrogen Sulfide:		0 PPM	Aluminum:		
		pH at time of sampling:		7	Chromium:		
		pH at time of analysis:			Copper:		
		pH used in Calculation:		7	Lead:		
					Manganese:	0.100	0.
					Nickel:		

Conditions		Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl										
Temp	Gauge Press.	Calcite CaCO ₃		Gypsum CaSO ₄ ·2H ₂ O		Anhydrite CaSO ₄		Celestite SrSO ₄		Barite BaSO ₄		CO ₂ Press
		Index	Amount	Index	Amount	Index	Amount	Index	Amount	Index	Amount	
80	0	1.06	188.52	-1.20	0.00	-1.18	0.00	-0.11	0.00	0.58	0.29	1.72
100	0	1.10	206.05	-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 CO₂ pressure is actually the calculated CO₂ fugacity. It is usually nearly the same as the CO₂ partial pressure.

Attachment 4

Injection Formation Water Analyses

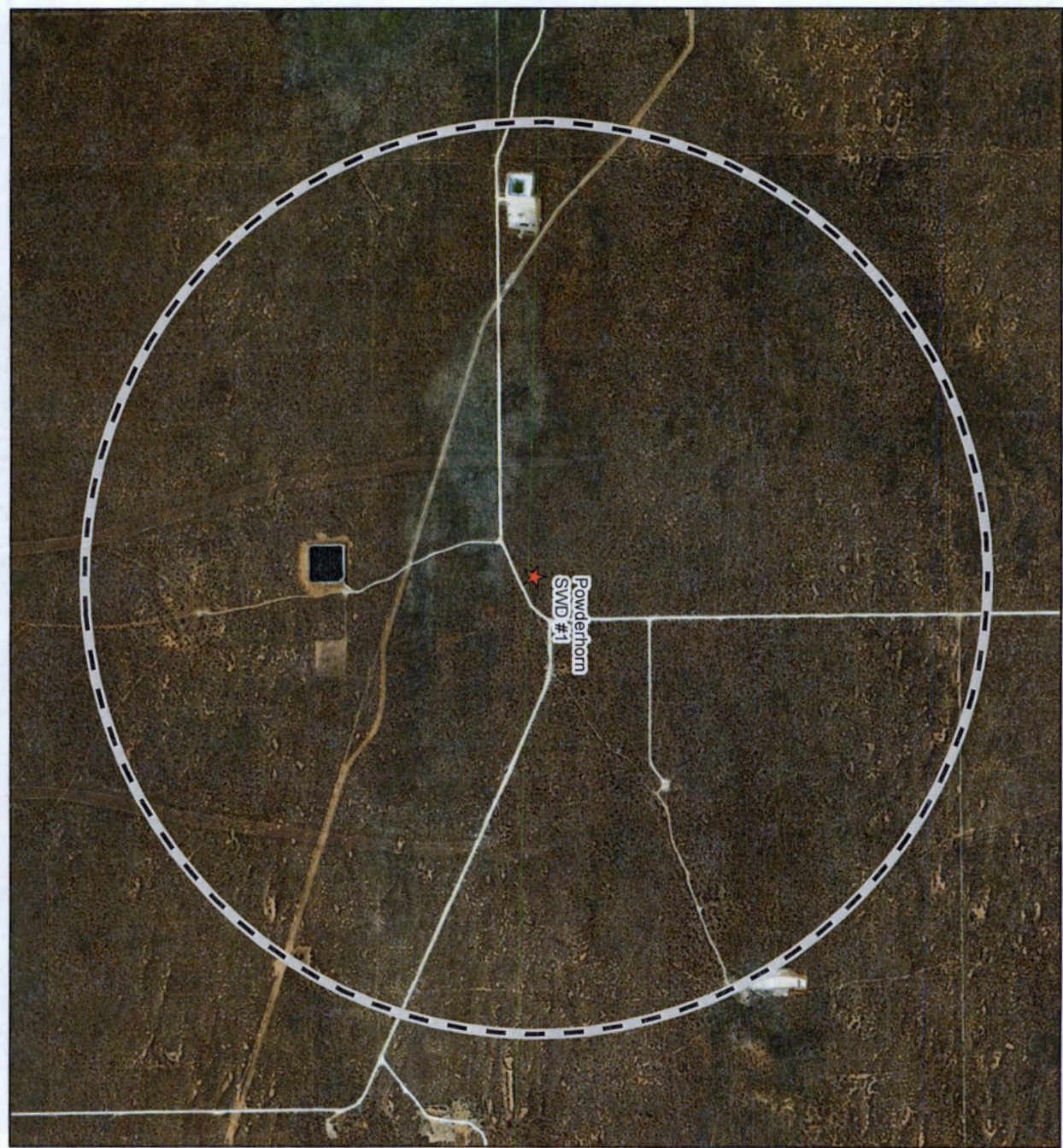
wellname	api	section	township	range	county	state	formation	sampledate	ph	specificgravity	specificgravity_temp_f	tdc_mgd	resistivity_ohm_cm	resistivity_ohm_cm_temp_f	conductivity	conductivity_temp_f	sodium_mgd	calcium_mgd	magnesium_mgd	chloride_mgd	bicarbonate_mgd	sulfate_mgd
JURNEGAN POINT R001	3001310280	5	245	23E	EDDY	NM	DEVONIAN	12/14/1984 000	7	1.012	60	203100	0.36	75	25596	64	6072	1002	132	121100	175	2220
WHITE CITY FERN GAS COM UNIT 1 R001	3001500008	29	245	24E	EDDY	NM	DEVONIAN	3/1/1990 000	7	1.012	60	203100	0.36	75	25596	64	6072	1002	132	10120	653	1386


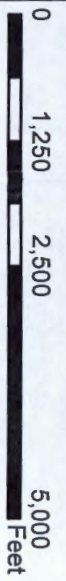
Source: Geo-Tech (<http://geochem.mnt.edu/geotech/Water/producewater.aspx>)

Attachment 5

Water Well Map

Proposed SWD & Water Wells within 1 mile





Powderhorn SWD #1			
County: Lea, NM	Date: 7/25/2018		
Lat: 32.124456	PM: J Daniel Arthur		
Long: -103.416522	Map: Ben Bockelmann	1:22,000	

Service Layer Credits: Esri, HERE, Garmin, © OpenStreetMap contributors
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Legend

-  Proposed SWD
-  Proposed SWD 1-mi Buffer



Prepared by:

Attachment 6

Induced Seismicity Assessment Letter

August 1, 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 Powderhorn SWD #1

Dear Mr. Goetze,

This letter provides information regarding the seismic potential associated with injection operations associated with Solaris Water Midstream, LLC's (Solaris), proposed Powderhorn 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 466' FSL & 430' FEL of Section 13, in T25-S and R34-E of Lea County, New Mexico. Historically, the Eddy and Lea County area has experienced very limited recorded seismic activity (per the U.S. Geological Survey [USGS] earthquake catalog database). The closest recorded seismic event was a M2.9 that occurred on December 4, 1984, and was located approximately 12.72 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 4.61 miles to the north (See Exhibit 1).

Solaris 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 34.26 miles west 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 Ellenberger 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 Ellenberger 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



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

Enclosures
References
Exhibits

Induced Seismicity Potential Statement for the Powderhorn SWD #1
August 1, 2018

References

Induced Seismicity Potential Statement for the Powderhorn SWD #1
August 1, 2018

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 (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).

Induced Seismicity Potential Statement for the Powderhorn SWD #1
August 1, 2018

Exhibits

Induced Seismicity Potential Statement for the Powderhorn SWD #1
 August 1, 2018

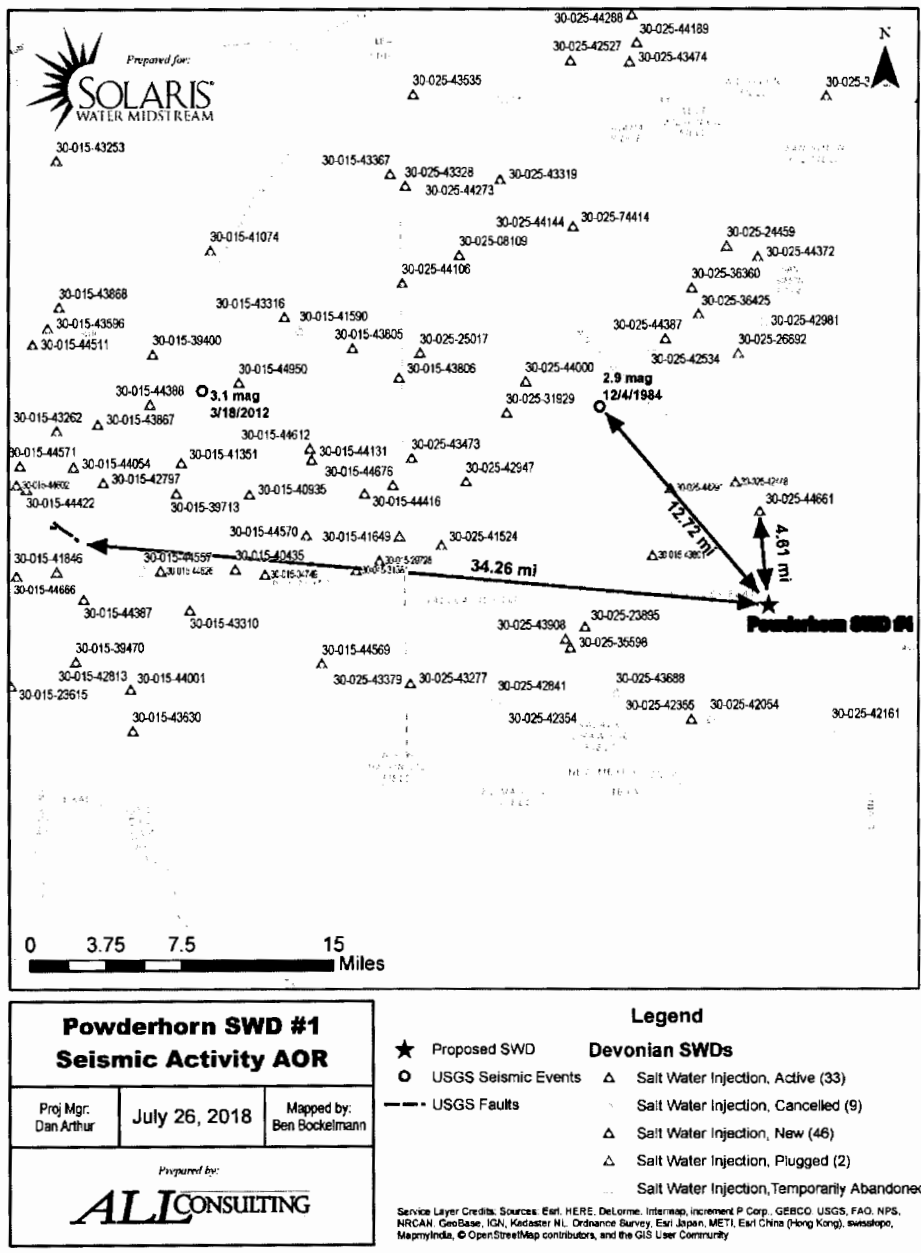


Exhibit 1. Map Showing the Distances from Known and Inferred Faults, Seismic Event, and Closest Deep Injection Well

Induced Seismicity Potential Statement for the Powderhorn SWD #1
 August 1, 2018

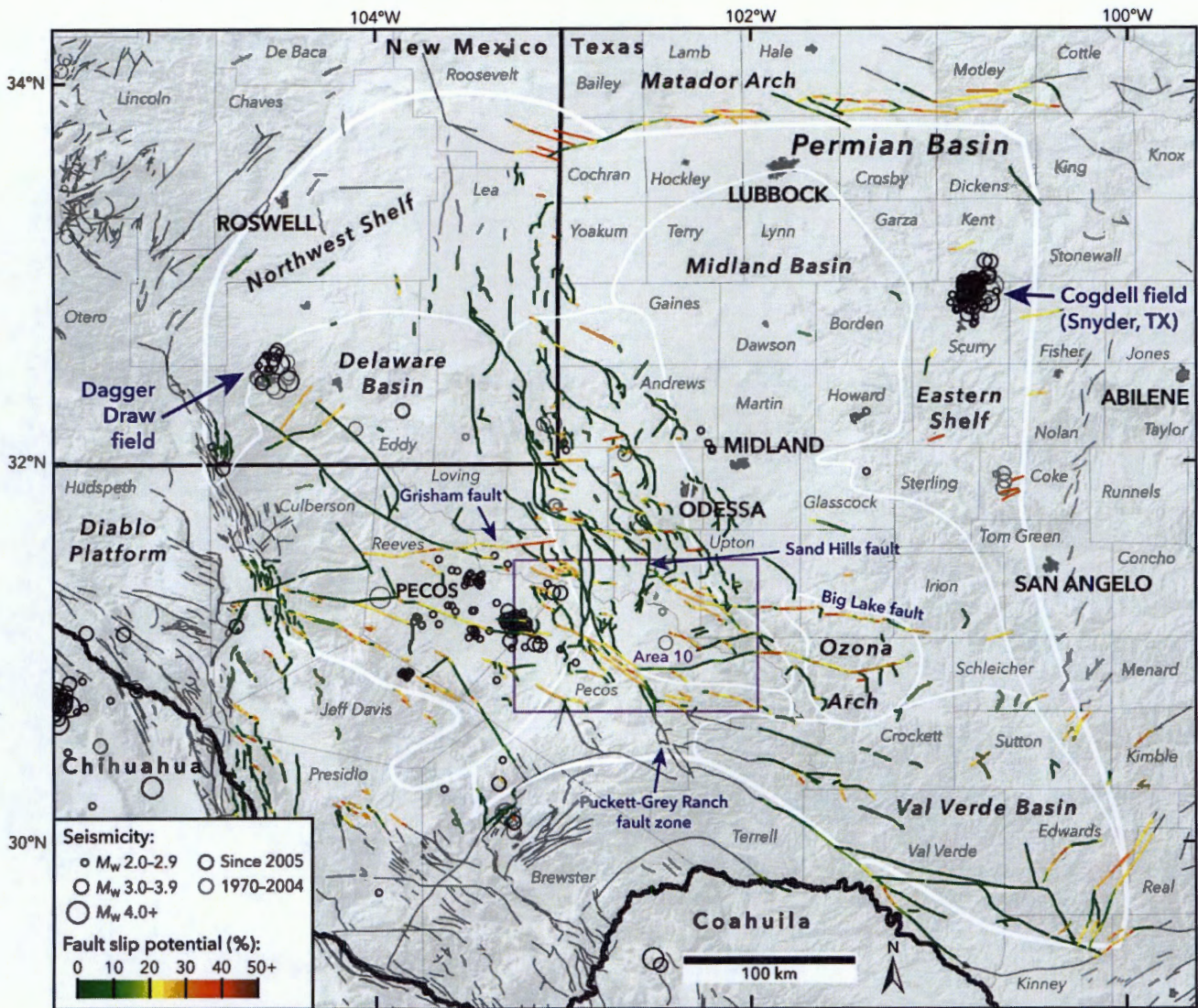


Exhibit 2. Results of the Snee and Zoback (2018) Probabilistic FSP Analysis Across the Permian Basin

Induced Seismicity Potential Statement for the Powderhorn SWD #1
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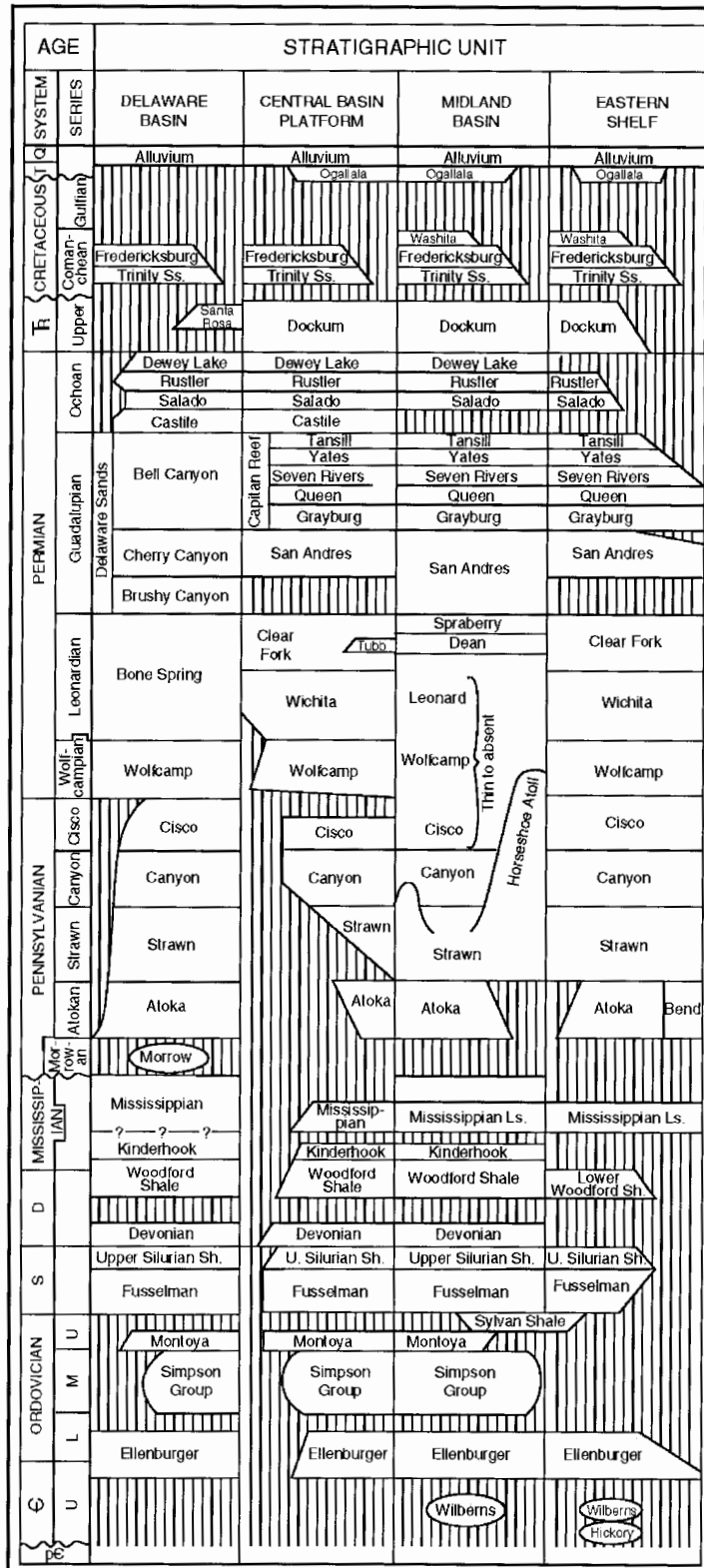


Exhibit 3. Delaware Basin Stratigraphic Chart (Ball 1995)

Attachment 7

Public Notice Affidavit and Notice of Application Confirmations

Affidavit of Publication

STATE OF NEW MEXICO
COUNTY OF LEA

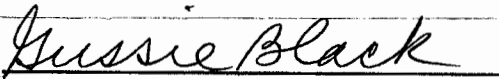
I, Daniel Russell, Publisher of the Hobbs News-Sun, a newspaper published at Hobbs, New Mexico, solemnly swear that the clipping attached hereto was published in the regular and entire issue of said newspaper, and not a supplement thereof for a period of 1 issue(s).

Beginning with the issue dated
August 09, 2018
and ending with the issue dated
August 09, 2018.



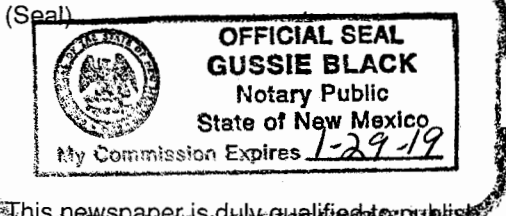
Publisher

Sworn and subscribed to before me this
9th day of August 2018.



Business Manager

My commission expires
January 29, 2019



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

LEGAL NOTICE August 9, 2018

APPLICATION FOR AUTHORIZATION TO INJECT

NOTICE IS HEREBY GIVEN: That Solaris Water Midstream, LLC, 9811 Katy Freeway, Suite 900, Houston, TX 77024, 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: Powderhorn SWD #1
SE 1/4 SE 1/4, Section 13, Township 25S, Range 34E
466' FSL 430' FEL
Lea County, NM

NAME AND DEPTH OF DISPOSAL ZONE: Devonian-Silurian (18,470' - 19,990')
EXPECTED MAXIMUM INJECTION RATE: 30,000 Bbls/day
EXPECTED MAXIMUM INJECTION PRESSURE: 3,694 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 Bonnie Atwater (Solaris - Regulatory Technician) at 432-203-9020.
#33090

67115320

00216290

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

Powderhorn SWD #1 Notice of Application Recipients

Entity	Address	City	State	Zip Code
Landowner				
New Mexico BLM	620 E. Greene St.	Carlsbad	NM	88220
OCD District				
OCD District 1	1625 N. French Drive	Hobbs	NM	88240
Leasehold Operators				
Crown Oil Partners, LP.	P.O. Box 50820	Midland	TX	79701
Daniel E. Gonzales	P.O. Box 228	Sante Fe	NM	87504
Energen Resources Corporation	2198 Bloomfield Highway	Farmington	NM	87041
EOG Resources, Inc.	P.O. Box 2267	Midland	TX	70702
Gulf Oil Company	P.O. Box 1938	Roswell	NM	88201
Matador Production Company	5400 LBJ Freeway, Suite 1500	Dallas	TX	75240
MRC Permian Company	5400 LBJ Freeway, Suite 1500	Dallas	TX	75240
Phillips Petroleum Company	P.O. Box 791	Midland	TX	79701
Southland Royalty Company	200 Interfirst Tower	Fort Worth	TX	76102
Yates Petroleum Corporation	105 S. Fourth Street	Artesia	NM	88210

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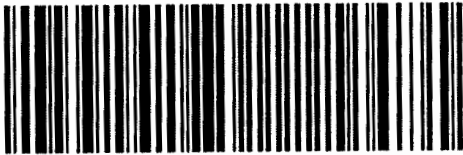
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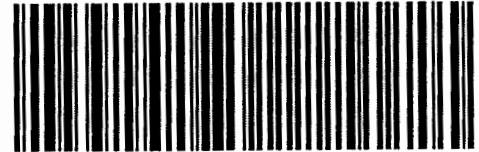
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Santa Fe NM 87504

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Midland TX 79710-0820

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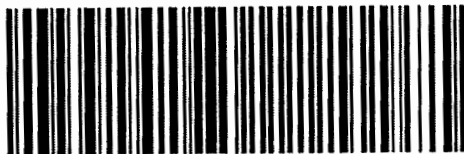
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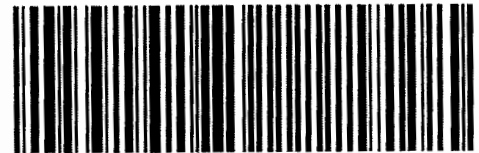
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2198 Bloomfield Highway
Farmington NM 87401-8108

EOG Resources, Inc.
P.O. Box 2267
Midland TX 79702-2267

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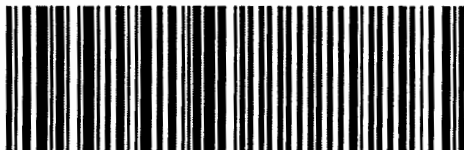
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Gulf Oil Company
P.O. Box 1938
Roswell NM 88202-1938

Matador Resources Company
5400 LBJ Freeway Suite 1500
Dallas TX 75240-1017

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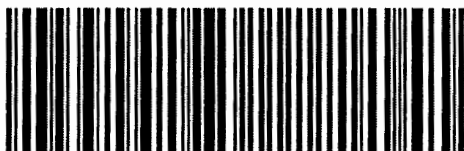
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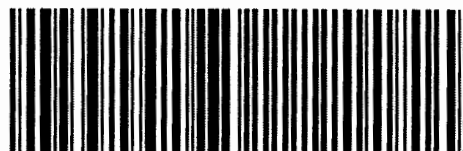
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Dallas TX 75240-1017

New Mexico BLM
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Carlsbad NM 88220-6292

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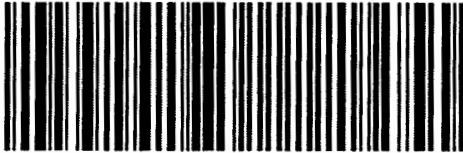


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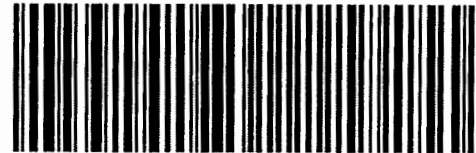
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NMOCD District 1
1625 N. French Drive
Hobbs NM 88240-9273

Phillips Petroleum Company
P.O. Box 791
Midland TX 79702-0791

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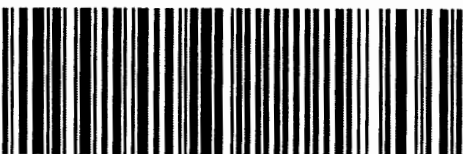


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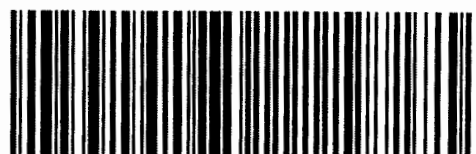
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Southland Royalty Company
200 Interfirst Tower
Fort Worth TX 76102

Yates Petroleum Corporation
105 S. Fourth Street
Artesia NM 88210-2177

"Updated"

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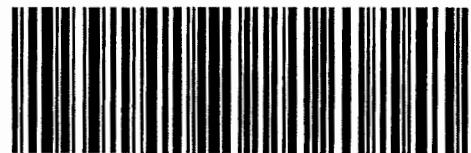
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Energen Resources Corporation
3510 North A St
Midland TX 79705-5427

Gulf Oil
1780 South Bellaire St.
Denver CO 80222-4307

McMillan, Michael, EMNRD

From: McMillan, Michael, EMNRD
Sent: Monday, August 27, 2018 8:52 AM
To: nalleman@all-llc.com
Cc: Goetze, Phillip, EMNRD
Subject: Solaris Water Midstream LLC Powderhorn SWD Well No. 1

Nate:

Your address for Energen is wrong.

There address is in Midland.

Next, Gulf Oil has not had an address in Roswell in over 50 years-make sure that address is correct.

I will suspend your application until you can verify these addresses.

Mike

Michael McMillan
1220 South St. Francis
Santa Fe, New Mexico
505-476-3448
Michael.mcmillan@state.nm.us