Initial

Application

Part I

Received: <u>08/23/2019</u>

This application is placed in file for record. It MAY or MAY NOT have been reviewed to be determined Administratively Complete

RECEIVED: REVIEWER: 08/23/2019	TYPE: SWD	APP NO: pDHR1923850590
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ABOVE THIS TABLE FOR OCD DIVISION USE ONLY



NEW MEXICO OIL CONSERVA	7
- Geological & Engineering	
1220 South St. Francis Drive, Santo	d Fe, NM 87505
ADMINISTRATIVE APPLICATION	ON CHECKLIST
THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICA REGULATIONS WHICH REQUIRE PROCESSING AT THE	(1984) 이 사람들은 그리아 (2014) 이 그리아 아내는 이 사람들이 들어보다면 보다면 모양을 하게 되었다면 보다면 다른데 (1984)
Applicant: BAM Permian Operating, LLC	OGRID Number: 328565
Well Name: Linley State SWD I	API: 30-005-
Pool: SWD; San Andres - Glorieta	Pool Code: 96127
SUBMIT ACCURATE AND COMPLETE INFORMATION REQUII INDICATED BELO 1) TYPE OF ARRUCATIONS Charles there are the for [A]	DW
1) TYPE OF APPLICATION: Check those which apply for [A] A. Location – Spacing Unit – Simultaneous Dedication NSL NSP(PROJECT AREA) NSP	
B. Check one only for [1] or [1] [1] Commingling – Storage – Measurement DHC DTB PLC PC O [11] Injection – Disposal – Pressure Increase – Enha	anced Oil Recovery SWD-2258
2) NOTIFICATION REQUIRED TO: Check those which apply A. Offset operators or lease holders B. Royalty, overriding royalty owners, revenue ow C. Application requires published notice D. Notification and/or concurrent approval by SLC E. Notification and/or concurrent approval by BLC F. Surface owner G. For all of the above, proof of notification or put H. No notice required	ners Application Content Complete
3) CERTIFICATION: I hereby certify that the information sub administrative approval is accurate and complete to the understand that no action will be taken on this applical notifications are submitted to the Division.	ne best of my knowledge. I also

	8-23-19
ı Wood	Date
or Type Name	505 466-8120
15 Wood	Phone Number
	brian@permitswest.com

STATE OF NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

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

FORM C-108 Revised June 10, 2003

APPLICATION FOR AUTHORIZATION TO INJECT

I.	PURPOSE: Secondary Recovery Pressure Maintenance XXX Disposal Storage Application qualifies for administrative approval? XXX Yes No
II.	OPERATOR: BAM PERMIAN OPERATING, LLC
	ADDRESS: 4416 BRIARWOOD AVE., SUITE 110, PMB 53, MIDLAND, TX 79707
	CONTACT PARTY: BRIAN WOOD (PERMITS WEST, INC.) PHONE: 505 466-812
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 XXX 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:
	 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.
*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.
	Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
	NAME: BRIAN WOOD TITLE: CONSULTANT
	SIGNATURE:DATE: AUG. 22, 2019
	E-MAIL ADDRESS: brian@permitswest.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.

BAM PERMIAN OPERATING, LLC

OPERATOR:

OR CBL OR TS ff3 H ff3 Method Determined: CIRCULATE 29 E RANGE 13.375" Method Determined: CIRC. 9.625" Method Determined: CIRC. WELL CONSTRUCTION DATA TOWNSHIP 15 S Casing Size: Casing Size: Casing Size: to 5200' Intermediate Casing Production Casing Injection Interval Surface Casing or or 01 3750 feet SX. SX. SX. SECTION 32 8.75" 5200 720 GI 12.25" 1950 410 17.5" 480 GI Cemented with: TOC (480 sx) = GL (circ.) Cemented with: Top of Cement: Top of Cement: Cemented with: Top of Cement: Total Depth: UNIT LETTER Hole Size: Hole Size: Hole Size: Z 17.5" hole @ 350' 13.375" 48# in 12.25" hole @ 1500' TOC TOC (410 sx) = GL(720 sx) = GL (circ. or CBL)9.625" 36# in LINLEY STATE SWD (circ. or TS) 7" 26# in 8.75" hole @ 5200' WELL LOCATION: 201' FSL & 999' FWL FOOTAGE LOCATION WELLBORE SCHEMATIC (not to scale) TD 5200' WELL NAME & NUMBER: 3.5" IPC tbg @ ≈3650' set packer ≈3650° San Andres & Glorieta 3750' - 5200' perf

(Perforated or Open Hole; indicate which)

INJECTION WELL DATA SHEET

Packer Setting Depth: ≈3650 ' Other Type of Tubing/Casing Seal (if applia 1. Is this a new well drilled for injection? If no, for what purpose was the well or 2. Name of the Injection Formation: LO 3. Name of Field or Pool (if applicable): 4. Has the well ever been perforated in an intervals and give plugging detail, i.e. s	Packer Setting Depth: ≈3650' Other Type of Tubing/Casing Seal (if applicable):
It Type of Tubing/Cas Is this a new well dril If no, for what purpos Name of the Injection Name of Field or Poo Has the well ever beer intervals and give plu	asing Seal (if applicable):
Is this a new well dril If no, for what purpos Name of the Injection Name of Field or Poo Has the well ever beer intervals and give plu	
Is this a new well dril If no, for what purpos Name of the Injection Has the well ever beer intervals and give plu	Additional Data
If no, for what purpos Name of the Injection Name of Field or Poo Has the well ever beel intervals and give plu	illed for injection? XXX Yes No
Name of the Injection Name of Field or Poo Has the well ever beer intervals and give plu	If no, for what purpose was the well originally drilled?
Name of Field or Poo Has the well ever beer intervals and give plu	Name of the Injection Formation: LOWER SAN ANDRES & GLORIETA
Has the well ever been intervals and give plu	Field or Pool (if applicable): SWD; SAN ANDRES - GLORIETA (96127)
	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. NO
Onve the name and depths injection zone in this area:	Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area:
OVER: GRAYBURG	RG (2100'), UPPER SAN ANDRES (3100')

Goal is to drill a 5200' deep saltwater disposal well. Proposed disposal interval will be 3750' - 5200' in the SWD; San Andres-Glorieta (96127). This will be the lower San Andres.

Operator: BAM Permian Operating, LLC 11. (OGRID 328565)

Operator phone number: (432) 242-8851

Operator address: 4416 Briarwood Ave. Suite 110 PMB 53, Midland TX 79707

Contact for Application: Brian Wood (Permits West, Inc.)

Phone: (505) 466-8120

III. A. (1) Lease type: NMSLO

Lease name: Linley State Lease Number: VC-0379-0000 Lease Size: 320.00 acres Lease Area: W2 32-15s-29e Closest Lease Line: 201'

Well name & number: Linley State SWD 1

Well location: 201' FSL & 999' FWL Sec. 32, T. 15 S., R. 29 E.

A. (2) Surface casing (13.375", 48#, H-40, ST&C) will be set at 350' in a 17.5" hole and cemented to GL with 480 sacks. Will verify TOC by circulation.

> Intermediate casing (9.625", 36#, J-55, LT&C) will be set at 1500' in a 12.25" hole and cemented to GL with 410 sacks. Will verify TOC by circulation, or temperature survey if needed.

> Production casing (7", 26#, J-55, LT&C) will be set at 5200' in an 8.75" hole and cemented to GL in 2 stages (tool at ≈2750') with 720 sacks. Will verify TOC by circulation, or CBL if needed.

- A.(3)Tubing will be IPC, 3.5", 9.3#, J-55. Setting depth will be >3650'. (Disposal interval will be 3750' to 5200'.)
- A. (4) A 7" x 3.5" Arrowset I-X nickel coated or stainless-steel packer will be set at >3650'. (Disposal interval will be 3750' to 5200'.)



- B. (1) Disposal zone will be the SWD; San Andres-Glorieta (96127).
- B. (2) Disposal interval will be 3750' to 5200'.
- B. (3) Well will be drilled as a saltwater disposal well.
- B. (4) Well was has not yet been drilled.
- B. (5) No production has been found above the San Andres (2450') within the ½ mile area of review. Grayburg was tested in 30-005-60522, but was P&A without producing from the Grayburg.

Upper San Andres may be productive. BAM has an approved APD (30-005-64337) for a well 100' west in the Round Tank; San Andres (52770). TVD will be 3150'. This will be 600' above the top of the disposal interval.

Two zones (Abo and Wolfcamp) in the area of review produce below the Glorieta.

- IV. This is not an expansion of an existing injection project. It is disposal only.
- V. Exhibit B shows and tabulates 3 existing wells (2 producers + 1 P&A) within a half-mile. Exhibit C shows 72 existing wells (33 oil or gas wells + 39 P & A wells) within a 2-mile radius.

Exhibit D shows and tabulates all leases and lessors (BLM & NMSLO) within a half-mile. Exhibit E shows all leases and lessors (BLM, fee, & NMSLO) within a two-mile radius.

VI. Four wells are, or will be, within a half-mile. Three have, or will, penetrated the San Andres - Glorieta disposal zone (3750' - 5200'). Construction details of the penetrators are in Exhibit F. None of the penetrators are P&A.



- VII. 1. Average injection rate will be ≈4,000 bwpd. Maximum injection rate will be 5,000 bwpd.
 - 2. System will be open and closed.
 - 3. Average injection pressure will be ≈700 psi. Maximum injection pressure will be 750 psi (= 0.2 psi/foot x 3750' (highest perforation)).
 - 4. Compatibility is not expected to be an issue. Only produced water will be reinjected. No problems have been reported from disposing into the closest (24 miles east-southeast) SWD; San Andres Glorieta well (30-025-31110). A minimum of 2,265,043 barrels have been disposed in the last 25 years.
 - Source of the disposal water will initially be San Andres produced water from BAM wells. However, other produced water (e. g, Wolfcamp) could be accepted. Data from the NM Produced Water Quality Database v.2 are in Exhibit G.
 - 5. The proposed disposal zone (lower San Andres Glorieta) has not been found productive within a mile. Closest San Andres producer (30-005-64310) is 4419' northeast. It produces from the upper San Andres. TVD of that San Andres well is 3217' (vs. top of the proposed disposal zone at 3750'). Closest Glorieta producer (30-015-38140) is 5-3/4 miles south-southwest. San Andres and Glorieta water analyses are in Exhibit G.

VIII. San Andres consists of carbonates, anhydrite, and shale. Glorieta is mainly sandstone. Closest possible underground source of drinking water above the proposed disposal interval are the red beds in the top ≈ 225 ' of the well.

State Engineer records (Exhibit H) show no water wells within 4-miles. No water wells within a mile were found during an August 20-21, 2019 field inspection which found no water wells. No underground source of drinking water is below the proposed disposal interval.



Estimated formation tops are:

Red beds = 0'
Yates = 970'
Seven Rivers = 1165'
Queen = 1777'
San Andres = 2450'
disposal interval = 3750' - 5200'
Glorieta = 3942'
TD = 5200'

There will be ≈3525' of vertical separation and multiple layers of anhydrite, salt, and shale between the bottom of the only likely underground water source (red beds) and the top of the San Andres.

- IX. Well will be treated with 20,000 gallons of 15% HCl to clean out scale or fill.
- X. GR/ND/Triple Combo log will be run. CBL log will be run if cement fails to circulate.
- XI. Based on an August 20-21, 2019 field inspection and a review of the State Engineer's records, no water wells are within a one-mile radius. See Exhibit H.
- XII. BAM Permian Operating, LLC is not aware (Exhibit I) of any geologic or engineering data that may indicate the San Andres or Glorieta is in hydrologic connection with any underground sources of water. Anhydrite, salt, and shale strata prevent that. There are 115 active San Andres SWD wells and 12 active Glorieta SWD wells in New Mexico. Closest Quaternary fault is 70 miles southwest (Exhibit I).

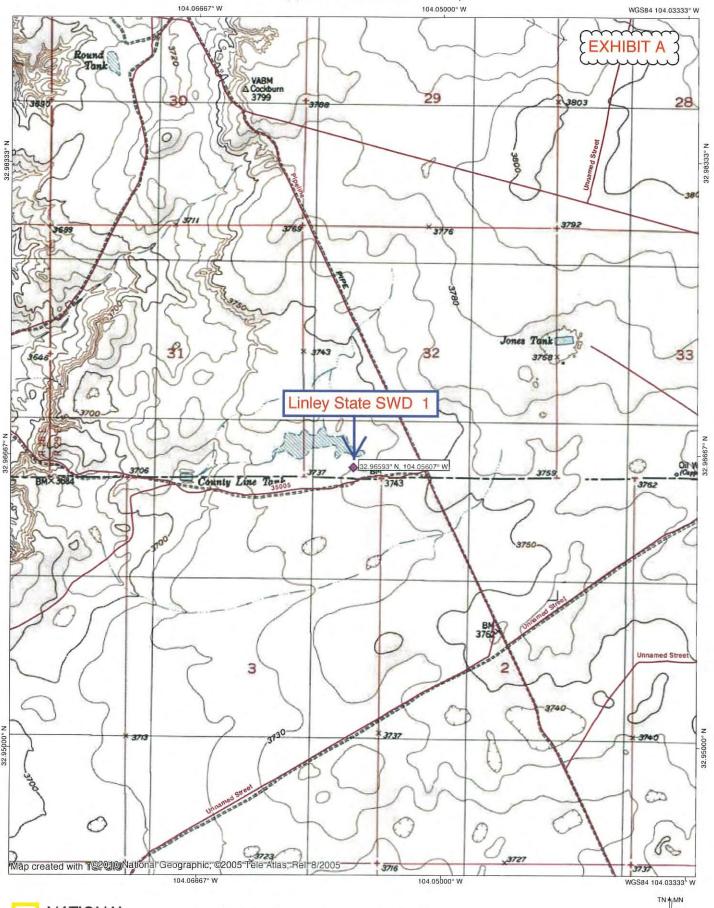


PAGE 5

XIII. A legal ad (see Exhibit J) was published on May 19, 2019 in the Artesia paper and on May 22, 2019 in the Roswell paper. Notice (this application) has been sent (Exhibit K) to the surface owner (NMSLO), government lessors (BLM & NMSLO), government lessees of record (Chalfant, Dakota, EOG, Murchison), operating rights holders (MEC), and well operators regardless of depth (EOG, Mack, Murchison).



TOPO! map printed on 08/16/19 from "Untitled.tpo"





0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 miles 0.0 0.5 1.0 km

7° 08/16/19

DISTRICT | 1625 N. French Dr., Hobbs, N.M. 88240 Phone: (575) 393-6161 Fax: (575) 393-0720

DISTRICT | | 811 S. First St., Artesia, N.M. 88210 Phone: (575) 748-1283 Fax: (575) 748-9720

1000 Rio Brazos Rd., Aztec, N.M. 87410 Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV 1220 S. St. Francis Dr., Santa Fe, N.M. 87505 Phone: (505) 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, N.M. 87505

Form C-102

Revised August 1, 2011

Submit one copy to appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

30-005-	Pool Code 96127	SWD; San Andres	- Glorieta
⁴ Property Code	Property Linley Sta		⁶ Well Number
70GRID No. 328565	Operator BAM Permian O		'Elevation 3742

¹⁰ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	32	15 S	29 E		201	South	999	West	Chaves

11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
Dedicated Acre	3		15 Joint or	Infill 14 Cor	nsolidation Code	¹⁵ Order No.			

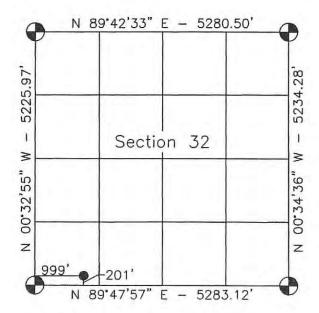
NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

SURFACE LOCATION NAD 83 NMSPC ZONE 3001 Y=715253.7 N

X=626369.8 E LAT.=32.9659321° N LONG.=104.0560794° W

SURFACE LOCATION NAD 27 NMSPC ZONE 3001

Y=715189.6 N X=585190.9 E LAT.=32.9658190° N LONG.=104.0555689° W



Legend:

Surface Location

O = Bottom Hole Location

= Found 1916 USGLO Brass Cap

17 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 organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division

8-16-19

Signature

Brian Wood

Printed Name brian@permitswest.com

E-mail Address

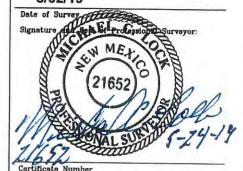
505 466-8120

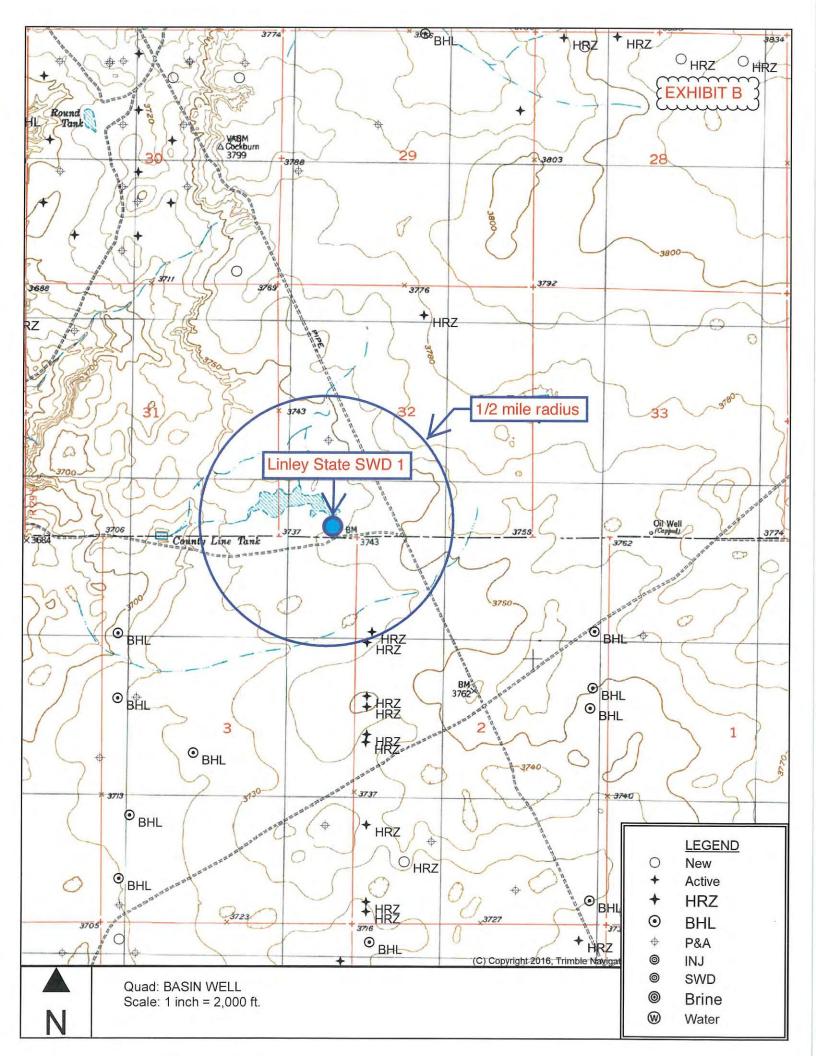
Date

18 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.

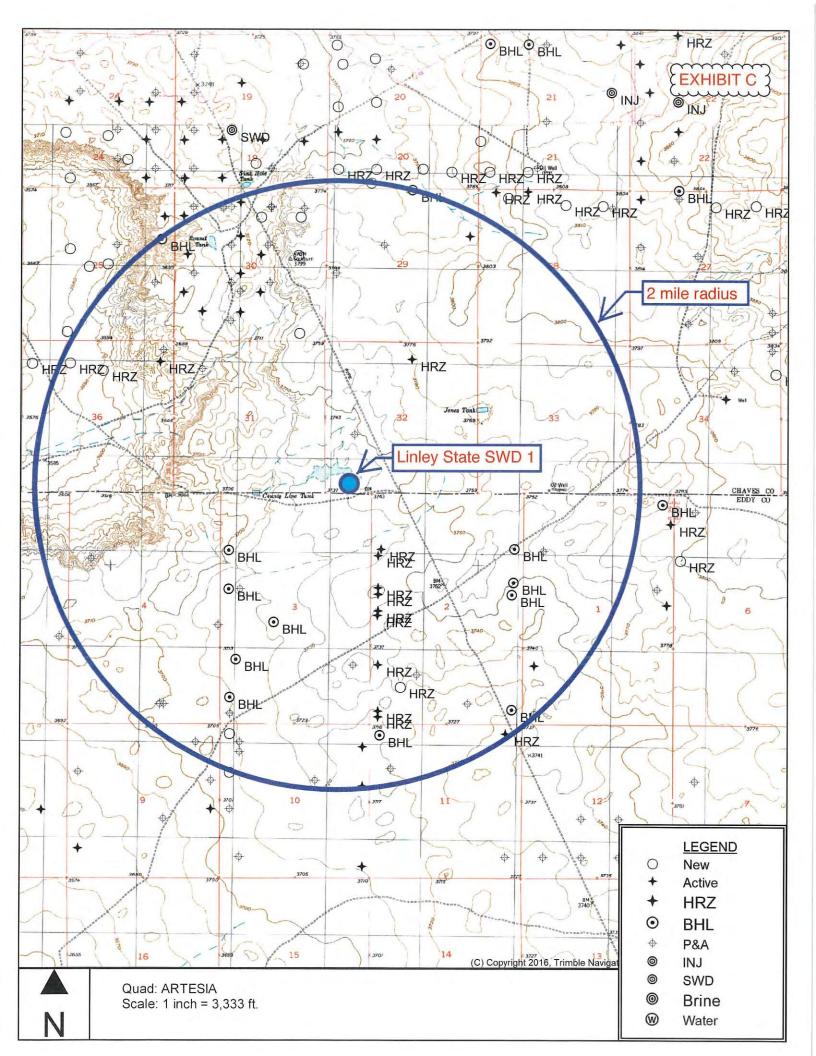
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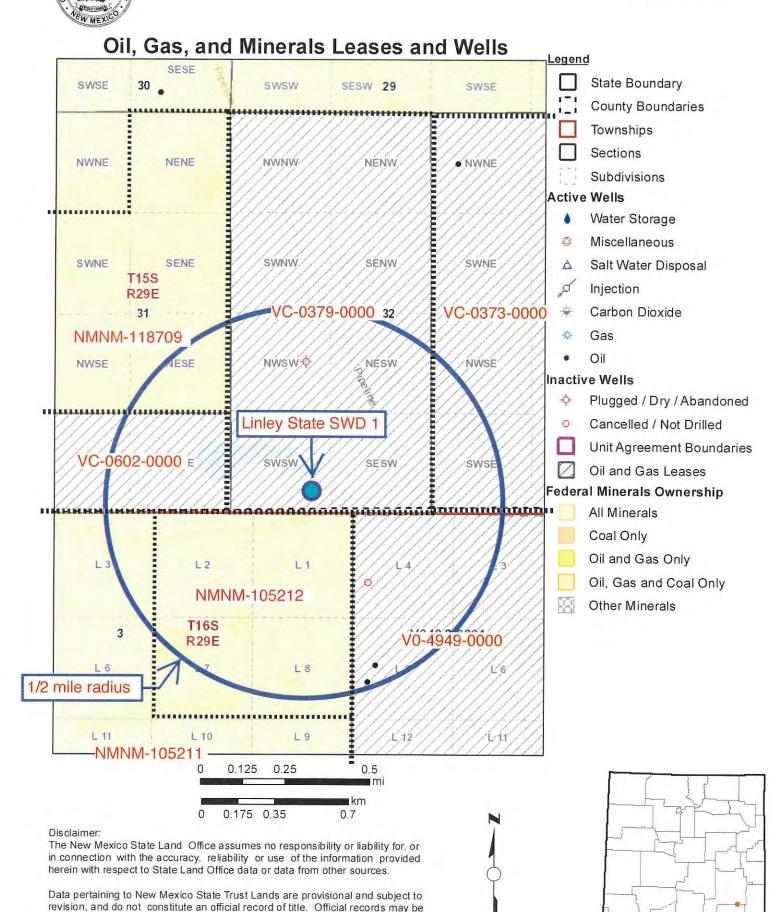


SORTED BY DISTANCE FROM LINLEY STATE SWD 1

API	OPERATOR	WELL	TYPE	UNIT- SECTION	TVD	ZONE @ TD	FEET FROM LINLEY STATE SWD 1
3000564337	вам	Linley State 001H	0	M-32	3150 plan	San Andres	100
3000560522	McClellan	M & M St 001	P&A	L-32	2365	Grayburg	1778
3001538038	Murchison	Pequeno Mike Blu Federal 005H	0	E-2	7108	Wolfcamp	2365
3001538577	EOG Y	Grande Mike AZK State 004H	0	E-2	7249	Wolfcamp	2536
3001538550	EOG Y	Grande Mike AZK State 003H	0	D-2	7251	Wolfcamp	3352



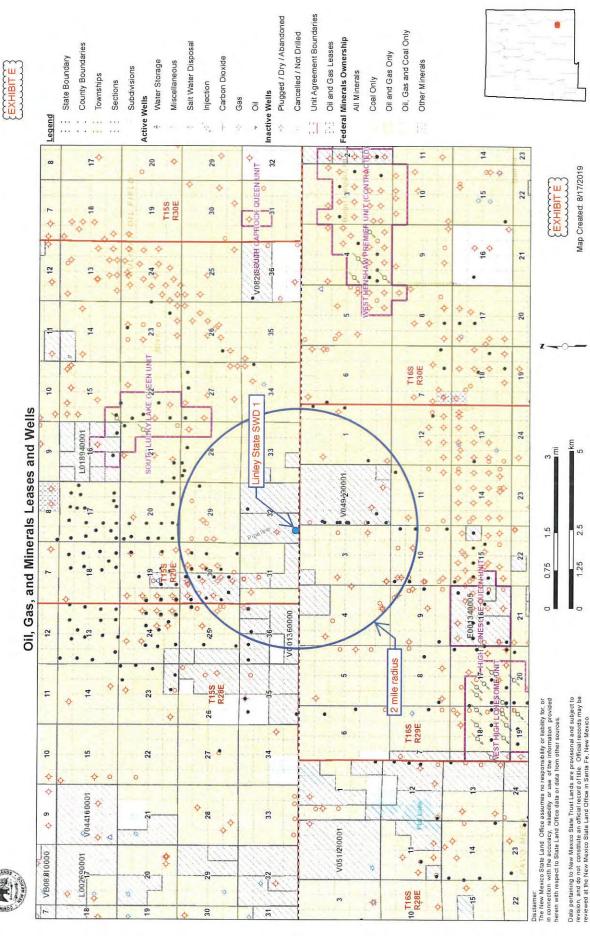




reviewed at the New Mexico State Land Office in Santa Fe, New Mexico.

LINLEY STATE SWD 1 AREA OF REVIEW LEASES

Aliquot Parts in Area of Review	Lessor	Lease	Lessee of Record	Well Operators
T. 15 S., R. 29 E.				
SENE & N2SE4 Sec. 31	BLM	NMNM-118709	EOG & Murchison	none
S2SE4 Sec. 31	NMSLO	VC-0602-0000	Chalfant	none
W2SE4 Sec. 32	NMSLO	VC-0373-0000	Dakota	Mack
S2NW4 & SW4 Sec. 32	NMSLO	VC-0379-0000	Dakota	BAM
T. 16 S., R. 29 E.				
Lots 3-6 Sec. 2	NMSLO	V0-4949-0000	EOG	EOG & Murchison
Lots 1, 2, 7, & 8 Sec. 3	BLM	NMNM-105212	Murchison	Murchison
Lots 3 & 6 Sec. 3	BLM	NMNM-105211	Murchison	Murchison



Map Created: 8/17/2019

1.25

Sorted by distance from Linley State SWD 1

HOW TOC DETERMINED	Circ	Circ or CBL		No report	Circ 302 sx	Circ 159 sx	N/A	Circ	Circ	ď	Calc	
ТОС	Surface	Surface		Surface	Surface	Surface	N/A	Surface	Surface	Surface	909	
CEMENT	480	1345		470 sx	1470 sx	1450 sx	none	26 sx	470 sx	910 sx	570 sx	
SET @	350	7789 MD		430	2605	6483	11893 MD	60	400	2567	11810 MD	
CASING O.D.	13.375	7 & 5.5		13.375	9.625	7	4.5	20	13.375	9.625	5.5	
HOLE 0.D.	17.5	8.75		17.5	12.25	8.75	6.125	26	17.5	12.25	8.5	
WELL	0			0				0				
ZONE @ TD	upper San Andres			Wolfcamp				Wolfcamp				
DVT	3150			7108				7249				
SPUD	not yet			6/10/10				5/20/11				
WELL	Linley State 1H	3000564337	M-32-15S-29E	Pequeno Mike BLU Federal 005H	3001538038	E-2-16S-29E		Grande Mike AZK State 004H	3001538577	D-2-16S-29E		

2002/8 85031 2154 0 614
194570 81552 2809 0 533
201018 70389 8494 10 4954
5197
306495
294815
1920 15 293
52007 1680 0 851
58261 2000 0 1823
97783 1600 0 803
680 0 195
840 0 438
171908
103332 35582 2582 154 1266
17581 4368 1508 6 292
28437 7566 2120 12 537
85662 28112 3474 5 1361
92861 30726 3969 6 1538
93913 30348 3934 6 1544
85154 28192 3484 5 1373
79849 25631 3153 5 1252
90668 28910 3768 12 1476
119043 36363 5777 20 2034

ATTACHMENT C

THE WESTERN COMPANY OF NORTH AMERICA WATER ANALYSIS



ANALYSIS NO: 920203C

GENERAL INFORMATION

OPERATOR: YATES PET, 16s-33e

WELL: EIDSON RANCH UNIT#1 DEPTH: FIELD: EIDSON RANCH UNIT DATE S.

FORMATION: SAN ANDRES

COUNTY: EDDY STATE: NM

EAN ANDRES
EDDY
NM

DATE SAMPLED:

DATE RECEIVED: SUBMITTED BY:

WORKED BY: PHONE: 2-3-92 RAY STALL SHEPHERD

+/-5700

2-3-92

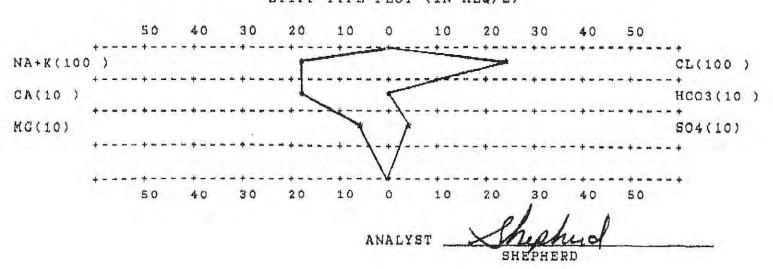
505-392-5556

SAMPLE DESCR: POST TREATMENT ANALYSIS.

PHYSICAL AND CHEMICAL DETERMINATIONS

SPECIFIC GRAVITY: 1.110 AT 69 DEG. F PH = 6.05 IRON: NOT DETERMINED | SULFATE: 2297 PPM FE2+1 +/-3 PPM SODIUM + POTASS: 52837 PPM CHLORIDE; 87368 PPM | BODIOM CHICKIDE (CALC); 144025 MAA 3319 BICARBONATE: CALCIUM: PPM 385 PPM MACNESIUM: ... 635 PPM TOT. HARDNESS AS CACO3: 10911 PPM PHOSPHATE: NOT DETERMINED TOT. DISSOLVED SOLIDS: 153797 PPM RESISTIVITY (CALCULATED): 0.054 OHM/METER @ 75 DEGREES F. REMARKS: NO KCL IN SAMPLE. OIL GRAV. IS 26.8 API CORRECTED TO 60 * F.

STIFF TYPE PLOT (IN MEQ/L)







MILLER CHEMICALS, INC.

Post Office Box 298 Artesia, N.M. 88211-0298 (505) 746-1919 Artesia Office (505) 892-2893 Hobbs Office (506) 746-1918 Fax

WATER ANALYSIS REPORT

Company
Address
Lease
Well
Sample Pt. : WELLHEAD

Date : NOVEMBER 9, 2005 Date Sampled : NOVEMBER 8, 2005

Analysis No. :

1015	· · · · · · · · · · · · · · · · · · ·						
	ANALYSIS			mg/L		* meq/	L,
	~~~~~						_
1.	pH	6.8					
2.	H2S	20					
3.	Specific Gravity	1.130					
4 -	Total Dissolved Sol	ids		197451.2			
5.	Suspended Solids			NR			
6.	Dissolved Oxygen			NR			
7.	Dissolved CO2			NR			
8.	Oil In Water			NR			
9.	Phenolphthalein Alk	alinity IC	aCO31	1161			
10.	Methyl Orange Alkal						
11.	Bicarbonate		HCO3	317.2	нсоз		
12.	Chloride		Cl	117363.0	Cl	5.2	
13.	Sulfate		SO4	3750.0	100	3310.7	
14.	Calcium		Ca		SO4	78.1	
15.	Magnesium			4800.0	Ca	239.5	
16.	Sodium (calculated)		Mg	1460.5	Mg	120.2	
17.	Iron		Na	69758.1	Na	3034.3	
18.	Barium		Fe	2.5			
19.			Ba	NR			
20.	Strontium		Sr	NR			
20.	Total Hardness (CaC	<b>93)</b>		18000.0			

#### PROBABLE MINERAL COMPOSITION

*milli equivalents per Liter	Compound	Equiv w	t X meq/L	- mg/L
240  *Ca < *HCO3   5     />      120  *Mg> *SO4   78       </td <td>Ca (HCO3) 2 CaSO4 CaC12 Mg (HCO3) 2</td> <td>81.0 68.1 55.5 73.2</td> <td>5.2 78.1 756.2</td> <td>421 5315 8669</td>	Ca (HCO3) 2 CaSO4 CaC12 Mg (HCO3) 2	81.0 68.1 55.5 73.2	5.2 78.1 756.2	421 5315 8669
3034  *Na> *Cl   3311  ++ Saturation Values Dist. Water 20 C CaCO3   13 mg/L	Mg\$04 MgCl2 NaHCO3	60.2 47.6 84.0	120.2	5720
CaSO4 * 2H2O 2090 mg/L BaSO4 2.4 mg/L	Na2SO4 NaCl	71.0 58.4	3034.3	177323

REMARKS:

This water analysis is from our Fikes#1, an oil well we plan to convert to SwD.

This water Sample comes from a depth of 2833' - 3609' Glorieta-Yeso





#### MILLER CHEMICALS, INC.

Post Office Box 298 Artesia, N.M. 68211-0298 (505) 746-1919 Artesia Office (506) 392-2898 Hobbs Office (505) 746-1918 Pax

#### SCALE TENDENCY REPORT ----

Company

: UHC PETROLEUM

: NOVEMBER 9, 2005

Address Well

Date Date Sampled : NOVEMBER 8, 2005

Lease

: FIKES : #1

Analysis No. :

Sample Pt. : WELLHEAD Analyst : JOHN D. SMITH

#### STABILITY INDEX CALCULATIONS (Stiff-Davis Method) CaCO3 Scaling Tendency

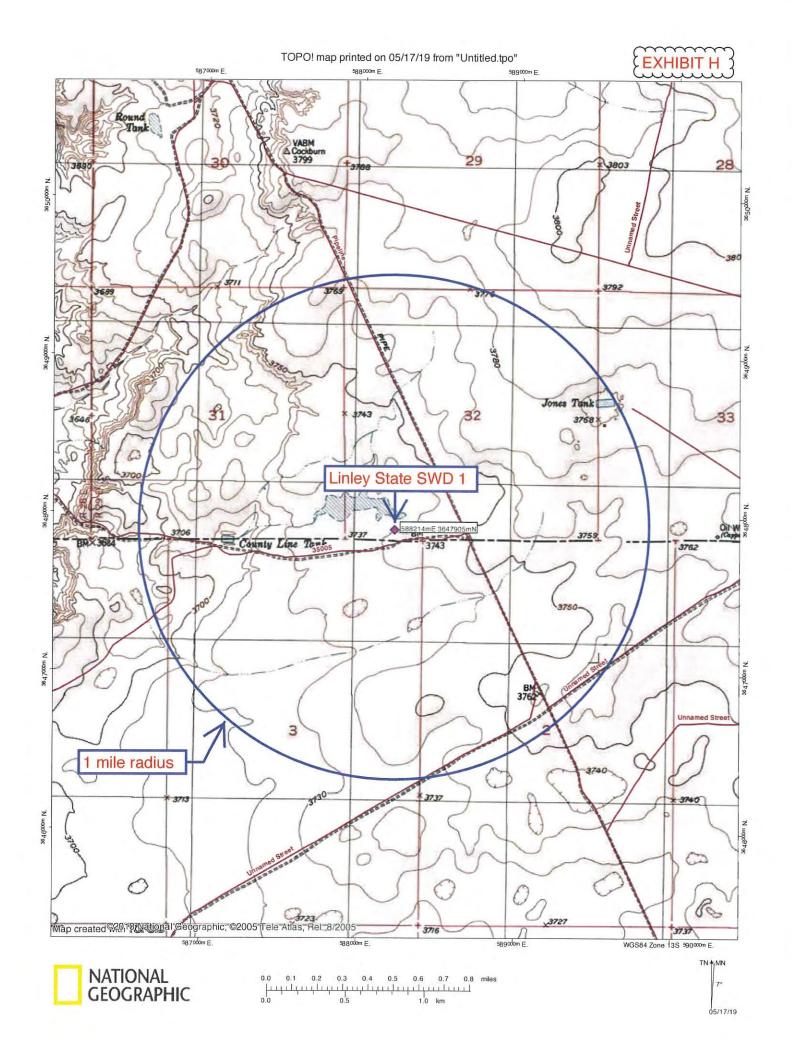
0.8 at 70 deg. F or 21 deg. C S.I. = S.I. -0.8 at 90 deg. F or 32 deg. C S. I. -0.9 at 110 deg. F or 43 deg. C S.I. -0.9 at 130 deg. F or 54 deg. C S.I. = 1.0 at 150 deg. F or 66 deg. C

*************************

#### CALCIUM SULFATE SCALING TENDENCY CALCULATIONS (Skillman-McDonald-Stiff Method) Calcium Sulfate

5 = 3857 at 70 deg. F or 21 deg C 4094 at 90 deg. F or 32 deg C 5 4 4256 at 110 deg. F or 43 deg C 5 = 4321 at 130 deg. F or 54 deg C S = 4327 at 150 deg. F or 66 deg C

> Respectfully submitted, JOHN D. SMITH





## New Mexico Office of the State Engineer

## EXHIBIT H

## Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned,

C=the file is

closed)

(quarters are I=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD

		Sub-		Q	Q	Q								V	Vater	
POD Number	Code	basin	County	64	116	4	Sec	Tws	Rng	X	Y	DistanceDepthWellDepthWater Column				
L 14514 POD1		L	LE	2	2	1	32	15S	36E	595494	3649622	7479	208	77	131	
RA 12428		RA	CH	4	2	1	21	15S	28E	580579	3652317	8818	170	125	45	
RA 09342		RA	ED	4	4	3	19	16S	29E	582737	3640640*	9098	220	110	110	
RA 12429 POD1		RA	CH	1	1	4	32	15S	28E	579093	3648401	9134	62	27	35	

Average Depth to Water:

84 feet

Minimum Depth:

27 feet

Maximum Depth:

125 feet

Record Count: 4

UTMNAD83 Radius Search (in meters):

Easting (X): 588214

Northing (Y): 3647905

**Radius:** 10000

*UTM location was derived from PLSS - see Help

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

5/17/19 9:57 AM

WATER COLUMN/ AVERAGE DEPTH TO WATER





# Seismic Risk Assessment BAM Permian Operating, LLC

Linley State SWD No. 1

Section 32, Township 15 South, Range 29 East Chaves County, New Mexico

Cory Walk

Cory Walk

B.S., M.S.

Geologist

Permits West Inc.

August 21, 2019

#### BAM Permian Operating, LLC Linley State SWD No. 1

#### SEISMIC RISK ASSESSMENT PAGE 1



#### GENERAL INFORMATION

Linley State SWD #1 is located in the SW ¼, section 32, T15S, R29E, about 21 miles northeast of Artesia, NM in the Permian Basin. BAM Permian Operating, LLC proposes the injection zone to be within the Lower San Andres/Glorieta formations through a cased hole from 3,750'-5,200' below ground surface. This report assesses any potential concerns relating to induced seismicity along deep penetrating Precambrian faults or the connection between the injection zone and known underground potable water sources.

#### SEISMIC RISK ASSESSMENT

#### Historical Seismicity

Searching the USGS earthquake catalog resulted in no (0) earthquakes above a magnitude 2.5 within 6 miles (9.7 km) of the proposed disposal site since 1970 (Fig 1). According to this dataset, the nearest historical earthquake occurred in 2003 about 33 miles (~54 km) southwest and had a magnitude of 3.6.

#### Basement Faults and Subsurface Conditions

A structure contour map (Fig. 1) of the Precambrian basement shows the Linley State SWD #1 is approximately 8 miles from the nearest basement-penetrating fault inferred by Ewing (1990) and about 14 miles from the nearest surface fault.

Snee and Zoback (2018) state, "In the western part of Eddy County, New Mexico,  $S_{Hmax}$  is ~north-south (consistent with the state of stress in the Rio Grande Rift; Zoback and Zoback, 1980) but rotates to ~east-northeast-west-southwest in southern Lea County, New Mexico, and the northernmost parts of Culberson and Reeves counties, Texas." Around the Linley State SWD #1 site, Snee and Zoback indicate a  $S_{Hmax}$  direction of N010°E and an  $A_{\phi}$  of 0.57, indicating a normal and strike-slip faulting stress regime.

Induced seismicity is a growing concern of deep SWD wells. Snee and Zoback (2018) show that due to its orientation, the nearest Precambrian fault has a moderate probability of slipping (Fig. 2). However, the proposed injection zone is much shallower in the San Andres and Glorieta formations and therefore would not affect the deep Precambrian faults. The vertical and horizontal separation between the proposed SWD injection zone and any deep Precambrian faults is large enough to infer that there is no immediate concern or potential of induced seismicity as a result from this SWD well.

#### GROUNDWATER SOURCES

Quaternary Alluvium acts as the principal aquifer used for potable ground water near the Linley State SWD #1 location (Hendrickson and Jones, 1952). Nicholson and Clebsch (1961) state, "Potable ground water is not available below the Permian and Triassic unconformity but, because this boundary is not easily defined, the top of the Rustler anhydrite formation is regarded as the effective lower limit of 'potable' ground water." Around the Linley State SWD #1 well, the top of a thick anhydrite unit interpreted to represent the Rustler Formation lies at a depth of ~225 feet bgs.



#### SEISMIC RISK ASSESSMENT PAGE 2



#### STRATIGRAPHY

A thick permeability barrier exists above (Rustler Anhydrite and Salado Fm; 500 ft thick) the targeted San Andres and Glorieta injection zone. Well data indicates ~3,500 ft of rock separating the top of the injection zone from the previously stated lower limit of potable water at the top of the Rustler anhydrite formation.

#### CONCLUDING STATEMENT

All available geologic and engineering data evaluated around the Linley State SWD #1 well show no potential structural or stratigraphic connection between the San Andres/Glorieta injection zone and any subsurface potable water sources. The shallow injection zone and spatial location also removes any major concern of inducing seismic activity along nearby faults.



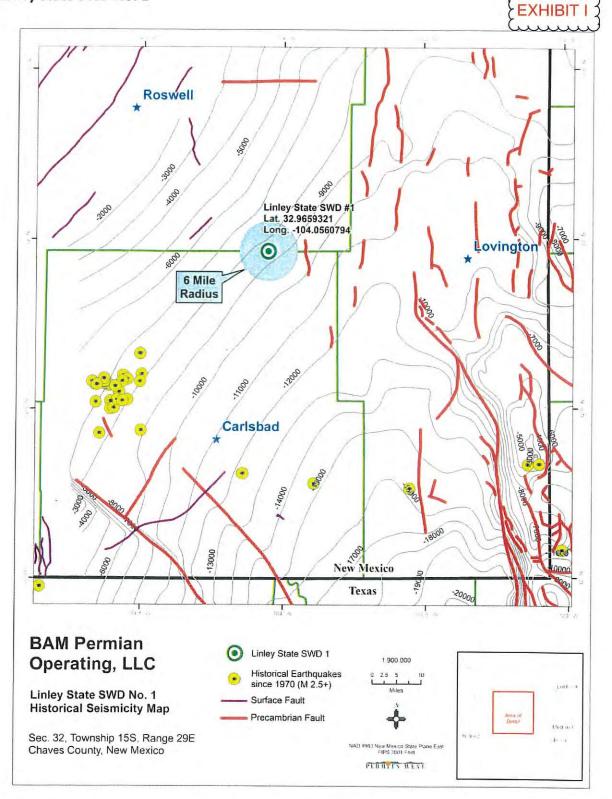


Figure 1. Structural contour map of the Precambrian basement in feet below sea level. Red lines represent the locations of Precambrian basement-penetrating faults (Ewing et al., 1990). The Linley State SWD #1 well lies ~8 miles east of the closest deeply penetrating fault, ~14 miles from the nearest surface fault and ~33 miles from the closest historic earthquake.



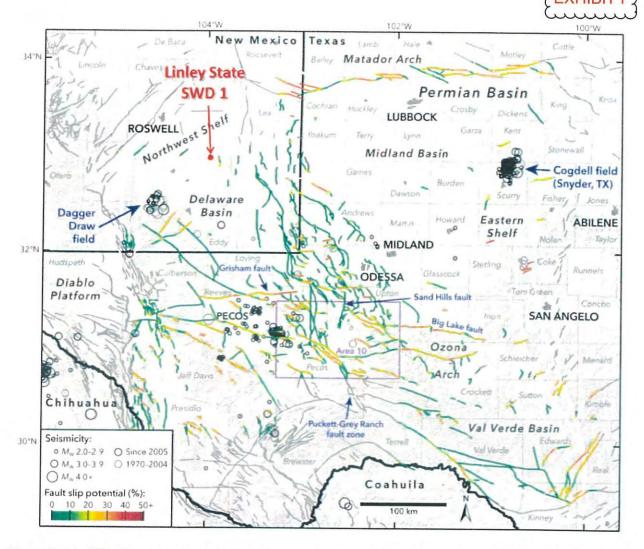


Figure 2. Modified from Snee and Zoback (2018). The nearest deep Precambrian fault lies ~8 miles east of the proposed SWD well and has a moderate probability (~10%) of slip. However, the proposed injection zone is much shallower in the San Andres and Glorieta formations and therefore removes any major concern of inducing seismicity on any known fault.



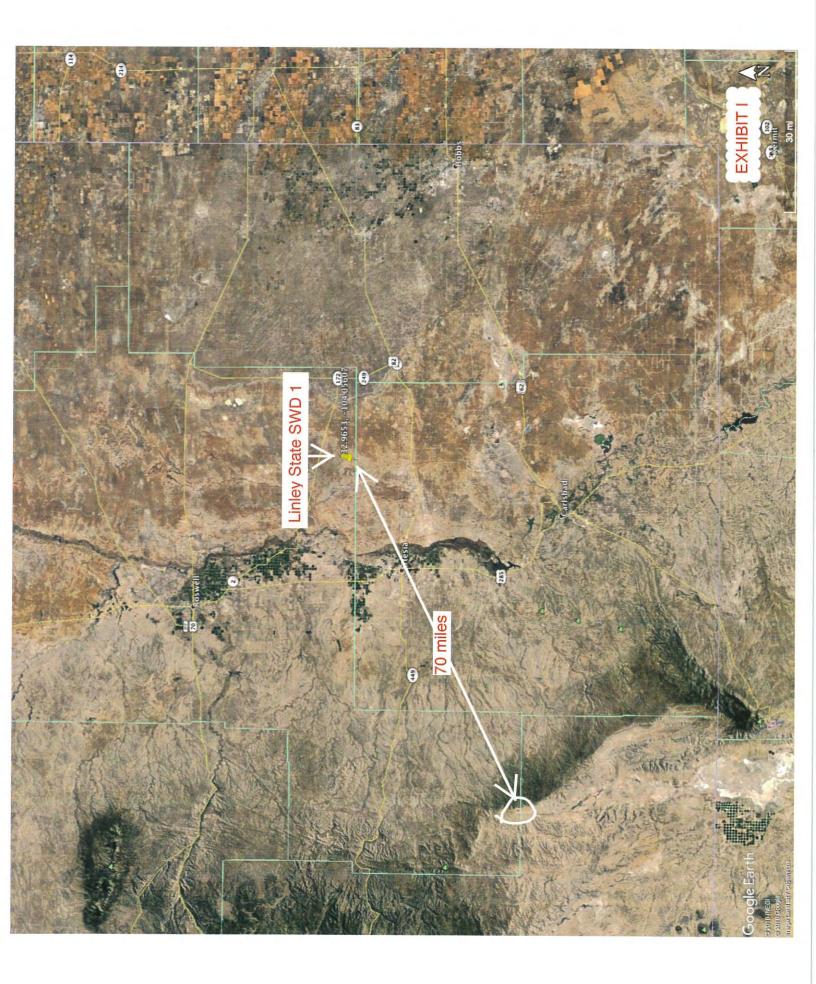
# BAM Permian Operating, LLC Linley State SWD No. 1

#### SEISMIC RISK ASSESSMENT PAGE 5

#### References Cited

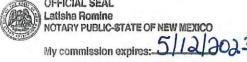


- Ewing, T. E., 1990, The tectonic map of Texas: Austin, Bureau of Economic Geology, The University of Texas at Austin.
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- Hendrickson, G. E., and Jones, R. S., 1952, Geology and Ground-Water Resources of Eddy County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Ground-Water Report 3, 179 pp., 6 plates.
- Nicholson, A., Jr., and Clebsch, A., Jr., 1961, Geology and ground-water conditions in southern Lea County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, Ground-Water Report 6, 123 pp., 2 plates.
- Snee, J.-E.L., Zoback, M.D., 2018, State of stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity: Leading Edge, v. 37, p. 127–134.



### **Affidavit of Publication**

State of New Mexico County of Eddy: Danny Scott/ being duly sworn sayes that he is the Publisher of the Artesia Daily Press, a daily newspaper of General circulation, published in English at Artesia, said county and state, and that the hereto attached Legal Ad was published in a regular and entire issue of the said Artesia Daily Press, a daily newspaper duly qualified for that purpose within the meaning of Chapter 167 of the 1937 Session Laws of the state of New Mexico for Consecutive weeks/day on the same day as follows: First Publication May 19, 2019 Second Publication Third Publication Fourth Publication Fifth Publication Sixth Publication Seventh Publication Subscribed and sworn before me this 21st day of 2019 May OFFICIAL SEAL Latisha Romine



Latista Romine

Latisha Romine

Notary Public, Eddy County, New Mexico

### Copy of Publication:



#### Legal Notice

BAM Permian Operating, LLC will apply to drill the Linley State SWD 1 as a saltwater disposal well. The well will dispose into the lower San Andres and Glorieta formations from 3750' to 5200'. It is staked 11 miles NNW of Loco Hills, NM at 201. FSL & 999 FWL Sec. 32, T. 15 S., R. 29 E., Chaves County, NM. Maximum disposal rate will be 5,000 bwpd. Maximum injection pressure will be 750 psi. Interested parties must file objections or requests for hearing with the NM Oil Conservation Division, 1220 South Saint Francis Dr., Santa Fe, NM 87505 within 15 days. Additional information can be obtained by contacting: Brian Wood, Permits West, Inc., 37 Verano Loop, Santa Fe, NM 87508. Phone number is (505) 466-8120.

Published in the Artesia Daily Press, Artesia, N.M., May 19, 2019 Legal No. 25131.

# AFFIDAVIT OF PUBLICATION STATE OF NEW MEXICO

#### I, Jennifer Martinez Legals Clerk

Of the Roswell Daily Record, a daily newspaper published at Roswell, New Mexico do solemnly swear that the clipping hereto attached was published in the regular and entire issue of said paper and not in a supplement thereof for a period of:

One time with the issue dated

May 22, 2019

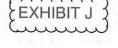
Sworn and subscribed to before me

Clerk

OFFICIAL SEAL
Claudia Martinez
NOTARY PUBLIC - STATE OF NEW MEXICO

this 22nd day of May, 2019

Notary Public



#### Legal Notice...

Publish May 22, 2019

BAM Permian Operating, LLC will apply to drill the Linley State SWD 1 as a saltwater disposal well. The well will dispose into the lower San Andres and Glorieta formations from 3750' to 5200'. It is staked 11 miles NNW of Loco Hills, NM at 201 FSL & 999 FWL Sec. 32, T. 15 S., R. 29 E., Chaves County, NM. Maximum disposal rate will be 5,000 bwpd. Maximum injection pressure will be 750 psi. Interested parties must file objections or requests for hearing with the NM Oil Conservation Division, 1220 South Saint Francis Dr., Santa Fe, NM 87505 within 15 days. Additional information can be obtained by contacting: Brian Wood, Permits West, Inc., 37 Verano Loop, Santa Fe, NM 87508. Phone number is (505) 466-8120.





August 22, 2019

NM State Land Office PO Box 1148 Santa Fe NM 87504

BAM Permian Operating, LLC is applying (see attached application) to drill the Linley State SWD 1 as a saltwater disposal well. As required by NM Oil Conservation Division (NMOCD) rules, I am notifying you of the following proposal. This letter is a notice only. No action is needed unless you have questions or objections.

Well: Linley State SWD 1  $\underline{TD}$  = 5,200' Proposed Disposal Zone: lower San Andres & Glorieta (3,750' – 5,200') Location: 201' FSL & 999' FWL Sec. 32, T. 15 S., R. 29 E., Chaves County, NM Approximate Location:  $\approx$ 11 miles NNW of Loco Hills, NM Applicant Name: BAM Permian Operating, LLC (432) 242-8851 Applicant's Address: 4416 Briarwood Ave. #110 PMB 53, Midland TX 79707

<u>Submittal Information:</u> Application for a saltwater disposal well will be filed with the NMOCD. If you have an objection, or wish to request a hearing, then it must be filed with the NMOCD within 15 days of receipt of this letter. The New Mexico Oil Conservation Division address is 1220 South St. Francis Dr. Santa Fe, NM 87505. Their phone number is (505) 476-3440.

Please call me if you have any questions.

Sincerely,

Brian Wood

