# Initial

# Application Part I

Received 7/14/20

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

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	Page	1 of 43
Revised March 23, 2	2017	

GR6C4-200714-C-	1080			Revised March 23, 2017
RECEIVED: 7/14/20	REVIEWER:	TYPE: SWD	APP NO: pBL2	2020244787
1	NEW MEXICO OIL - Geological & E 220 South St. Francis [	Engineering Bure	<b>I DIVISION</b>	A CONTRACTOR OF
		APPLICATION C	HECKLIST	
	T IS MANDATORY FOR ALL ADMINIS REGULATIONS WHICH REQUIRE PRO			ON RULES AND
pplicant: Strata Production				mber: 21712
ell Name: Sandy Federal	SWD 10		API: 30-015-4	
SWD; Devonian			Pool Code	96101
SUBMIT ACCURATE AN	ID COMPLETE INFORMA	TION REQUIRED TO CATED BELOW	O PROCESS THE T	PE OF APPLICATION
	N: Check those which a cing Unit – Simultaneou NSP(project AREA	s Dedication		SWD-2386
DHC – DHC – WFX	ng – Storage – Measure CTB PLC Disposal – Pressure Incre	]PC OLS ease – Enhanced ]IPI EOR	OLM Oil Recovery	FOR OCD ONLY
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Note: State	ment must be completed by an	individual with manage	erial and/or supervisory	capacity.
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brian@permitswest.com e-mail Address

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Signature

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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 03

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Revised	June	10,	20

	<b>APPLICATION FOR AUTHORIZATION TO INJECT</b>
I.	PURPOSE:      Secondary Recovery       Pressure Maintenance       XXX_Disposal      Storage         Application qualifies for administrative approval?       XXX_Yes      No
II.	OPERATOR: STRATA PRODUCTION COMPANY
	ADDRESS: PO BOX 1030, ROSWELL NM 88202
	CONTACT PARTY: BRIAN WOOD (PERMITS WEST, INC.) PHONE: 505 466-8120
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? XXX Yes No If yes, give the Division order number authorizing the project: <u>SWD-1784</u>
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: Sandy Federal SWD 10
	<ol> <li>Proposed average and maximum daily rate and volume of fluids to be injected;</li> <li>Whether the system is open or closed;</li> <li>30-015-46745</li> <li>SWD; Devonian (96101)</li> </ol>
	<ol> <li>Proposed average and maximum injection pressure;</li> <li>Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,</li> <li>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</li> </ol>
	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: BRIAN WOOD TITLE: CONSULTANT
	SIGNATURE:DATE: JULY 9, 2020
	E-MAIL ADDRESS: Dramepermeese.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:

Side 2

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.

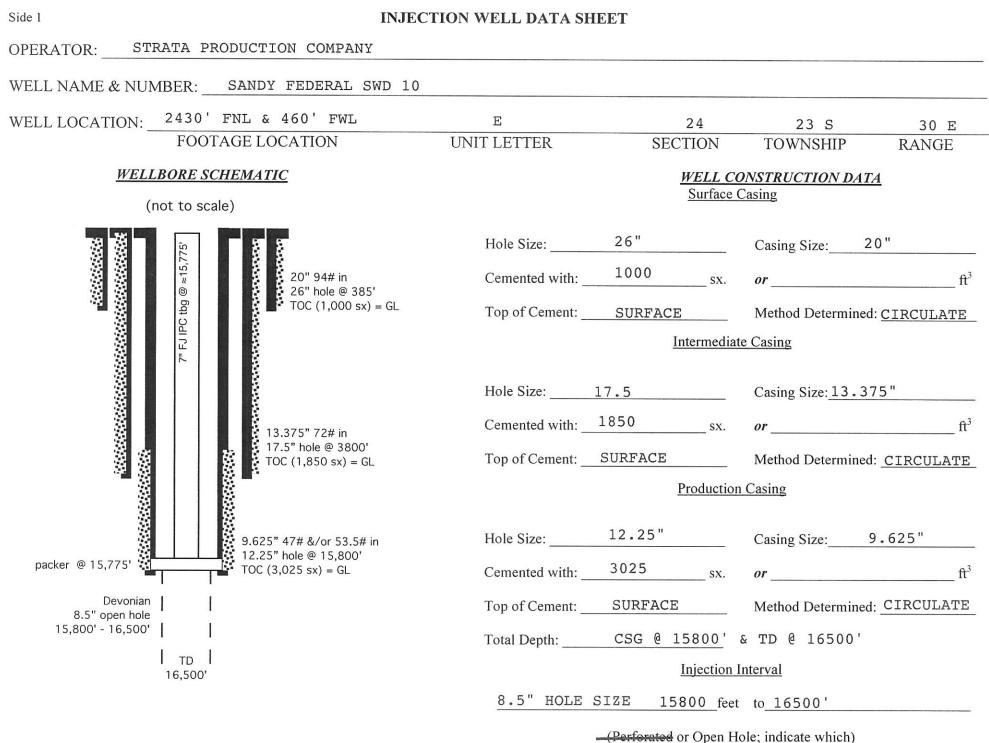
Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (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.



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# **INJECTION WELL DATA SHEET**

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Side 2

Tub	ing Size:7" FJLining Material:IPC										
Тур	e of Packer: CHROME &/OR NICKEL PLATED										
Pac	ker Setting Depth: $\geq 15775'$ (>15700')										
Oth	er Type of Tubing/Casing Seal (if applicable):										
	Additional Data										
1.	Is this a new well drilled for injection? <u>XXX</u> Yes <u>No</u>										
	If no, for what purpose was the well originally drilled?										
2.	Name of the Injection Formation: <u>DEVONIAN</u>										
3.	Name of Field or Pool (if applicable): <u>SWD; DEVONIAN</u> (96101)										
4.	Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. NO										
5.	Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area:										
	OVER: DELAWARE (3868'), BONE SPRING (7738'), WOLFCAMP (11140'),										
	& MORROW (13960')										
	UNDER: NONE										

30-015-46745 AMEND SWD-1784

I. Goal is to drill a 16,500' deep commercial saltwater disposal well. Proposed disposal interval will be 15,800' – 16,500' in the SWD; Devonian (96101). See Exhibit A for map and C-102. Well is on BLM surface and BLM minerals. Amendment will change downhole configuration to allow for increased disposal volume (from 15,000 to 50,000 bwpd).

II. Operator: Strata Production Company [OGRID 21712] Operator phone number: (575) 622-1127 Operator address: P. O. Box 1030, Roswell NM 88202 Contact for Application: Brian Wood (Permits West, Inc.) Phone: (505) 466-8120

- III. A. (1) Lease name: NMNM-114356
   Lease size: 640 acres Lease area: all of Section 24
   Well name and number: Sandy Federal SWD 10
   Location: 2430' FNL & 460' FWL Section 24, T. 23 S., R. 30 E.
  - A. (2) Surface casing (20", 94#, H-40, ST&C) will be set at 385' in a 26" hole and cemented to GL with 1,000 sacks.

Intermediate casing (13.375", 72#, N-80, ST&C)) will be set at 3,800' in a 17.5" hole and cemented to GL with 1,850 sacks.

Production casing (9.625", 47# &/or 53.5#, L-80 &/or P-110, LT&C) will be set at 15,800' in a 12.25" hole and cemented to GL in 2 stages with 3,025 sacks. DV tool will be set at  $\approx$ 11,500'.

An 8.5" open hole will be drilled to 16,500'.

A. (3) Tubing will be IPC, 7", 20# or 23#, L-80 flush joint set at  $\approx$ 15,775'. (Disposal interval will be 15,800' to 16,500'.)



PAGE 1

# STRATA PRODUCTION COMPANY SANDY FEDERAL SWD 10 2430' FNL & 460' FWL SEC. 24, T. 23 S., R. 30 E., EDDY COUNTY, NM

30-015-46745 AMEND SWD-1784

- A. (4) A chrome and/or nickel-plated packer will be set at  $\approx 15,775'$  (or  $\leq 100'$  above the top of the open hole which will be at 15,800').
- B. (1) Disposal zone will be the Devonian (SWD; Devonian (96101)).
- B. (2) Disposal interval will be open hole from 15,800' to 16,500'.
- B. (3) Well has not been drilled. It will be drilled as a saltwater disposal well.
- B. (4) No perforated intervals are in the well.
- B. (5) Productive zones in the area of review and above the Devonian (15,500') are the Delaware (3,868'), Bone Spring (7,738'), Wolfcamp (11,140'), and Morrow (13,960'). No oil or gas zone is below the Devonian in the area of review.
- IV. This is not an expansion of an existing injection project. It is disposal only.

V. Exhibit B shows and tabulates the 11 existing wells within a 1-mile radius. None of the wells are P&A. Deepest of the 11 wells is 14,857' TVD. Exhibit C shows all 83 existing or active wells (78 oil or gas + 1 SWD (Delaware) + 4 water) within a two-mile radius.

Closest active SWD; Devonian well (30-015-4462) is 4.17 miles southeast in N-5-24s-31e. Closest drilled and uncompleted SWD; Devonian well (30-015-46432) is 3.11 miles northeast in K-6-23s-31e. Closest approved but undrilled SWD; Devonian well (30-015-46676) is 2.36 miles northeast in E-17-23s-31e. Closest pending SWD; Devonian well (OWL's Smails SWD 1) is 3.87 miles east in I-21-23s-31e. (C-108 approvals for two SWD; Devonian wells (30-015-44950 (1.16 miles) and 30-015-43801 (1.88 miles) within two miles have expired.)

Exhibit D shows and tabulates all leases (all BLM) within a one-mile radius. Two-mile radius leases are all BLM or NMSLO (Exhibit E).



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30-015-46745 AMEND SWD-1784

VI. No Devonian penetrator is within a mile. Deepest (14,857' TVD) well within a mile bottomed in the Morrow, 688' above the Devonian.

- VII. 1. Average injection rate will be  $\approx$ 40,000 bwpd. Maximum injection rate will be 50,000 bwpd.
  - 2. System will be open and closed. Water will be trucked and piped.
  - Average injection pressure will be ≈2,000 psi. Maximum injection pressure will be 3,160 psi (= 0.2 psi/foot x 15,800' (top of open hole)).
  - 4. Disposal water will be produced water, mainly Delaware and Bone Spring. There are 389 active or new Delaware wells and 249 active or new Bone Spring wells in T. 23 S., R. 24 E. and the adjacent T. 23 S., R. 31 E. The well will take other Permian Basin waters (e. g., Wolfcamp) too. Abstracts from the NM Produced Water Quality Database v.2 for wells in T. 22-24 S., R. 29-31 E. are in Exhibit F. A table of TDS ranges from those wells is below. Two Devonian samples from 30-015-03691 (6-1/4 miles west) found TDS at 56,922 and 64,582. (A DST of the Devonian found "no show oil or water".)

Formation	TDS range (mg/l)
Atoka	65,656 - 202,478
Avalon Lower	116,287 – 247,258
Avalon Middle	120,140 - 239,858
Avalon Upper	154,164 - 190,214
Bone Spring	8,856 - 271,010
Bone Spring 1 <sup>st</sup> Sand	146,425 – 153,751
Bone Spring 2 <sup>nd</sup> Sand	870 (?) – 172,328
Bone Spring 3 <sup>rd</sup> Sand	88,892 - 166,258
Delaware	37,824 - 383,600
Delaware – Brushy Canyon	47,726 - 307,839
Devonian	56,922 - 64,582
Morrow	62,523
Wolfcamp	37,359





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STRATA PRODUCTION COMPANY SANDY FEDERAL SWD 10 2430' FNL & 460' FWL SEC. 24, T. 23 S., R. 30 E., EDDY COUNTY, NM

30-015-46745 AMEND SWD-1784

No compatibility problems have been reported from the closest (4.17 miles southeast in N-5-24s-31e) active Devonian; SWD well. At least 10,220,750 barrels have been disposed in 30-015-44612.

5. Closest Devonian producer is >6 miles distant.

VIII. The Devonian (estimated 1,140' thick) consists of dolomite and limestone. Closest possible underground source of drinking water above the proposed disposal interval are the Quaternary red beds at the surface. According to State Engineer records (Exhibit G), deepest water well within 2 miles is 365' deep and closest water well is 1.16-miles northwest. No underground source of drinking water is below the proposed disposal interval.

Estimated formation tops are:

Quaternary = 0' Rustler = 150' Salado = 470' Base salt = 2290' Delaware = 3868' Bone Spring = 7738' Wolfcamp = 11140' Strawn = 13020' Atoka = 13185' Morrow = 13960' Lower Mississippian = 14900' Woodford base & Devonian top = 15500' disposal interval = 15800' - 16500' TD = 16500' (Montoya = 16640')

According to State Engineer records (Exhibit G), closest water well is 1.16miles northwest. Its depth is 300'. There will be >15,000' of vertical separation including shale, salt, and anhydrite intervals between the bottom of the only likely underground water source (Quaternary red beds) and the top of the Devonian.



# STRATA PRODUCTION COMPANY SANDY FEDERAL SWD 10 2430' FNL & 460' FWL SEC. 24, T. 23 S., R. 30 E., EDDY COUNTY, NM

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30-015-46745 AMEND SWD-1784

IX. Well will be stimulated with acid as needed.

X. CBL, CNL/FDC, CDL, CNL, DS, DIL, DLL, caliper, and mud logs are planned.

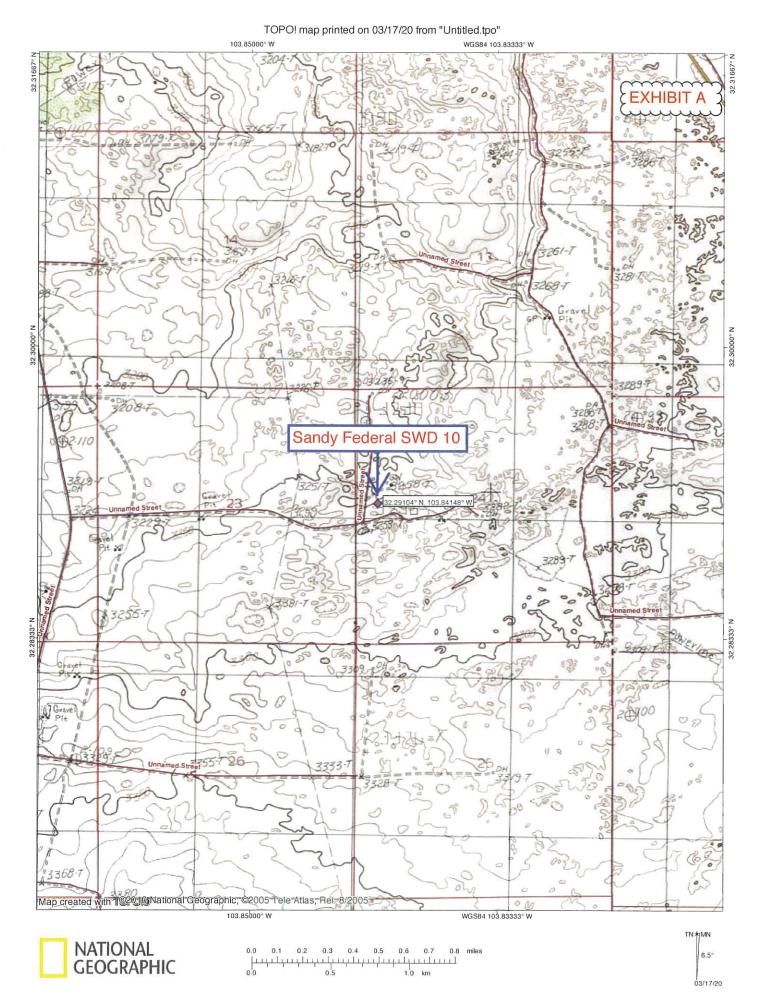
XI. According to State Engineer records (Exhibit G), four water wells are within a 2-mile radius. One (C 02772 POD 1) was found 1.16-mile northwest and sampled (Exhibit G) during a March 30, 2020 field inspection. The other 3 wells were not found. Sandy Federal SWD 10 is 15 miles from the Capitan Reef and 30 miles from the Ogallala.

XII. Strata Production Co. (Exhibit H) is not aware of any geologic or engineering data that may indicate the Devonian is in hydrologic connection with any underground sources of water. Deepest water well within a 2-mile radius is 365'. There are 265 approved Devonian SWD APDs in New Mexico, of which 166 are active. Well is on an approved potash drill island.

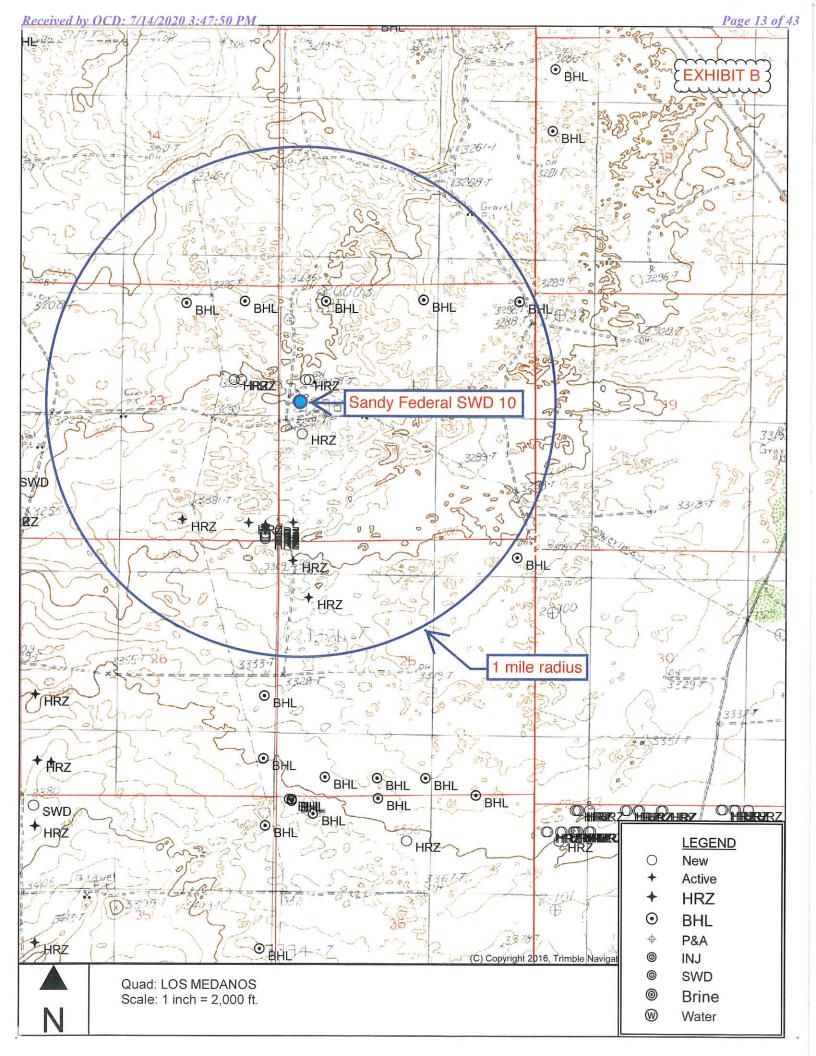
XIII. A legal ad (Exhibit I) was published on April 19, 2020. Notice (Exhibit J) and this application has been sent to the surface owner (BLM), all well operators regardless of depth, potash lessee, government lessors, lessees, and operating right holders within a mile.



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Rio Brazos Road, A e: (505) 334-6178 F					Santa Fe, N				AIA	_	
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<u>60' S</u> . L.				 24     	N: 472408.2 E: FOUND BRAS: N: 472426.7 F: FOUND BRAS: N: 469787.4 G: CALCULATE N: 467146.1 H: FOUND BRAS	S CAP "1942" E: 695526.2 S CAP "1916" E: 698208.3 S CAP "1916" E: 698219.9 ED CORNER E: 698232.1 S CAP "1942"	55" W 2641.87'	E-mail Addres <sup>18</sup> SUJ <i>I hereby</i> <i>plat was</i> <i>made by</i> <i>same is t</i> <b>8-2</b> Date of Su Signature a	s RVEYO certify that plotted from me or unde rue and con 3-18 vey nd Seal of pro-	R CER the well la n field not r my supe rect to the	TIFICATION bocation shown on this es of actual surveys rvision, and that the best of my belief.
<u>60'</u> S.L.			/	 24       	N: 472408.2 E: FOUND BRAS: N: 472426.7 F: FOUND BRAS: N: 469787.4 G: CALCULATE N: 467146.1 H: FOUND BRAS	S CAP "1942" E: 695526.2 S CAP "1916" E: 698208.3 S CAP "1916" E: 698219.9 ED CORNER E: 698232.1 S CAP "1942"	55" W 2641.87'	E-mail Addres IR SUI I hereby plat was made by same is t <b>8 - 23</b> Date of Sui Signature a	s RVEYO certify that plotted from me or unde rue and con 3-18 vey nd Seal of pro-	R CER the well la n field not r my supe rect to the	TIFICATION ocation shown on this es of actual surveys rvision, and that the e best of my belief.

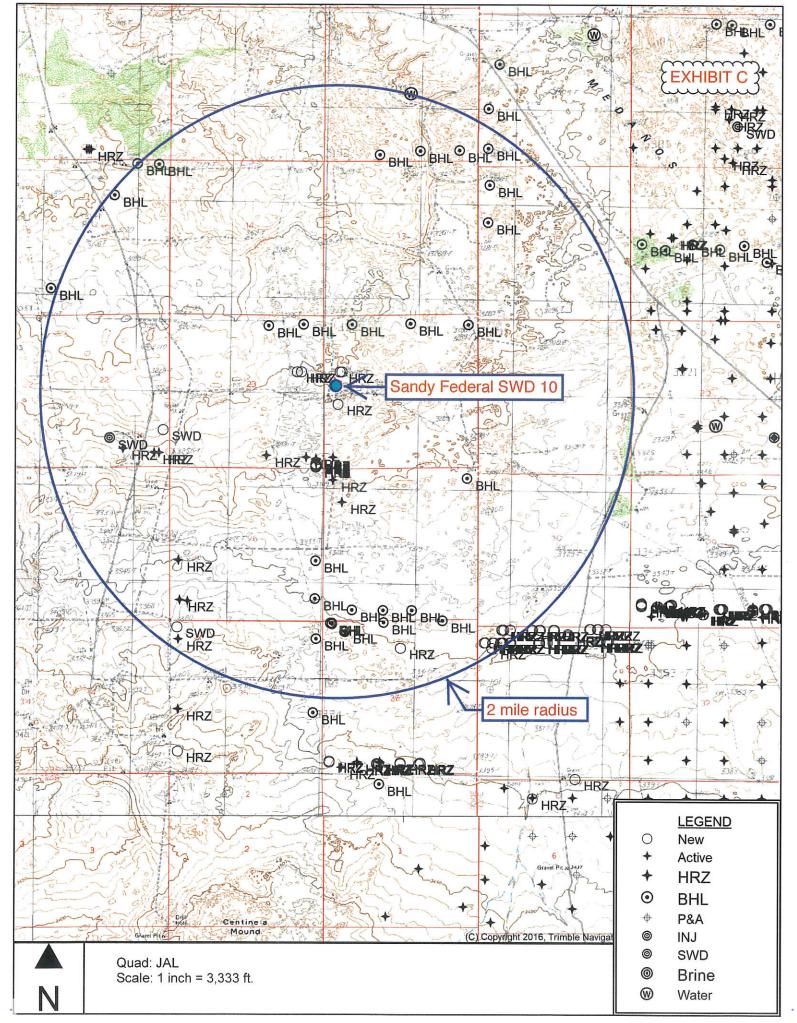


#### SORTED BY DISTANCE FROM SANDY FEDERAL SWD 10

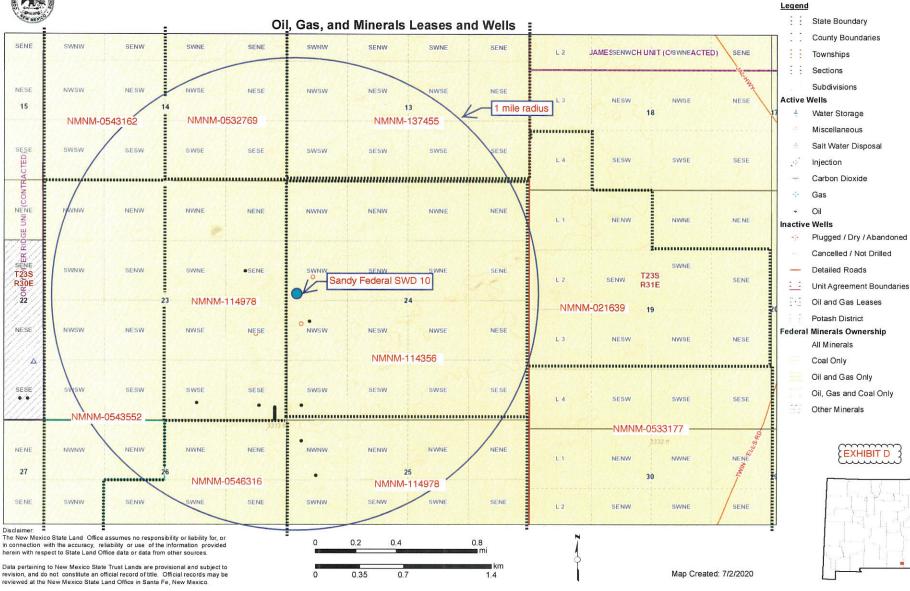
ΑΡΙ	OPERATOR	WELL	STATUS	UNIT- SECTION- T23S-R30E	TVD	ZONE @ TD	FEET FROM SANDY FED'L SWD 10
3001521126	Strata	Sandy Federal 001	0	E-24	14,857	Morrow	493
3001541042	Strata	Sandy Federal 004H	О	L-24	Plan 7712	Delaware	679
3001540055	Strata	Sandy Federal 003	о	M-24	7737	Delaware	2531
3001541426	Cimarex	Sandy Federal 020H	О	P-23	9890	Bone Spring	2667
3001541388	Cimarex	FNR Ridge 25 Federal 001H	0	P-23	9816	Bone Spring	2696
3001541791	Cimarex	Sandy Federal 021H	ο	P-23	9760	Bone Spring	2725
3001540615	Cimarex	FNR Ridge 23 Federal 001H	0	P-23	9924	Bone Spring	2739
3001541792	Cimarex	Sandy Federal 022H	0	P-23	11216	Wolfcamp	2754
3001541793	Cimarex	Sandy Federal 023H	0	P-23	9865	Bone Spring	2783
3001539361	Strata	Roadrunner Federal 001H	0	D-25	7708	Delaware	3320
3001540649	Cimarex	FNR Ridge 23 Federal 002H	О	O-23	9810	Bone Spring	3471
3001541041	Strata	Roadrunner Federal 002H	0	D-25	7700	Delaware	4083

#### Received by OCD: 7/14/2020 3:47:50 PM

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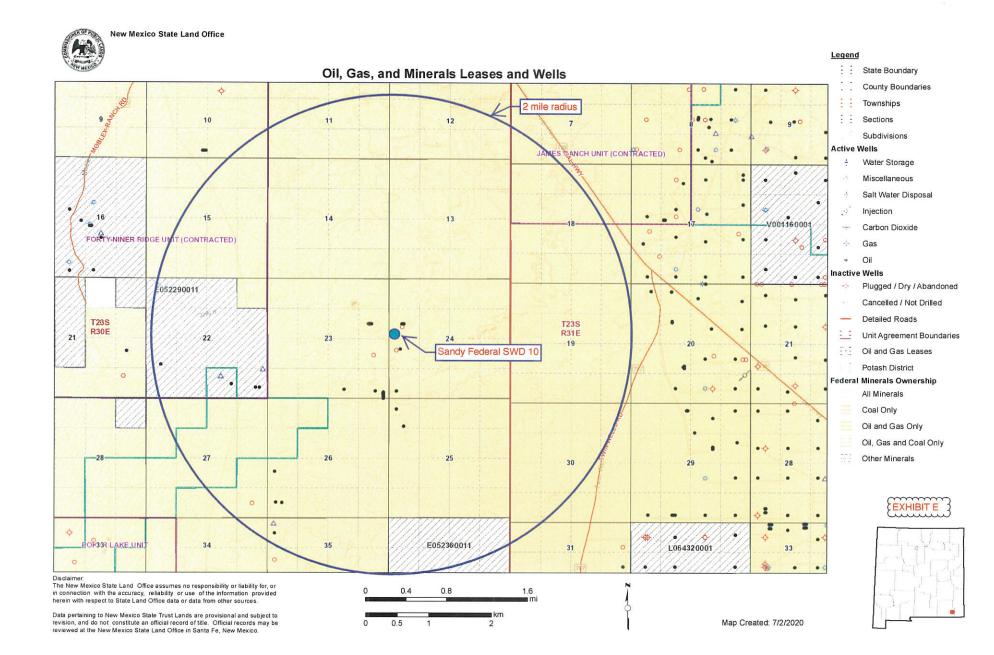






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Aliquot Parts in Area of Review	Lease	Lessee(s) of Record	Well Operators (all shallower	
			than Devonian)	
S2NW4 & S2 13-23s-30e	NMNM-137455	OXY USA	none	
SENE & SE4 14-23s-30e	NMNM-0532769	ConocoPhillips	Strata	
NESW & S2SW4 14-23s-30e	NMNM-0543162	ConocoPhillips	Strata	
E2 23-23s-30e	NMNM-114978	Advance	Cimarex & Strata	
W2 23-23s-30e	NMNM-0543552	ConocoPhillips & OXY USA	none	
		Bane Bigbie, Hutchings Oil,		
all 24-23s-30e	NMNM-114356	Strata, Hat Mesa Oil, Wade	Cimentary & Churche	
all 24-253-50e	101011010-114550	Petroleum, Scott-Winn, &	Cimarex & Strata	
		Scott Investment		
N2N2, S2NW4, & SWNE 25-23s-30e	NMNM-114978	Advance	Cimarex & Strata	
NE4 26-23s-30e	NMNM-0546316	ConocoPhillips & PXP	none	
N2NW4 & SENW 26-23s-30e	NMNM-0543552	ConocoPhillips & OXY USA	none	
Lots 1-3 19-23s-31e	NMNM-021639	ConocoPhillips	Strata	
Lot 4 19-23s-31e	NMNM-0533177	Burlington & ConocoPhillips	none	



API	Section	Township	Range	Formation	TDS	Sodium	Calcium	Iron	Magnesium	Chloride	Sulfate
3001504735	36	22S	30E	Atoka	92746					55500	923
3001504735	36	22S	30E	Atoka	65656					38600	1270
3001504735	36	22S	30E	Atoka	86236					51600	886
3001504735	36	22S	30E	Atoka	96171					57700	953
3001504735	36	225	30E	Atoka	85273					50170	1913
3001520242	26	235	31E	Atoka	202478					126000	540
3001537966	8	235	31E	Avalon Lower	143469	54687	334	67	65	82680	2871
3001538602	25	23S	31E	Avalon Lower	173088	61003	1287	49	310	105600	1522
3001538602	25	23S	31E	Avalon Lower	116287	36578	5331	30	651	71800	5
3001538602	25	23S	31E	Avalon Lower	116671	36578	5331	30	651	71800	607
3001538044	36	23S	31E	Avalon Lower	160367	65356	473	91	171	90224	0
3001538044	36	23S	31E	Avalon Lower	140626	54055	221	97	62	83255	1882
3001537898	34	245	31E	Avalon Lower	247258	65970	15480	31	2650	160100	0
3001537898	34	24S	31E	Avalon Lower	118580	44633	514	57	86	67021	2278
3001538282	17	235	31E	Avalon Middle	239858	71907	16890	202	2757	144378	0
3001538282	17	235	31E	Avalon Middle	177442	60935	5485	17	1045	106633	1624
3001538603	25	235	31E	Avalon Middle	171838	62260	1330	53	304	102800	1636
3001538603	25	235	31E	Avalon Middle	160251	55958	362	26	71	92000	51
3001538603	25	235	31E	Avalon Middle	120527	37521	5432	19	676	74438	745
3001538603	25	235	31E	Avalon Middle	120140	37521	5432	19	676	74438	0
3001538059	16	235	29E	Avalon Upper	154164	54960	798	35	203	92021	0
3001538059	16	235	29E	Avalon Upper	154965	58687	719	54	131	91118	1502
3001537900	11	24S	29E	Avalon Upper	190214	69190	3114	127	501	114114	643
3001537900	11	24S	29E	Avalon Upper	174709	64668	2184	20	358	104800	575
3001503691	24	235	29E	Bone Spring	271010					168800	100
3001528127	3	24S	29E	Bone Spring			2162	0	775	84981	600
3001529396	13	24S	29E	Bone Spring			25552	175	4471	164963	190
3001528638	21	245	29E	Bone Spring	8856	0	601	0	73	62858	0
3001541148	16	235	29E	Bone Spring 1st Sand	152943	54184	1409	16	275	92807	0
3001541149	16	235	29E	Bone Spring 1st Sand	153042	53896	1294	0	273	92918	0

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EXHIBIT F

API	Section	Township	Range	Formation	TDS	Sodium	Calcium	Iron	Magnesium	Chloride	Sulfate
3001541150	16	235	29E	Bone Spring 1st Sand	146425	55118	1445	11	313	84786	0
3001540038	16	235	29E	Bone Spring 1st Sand	153751	57591	1198	10	244	91697	755
3001542552	24	225	30E	Bone Spring 2nd Sand	148232	44055	8174	39	1152	92306	1258
3001542082	36	225	31E	Bone Spring 2nd Sand	146288	44631	7906	46	971	90420	17
3001542655	1	235	31E	Bone Spring 2nd Sand	9847	2752	583	23	190	4275	0
3001542655	1	235	31E	Bone Spring 2nd Sand	146749	47947	7556	41	940	87902	953
3001542896	2	235	31E	Bone Spring 2nd Sand	139843	44495	5640	34	830	85890	1378
3001542897	2	235	31E	Bone Spring 2nd Sand	143382	45080	6739	39	958	87791	1304
3001542073	25	24S	31E	Bone Spring 2nd Sand	140166	43931	7308	42	928	85564	0
3001541847	26	245	31E	Bone Spring 2nd Sand	155992	50515	8323	41	1105	93762	0
3001542071	26	24S	31E	Bone Spring 2nd Sand	151345	46112	8091	79	1023	93688	1053
3001542072	26	245	31E	Bone Spring 2nd Sand	146515	44563	6413	35	814	92435	1024
3001541818	26	245	31E	Bone Spring 2nd Sand	166146	49158	9119	12	1244	103659	1174
3001541818	26	245	31E	Bone Spring 2nd Sand	165956	49158	9119	12	1244	103659	0
3001541818	26	24S	31E	Bone Spring 2nd Sand	136887	41804	7434	31	1017	84467	0
3001541847	26	24S	31E	Bone Spring 2nd Sand	151979	47599	8167	44	1042	92927	0
3001541941	34	24S	31E	Bone Spring 2nd Sand	155271	50208	8326	38	1039	93360	0
3001538434	34	24S	31E	Bone Spring 2nd Sand	172328	49945	10510	73	1478	108043	0
3001538434	34	24S	31E	Bone Spring 2nd Sand	159044	53448	9151	16	1112	92748	0
3001541941	34	24S	31E	Bone Spring 2nd Sand	137890	32365	5547	77	699	97298	0
3001538453	35	24S	31E	Bone Spring 2nd Sand	870	118	100	9	29	326	136
3001538453	35	24S	31E	Bone Spring 2nd Sand	146990	43508	7415	36	1026	92465	0
3001541869	35	24S	31E	Bone Spring 2nd Sand	150530	45890	7803	62	983	93209	0
3001538453	35	24S	31E	Bone Spring 2nd Sand	158457	51199	8178	29	1001	95601	0
3001541537	36	24S	31E	Bone Spring 2nd Sand	148040	43788	7357	28	912	93400	0
3001542551	24	225	30E	Bone Spring 3rd Sand	151327	45205	9096	24	1186	93109	445
3001541395	25	225	30E	Bone Spring 3rd Sand	154038	43567	8393	97	1154	97592	0
3001541116	25	225	30E	Bone Spring 3rd Sand	151564	45241	8478	21	1101	94285	0
3001541116	25	225	30E	Bone Spring 3rd Sand	166258	49061	9529	39	1229	104045	51
3001540828	25	225	30E	Bone Spring 3rd Sand	164913	49952	9292	27	1260	101950	365

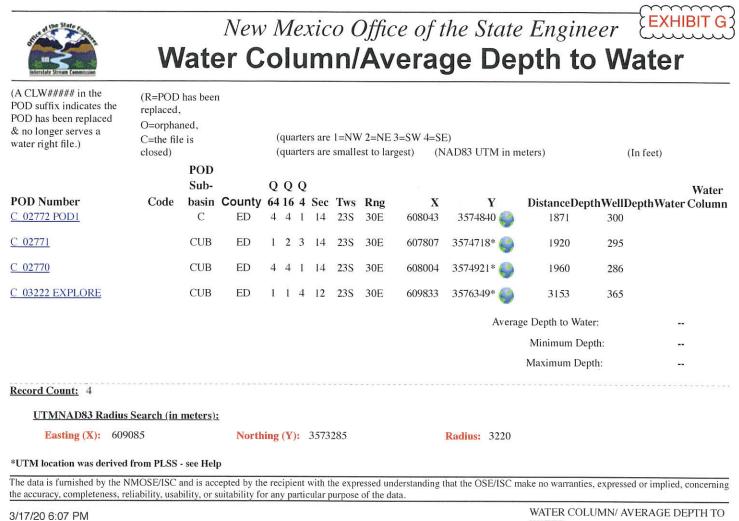
API	Section	Township	Range	Formation	TDS	Sodium	Calcium	Iron	Magnesium	Chloride	Sulfate
3001538612	25	235	31E	Bone Spring 3rd Sand	113141	34009	5050	17	651	71437	661
3001538614	25	23S	31E	Bone Spring 3rd Sand	113319	33921	4990	35	651	71732	671
3001538614	25	235	31E	Bone Spring 3rd Sand	116623	36425	5150	27	628	72300	0
3001538614	25	235	31E	Bone Spring 3rd Sand	93440	30119	3764	24	516	56700	51
3001538614	25	235	31E	Bone Spring 3rd Sand	117104	35709	5359	24	694	73200	0
3001538612	25	235	31E	Bone Spring 3rd Sand	109641	35480	5431	62	672	66019	649
3001538624	26	23S	31E	Bone Spring 3rd Sand	173144	61249	1211	43	290	105600	1603
3001538624	26	235	31E	Bone Spring 3rd Sand	104667	33686	4535	30	603	63457	17
3001538624	26	235	31E	Bone Spring 3rd Sand	113710	33259	4909	0	625	72869	0
3001538624	26	235	31E	Bone Spring 3rd Sand	116691	37415	5610	23	691	71000	3
3001538624	26	235	31E	Bone Spring 3rd Sand	117079	37415	5610	23	691	71000	662
3001538625	27	23S	31E	Bone Spring 3rd Sand	88892	27222	3687	18	528	54500	34
3001538625	27	235	31E	Bone Spring 3rd Sand	128846	40079	5903	22	772	80073	17
3001538625	27	235	31E	Bone Spring 3rd Sand	124604	43455	6328	13	839	71737	3
3001538625	27	235	31E	Bone Spring 3rd Sand	125038	43455	6328	13	839	71737	627
3001542331	36	24S	31E	Bone Spring 3rd Sand	113125	34288	4804	25	608	71447	527
3001542331	36	24S	31E	Bone Spring 3rd Sand	110826	35073	4891	30	619	68330	520
3001542331	36	24S	31E	Bone Spring 3rd Sand	104968	31519	4562	31	587	66479	517
3001542331	36	245	31E	Bone Spring 3rd Sand	108465	33598	4943	26	649	67351	0
3001534221	13	225	30E	Del Brushy Canyon	296137	72385	32869	45	4607	182944	0
3001533730	13	225	30E	Del Brushy Canyon	291789	71158	31205	73	4633	181320	17
3001534219	24	225	30E	Del Brushy Canyon	288569	70486	29573	63	4512	180590	0
3001533616	24	225	30E	Del Brushy Canyon	159702	55321	3355	44	488	97068	0
3001533616	24	225	30E	Del Brushy Canyon	306597	76247	34297	86	5031	187467	17
3001534020	25	225	30E	Del Brushy Canyon	284822	69006	29915	41	4788	177706	2
3001535597	25	225	30E	Del Brushy Canyon	287266	69509	29355	57	4455	180686	0
3001535597	25	225	30E	Del Brushy Canyon	307839	73958	30870	66	4803	194945	34
3001533791	25	225	30E	Del Brushy Canyon	292553	73652	31186	54	4871	179364	17
3001536078	16	235	29E	Del Brushy Canyon	298475	74542	32308	52	4723	182394	3
3001536078	16	235	29E	Del Brushy Canyon	303155	76908	33274	62	4821	183875	0

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API	Section	Township	Range	Formation	TDS	Sodium	Calcium	Iron	Magnesium	Chloride	Sulfate
3001536078	16	235	29E	Del Brushy Canyon	273399	77650	20696	44	3301	168200	454
3001536461	22	235	29E	Del Brushy Canyon	297620	71507	31763	61	4691	186000	0
3001536738	22	235	29E	Del Brushy Canyon	288731	69567	31996	59	4781	179021	0
3001535073	22	235	29E	Del Brushy Canyon	108093	72995	26487	284	4547		
3001536461	22	235	29E	Del Brushy Canyon	302545	72865	32249	56	4837	188800	0
3001536738	22	235	29E	Del Brushy Canyon	294876	71940	32645	53	4970	181883	0
3001536461	22	235	29E	Del Brushy Canyon	292358	68893	31112	55	4509	184250	0
3001536738	22	235	29E	Del Brushy Canyon	292239	69172	31472	52	4557	183597	0
3001535073	22	23S	29E	Del Brushy Canyon	303550	80233	27451	49	4197	187467	331
3001537371	22	235	29E	Del Brushy Canyon	279275	78992	21728	25	3407	172189	177
3001540826	31	235	29E	Del Brushy Canyon	297841	79092	29745	70	4417	180802	0
3001540827	31	235	29E	Del Brushy Canyon	295110	76800	28512	60	. 4245	181795	0
3001541963	31	235	29E	Del Brushy Canyon	296788	80278	29889	65	4475	178388	0
3001535761	5	235	31E	Del Brushy Canyon	279914	73775	25103	48	3894	173724	17
3001535850	5	23S	31E	Del Brushy Canyon	281807	68738	25491	48	4054	180260	0
3001535892	5	23S	31E	Del Brushy Canyon	278202	70390	25192	50	3952	175284	17
3001537172	8	235	31E	Del Brushy Canyon	284845	73935	25240	51	3883	177832	0
3001537172	8	235	31E	Del Brushy Canyon	295783	85514	21355	98	3309	181309	623
3001534756	9	235	31E	Del Brushy Canyon	292449	80357	25580	59	4081	178739	0
3001536370	9	235	31E	Del Brushy Canyon	285733	83635	19665	37	3323	175730	347
3001536377	9	235	31E	Del Brushy Canyon	275813	73464	24062	38	4064	170397	337
3001536427	10	235	31E	Del Brushy Canyon	291342	81652	22711	51	3768	179799	34
3001535797	1	24S	30E	Del Brushy Canyon	301647	79806	30139	61	4345	183201	0
3001505853	24	24S	31E	Del Brushy Canyon	47726						
3001505853	24	24S	31E	Del Brushy Canyon	256580					158000	200
3001536406	25	245	31E	Del Brushy Canyon	237390	65944	14075	30	2449	152100	0
3001541385	25	24S	31E	Del Brushy Canyon	153793	46159	7627	36	974	96666	0
3001541385	25	24S	31E	Del Brushy Canyon	153975	46159	7627	36	974	96666	957
3001537447	26	24S	31E	Del Brushy Canyon	252483	78339	16486	53	2759	152004	0
3001537362	26	24S	31E	Del Brushy Canyon	249721	67582	16125	53	2772	160300	0

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API	Section	Township	Range	Formation	TDS	Sodium	Calcium	Iron	Magnesium	Chloride	Sulfate
3001537404	26	24S	31E	Del Brushy Canyon	250901	68763	16368	52	2801	159903	0
3001537409	26	24S	31E	Del Brushy Canyon	251843	65729	17262	39	2855	162900	0
3001537410	34	24S	31E	Del Brushy Canyon	258924	74706	17976	103	2991	160043	0
3001537410	34	24S	31E	Del Brushy Canyon	268137	79525	19508	123	3262	161607	0
3001538536	34	24S	31E	Del Brushy Canyon	246405	64243	14216	89	2449	162500	0
3001538607	35	24S	31E	Del Brushy Canyon	250735	73645	16781	51	2758	154666	0
3001538609	35	24S	31E	Del Brushy Canyon	258919	76041	19025	83	3088	157593	0
3001538609	35	24S	31E	Del Brushy Canyon	241871	75744	16098	4	2638	144614	188
3001538557	35	24S	31E	Del Brushy Canyon	235619	66963	13881	34	2456	149500	0
3001537926	36	24S	31E	Del Brushy Canyon	207903	58740	11192	30	1958	133413	0
3001539517	36	24S	31E	Del Brushy Canyon	228183	69638	13190	26	2376	140293	0
3001531604	2	225	31E	Delaware			24802	68	3761	164963	205
3001531606	2	225	31E	Delaware			20986	330	3472	166962	120
3001526875	2	225	31E	Delaware	295345		35471	40	5349	184958	200
3001526876	2	225	31E	Delaware	301948		30260	19	5956	188957	100
3001526591	16	235	31E	Delaware			10960	3	833	109108	125
3001505847	34	235	31E	Delaware	383600						
3001527276	3	24S	31E	Delaware	293782		17720	38	1081	180198	25
3001527244	6	24S	31E	Delaware			0	0	0	148966	8
3001527248	6	24S	31E	Delaware			22035	0	3645	189957	7
3001505853	24	24S	31E	Delaware	133002					82400	500
3001505853	24	24S	31E	Delaware	37824					13300	10000
3001510859	28	24S	31E	Delaware	120326					73100	470
3001503691	24	235	29E	Devonian	64582					37500	1700
3001503691	24	235	29E	Devonian	56922					29000	4980
3001522553	17	235	29E	Morrow	62523					37600	810
3001542895	2	235	31E	Wolfcamp	119472	37359	5659	22	746	73173	1036



WATER COLUMN/ AVERAGE DEPTH TO WATER

Analytical ReEXHIBIT G Lab Order 2004043

Date Reported: 4/14/2020

# Hall Environmental Analysis Laboratory, Inc.

CLIENT: Project:	Permits West Sandy		Client Sample ID: Sandy									
3	2004043-001	Collection Date: 3/31/2020 1:20:00 PM           Matrix: AQUEOUS         Received Date: 4/1/2020 10:08:00 AM										
Analyses		R	esult	RL	Qual	Units	DF	Date Analyzed	Batch			
EPA MET	HOD 1664B							Analyst	KMN			
N-Hexane NOTES:	e Extractable Material		ND	9.67	Ρ	mg/L	1	4/7/2020 5:56:00 PM	51615			
Sample not	properly preserved; analyst	added acid to reduce	e pH to <2.0.									
EPA MET	HOD 300.0: ANIONS							Analyst	CJS			
Chloride			610	25	*	mg/L	50	4/3/2020 9:14:27 PM	R67842			
SM2540C	MOD: TOTAL DISSOLV	ED SOLIDS						Analyst	KS			
Total Diss	olved Solids		4130	20.0	*	mg/L	1	4/9/2020 12:56:00 PM	51608			

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

- Value exceeds Maximum Contaminant Level.
   D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range RL Reporting Limit

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# QC SUMMARY REPORT Hall Environmental Analysis Laboratory, Inc.

Client: Project:	Permits Sandy	West									
Sample ID:	MB-51615	SampT	ype: MI	BLK	Tes	tCode: E	PA Method	1664B			
Client ID:	PBW	Batch	n ID: 51	615	F	RunNo: 6	7919				
Prep Date:	4/7/2020	Analysis D	)ate: 4/	7/2020	S	SeqNo: 2	346886	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Hexane Extra	actable Material	ND	10.0								
Sample ID:	LCS-51615	SampT	ype: LC	s	Tes	tCode: El	PA Method	1664B			
Client ID:	LCSW	Batch	n ID: 51	615	F	RunNo: 6	7919				
Prep Date:	4/7/2020	Analysis D	ate: 4/	7/2020	S	SeqNo: 2	346887	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Hexane Extra	actable Material	35.6	10.0	40.00	0	89.0	78	114			
Sample ID:	2LCS-51615	SampT	ype: LC	S	Tes	tCode: El	PA Method	1664B			
Client ID:	LCSW	Batch	ID: 510	615	R	unNo: 6	7919				
Prep Date:	4/7/2020	Analysis D	ate: 4/	7/2020	S	eqNo: 2	346902	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Hexane Extra	ctable Material	35.0	10.0	40.00	0	87.5	78	114			

Qualifiers:

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Limit

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EXHIBIT G: WO#: 2004043

14-Apr-20

4.6

0.50

5.000

Client: Project:	Permits West Sandy
Sample ID: MB	SampType: mblk TestCode: EPA Method 300.0: Anions
Client ID: PBW	Batch ID: R67842 RunNo: 67842
Prep Date:	Analysis Date: 4/3/2020 SeqNo: 2343290 Units: mg/L
Analyte	Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Chloride	ND 0.50
Sample ID: LCS	SampType: Ics TestCode: EPA Method 300.0: Anions
Client ID: LCSW	Batch ID: R67842 RunNo: 67842
Prep Date:	Analysis Date: 4/3/2020 SeqNo: 2343292 Units: mg/L
Analyte	Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual

0

92.5

90

110

#### Qualifiers:

Chloride

- Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- В Analyte detected in the associated Method Blank E
- Value above quantitation range J
- Analyte detected below quantitation limits P Sample pH Not In Range
- RL Reporting Limit

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EXHIBIT WO#: 2004043

14-Apr-20

G

# **QC SUMMARY REPORT** Hall Environmental Analysis Laboratory, Inc.

Client:	Permits	West									
Project:	Sandy										
Sample ID:	MB-51608	SampTy	pe: ME	BLK	Tes	tCode: S	M2540C M0	DD: Total Diss	olved So	lids	
Client ID:	PBW	Batch	ID: 51	608	F	RunNo: 6	7982				
Prep Date:	4/7/2020	Analysis Da	ite: 4/	9/2020	5	SeqNo: 2	349459	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	Solids	ND	20.0								
Sample ID:	LCS-51608	SampTy	pe: LC	S	Tes	tCode: SI	M2540C MC	DD: Total Diss	olved So	lids	
Client ID:	LCSW	Batch	ID: 51	608	F	anNo: 6	7982				
Prep Date:	4/7/2020	Analysis Da	te: 4/	9/2020	S	eqNo: 2	349460	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	Solids	1010	20.0	1000	0	101	80	120			

Qualifiers:

- \* Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix

- В Analyte detected in the associated Method Blank
- Е Value above quantitation range J
- Analyte detected below quantitation limits Sample pH Not In Range Р
- RL Reporting Limit

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EXHIBIT G WO#: 2004043

14-Apr-20



PERMITS WEST PROVIDING PERMITS for LAND USERS 37 Verano Loop, Santa Fe, New Mexico 87508 505-466-8120

NM Oil Conservation Division 1220 S. St. Francis Dr. Santa Fe, NM 8705 July 7, 2020

Re: Hydrology Statement Strata Production Company Sandy Federal SWD No. 10 Section 24, T. 23S, R. 30E Eddy County, New Mexico

To whom it may concern:

Publicly available geologic and engineering data related to the proposed well have been thoroughly reviewed, and no evidence for open faults or any other hydrologic connection between the proposed Devonian-Silurian injection zone and any underground sources of drinking water has been found. Please see the attached seismic risk assessment for additional information.

Sincerely,

low Walk

Cory Walk Geologist



Seismic Risk Assessment **Strata Production Company** Sandy Federal SWD No. 10 Section 24, Township 23 South, Range 30 East Eddy County, New Mexico

Cory Walk

B.S., M.S.

Geologist

Permits West Inc.

July 9, 2020



#### **GENERAL INFORMATION**

Sandy Federal SWD No. 10 is located in the NW 1/4, section 24, T23S, R30E, about 15 miles east of Loving, NM in the Permian Basin. Strata Production Company proposes the injection zone to be within the Devonian Formation through an open hole from 15,800'-16,500' 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 one (1) earthquake above a magnitude 2.5 within 6 miles (9.7 km) of the proposed deep disposal site since 1970 (Fig. 1). The nearest earthquake occurred on March 18, 2012 about 3.04 miles (~4.89 km) west of the proposed SWD site and had a magnitude of 3.1.

#### **Basement Faults and Subsurface Conditions**

A structure contour map (Fig. 1) of the Precambrian basement shows the Sandy Federal SWD #10 is approximately 18.7 miles (30.1 km) from the nearest basement-penetrating fault inferred by Ewing et al (1990). A fault is presumed to exist at the location of the nearby earthquake that occurred in 2012. However, analysis of publicly available well data gave no insights as to the orientation of the fault since there is a lack of nearby deep wells. Without any knowledge of the orientation, dip, and depth of the fault it is difficult to accurately model the fault slip potential on that fault. **Information about known nearby faults based on GIS data from Ruppel et al. (2009) is listed in Table 1**.

Snee and Zoback (2018) state, "In the western part of Eddy County, New Mexico,  $S_{Hmax}$  is ~northsouth (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 Sandy Federal SWD site, Snee and Zoback indicate a  $S_{Hmax}$  direction of N075°E and an  $A_{\phi}$  of 0.60, indicating an extensional (normal) stress regime.

Induced seismicity is a growing concern of deep SWD wells. Relatively new software developed by the Stanford Center for Induced and Triggered Seismicity allows for the probabilistic screening of deeply penetrating faults near the proposed injection zone (Walsh et al., 2016; Walsh et al., 2017). This software uses parameters such as stress orientations, fault strike/dip, injection rates, fault friction coefficients, etc. to estimate the potential for fault slip. Using the best available data as input parameters (Table 2), the Fault Slip Potential (FSP) models suggest a zero (0.00) percent chance of slip on nearby faults, inferred by Frenzel et al (1988) and Ewing et al. (1990), through the year 2040 (Fig. 2; Table 1). **This model also suggests a pore pressure increase of 1.2 psi on the nearest publicly known fault (Fault 13; Fig. 3; Table 1) by the year 2042.** Geomechanical modeling shows that the primary fault of concern (fault 13) would need a pressure increase of 5798 psi to reach a 100% probability of slip on the fault. Even a 50% probability requires an increase of 1349 psi which is far greater than the modeled increase of 9.4 psi (Fig. 3).



#### **GROUNDWATER SOURCES**

Quaternary Alluvium acts as the principal aquifer used for potable ground water near the Sandy Federal SWD #10 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 proposed SWD, the top of the Rustler Formation lies at a depth of approximately 150 feet bgs.

### VERTICAL MIGRATION OF FLUIDS

Thick permeability barriers exist above (Woodford shale; 130 ft thick) and below (Simpson Group; 450 ft thick) the targeted Devonian injection zone (Plate 2, Comer et al., 1991; Fig. 8, Frenzel et al., 1988). Well data indicates approximately 15,650 ft of rock separating the top of the Devonian from the previously stated lower limit of potable water at the top of the Rustler anhydrite formation. The stratigraphy suggests that the Woodford Shale and Simpson Group are adequate confining barriers that would prevent the vertical migration of injected fluids.

#### CONCLUDING STATEMENT

After examination of publically available geologic and engineering data, there is no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.

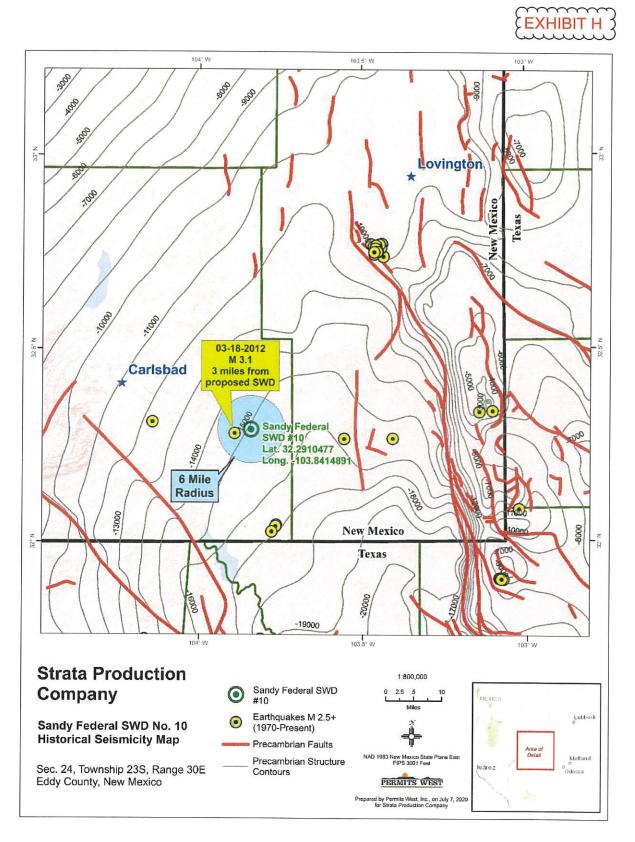


Figure 1. Structural contour map of the Precambrian basement in feet below sea level. Red lines represent the locations of Precambrian basement-penetrating faults (Ewing et al., 1990). Sandy Federal SWD #10 well lies  $\sim$ 18.7 miles west of the closest deeply penetrating fault and  $\sim$ 3 miles east from the closest historic earthquake.

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	Table 1: Ne	arby Basemer	nt Fault Inic	ormation	
ID g	Distance from proposed SWD (mi)	Strike (°)	Dip (°)	FSP	Pore Pressure change after 20 years (psi)
Fault 13	18.7	181	50-90	0.00	1.15
Fault 12	19.3	171	50-90	0.00	0.91
Fault 3	20.4	137	50-90	0.00	0.49

# **Table 1: Nearby Basement Fault Information**

Table 2: Fault Slip Potential model input parameters						
Faults	Value	Notes				
Friction Coefficient	0.58	Ikari et al. (2011)				
Dip Angle (deg)	70	Snee and Zoback (2018)				
Stress						
Vertical stress gradient (psi/ft)	1.1	Hurd and Zoback (2012)				
Max Horizontal Stress Direction (deg)	75	Snee and Zoback (2018)				
Depth for calculations (ft)	16000	Proposed injection zone				
Initial Reservoir Pressure Gradient (psi/ft)	0.7	calculated from mud wt (ppg) used in drilling at these depth				
A Phi Parameter	0.60	Snee and Zoback (2018)				
Reference Friction Coefficient	0.58	Ikari et al. (2011)				
Hydrology						
Aquifer thickness (ft)	700	Proposed injection zone				
Porosity (%)	6					
Permeability (mD)	150					
Injection Rate (bbl/day)	50000	Maximum proposed injection rate				

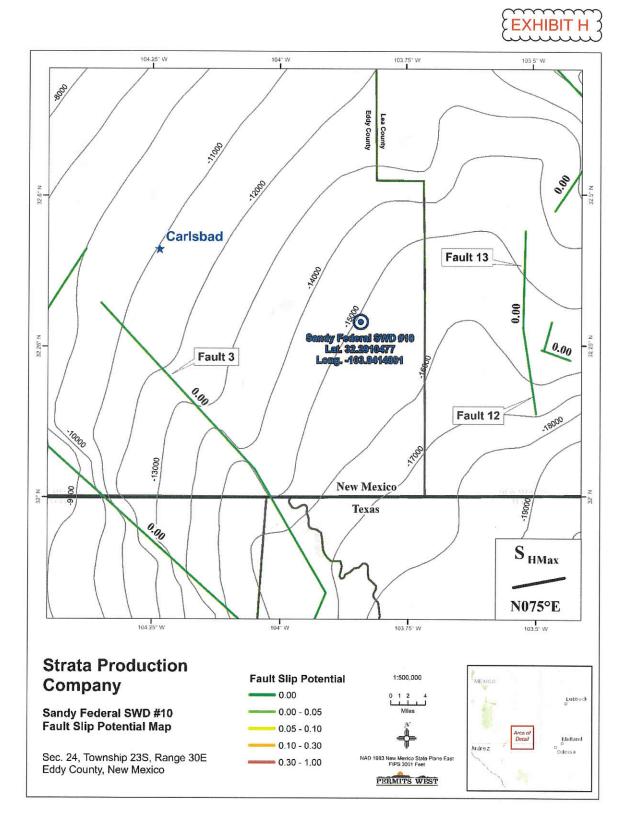


Figure 2. Precambrian fault map of Carlsbad, NM area as mapped by Ewing et al. (1990). Faults are colored based on probability of fault slip as modeled using Fault Slip Potential software (Walsh and Zoback, 2016). Labeled values represent the calculated fault slip potential using the parameters indicated in Table 2. Contours show the top of the Precambrian basement in feet below sea level.



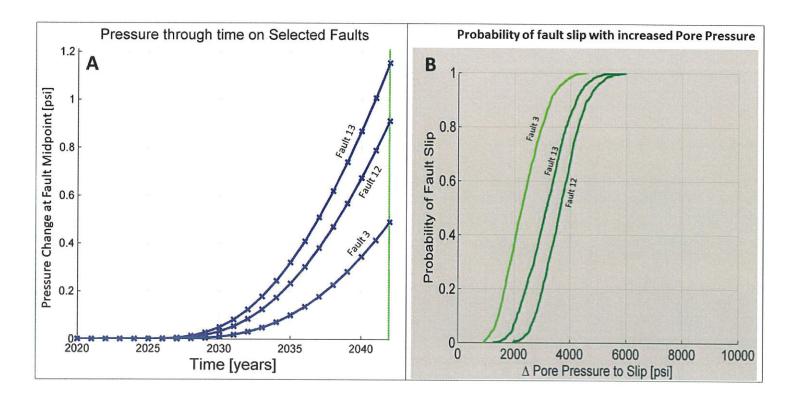


Figure 3. A) Plot showing the modeled change of pore pressure on nearby faults through time as a response to the proposed SWD well. B) Plot showing the required pore pressure increase needed to produce specific probabilities of fault slip on nearby faults.



#### **References** Cited

- Comer, J. B., 1991, Stratigraphic Analysis of the Upper Devonian Woodford Formation, Permian Basin, West Texas and Southeastern New Mexico: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 201, 63 p.
- Ewing, T. E., 1990, The tectonic map of Texas: Austin, Bureau of Economic Geology, The University of Texas at Austin.
- Frenzel, H. N., Bloomer, R. R., Cline, R. B., Cys, J. M., Galley, J. E., Gibson, W. R., Hills, J. M., King, W. E., Seager, W. R., Kottlowski, F. E., Thompson, S., III, Luff, G. C., Pearson, B. T., and Van Siclen, D. C., 1988, The Permian Basin region, in Sloss, L. L., ed., Sedimentary cover—North American Craton, U.S.: Boulder, Colorado, Geological Society of America, The Geology of North America, v. D-2, p. 261–306.
- 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.
- Hurd, O; Zoback, MD, 2012, Intraplate earthquakes, regional stress and fault mechanics in the Central and Eastern U.S. and Southeastern Canada. Tectonophysics, 581:182-92.
- Ikari, M. J.; C. Marone, and D. M. Saffer, 2011, On the relation between fault strength and frictional stability, Geology, 39, 83–86.
- 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.
- Ruppel, S.C., 2009, Integrated synthesis of the Permian basin: data and models for recovering existing and undiscovered oil resources from the largest oil-bearing basin: U.S. Oil & Natural Gas Technology, Bureau Economic Geology, The University of Texas at Austin, p. 1-959.
- 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.
- Walsh, F. R., and Zoback, M. D., (2016) Probabilistic assessment of potential fault slip related to injection induced earthquakes: Application to north central Oklahoma, USA, Geology, Data Repository item 2016334, doi:10.1130/G38275.1
- Walsh, F. R., Zoback, M. D., Pais, D., Weingarten, M., and Tyrrell, T. (2017) FSP 1.0: A Program for Probabilistic Estimation of Fault Slip Potential Resulting From Fluid Injection, User Guide from the Stanford Center for Induced and Triggered Seismicity, available at SCITS.Stanford.edu/software
- Zoback, M. L., and M. D. Zoback, 1980, State of stress in the conterminous United States: Journal of Geophysical Research, 85, no. B11, 6113–6156, https://doi.org/10.1029/JB085iB11p06113.

# Carlsbad Current Argus.



Affidavit of Publication Ad # 0004157289 This is not an invoice

PERMITS WEST, INC. 37 VERANO LOOP

SANTA FE, NM 87508

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

04/19/2020

Legal Clerk

Subscribed and sworn before me this April 19, 2020:

tate of WI, County of Brown

NOTARY PUBLIC

-3

My commission expires

SHELLY HORA Notary Public State of Wisconsin

Ad # 0004157289 PO #: Strata Production # of Affidavits 1

This is not an invoice

Strata Production Co. will apply to amend its Sandy Federal SWD 10 saltwater disposal well (30-015-46745; SWD-1784). Amendment will change the downhole will change the downnoie configuration and increase the disposal rate. The well will dispose into the Devon-ian formation from 15,800' to 16,500'. It is 14 miles east of Loving, NM at 2430' FNL & 460' FWL Sec. 24, T. 23 S., P. 20.6 Eddy County, NM R. 30 E., Eddy County, NM. Maximum disposal rate will be 50,000 bwpd. Maximum injection pressure will be 3,160 psi. Interested parties must file objections or re-quests for hearing with the NM Oil Conservation Division, 1220 South Saint Francis Dr., Santa Fe, NM 87505 within 15 days. Addi-tional information can be obtained by contacting: Brian Wood, Permits West, Fe, NM 87508. Phone number is (505) 466-8120. April 19, 2020



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July 9, 2020

## **TYPICAL NOTICE**

BLM 620 E. Greene Carlsbad NM 88220

Strata Production Company is applying (see attached application) to drill its Sandy Federal SWD 10 well as a saltwater disposal well. As required by NM Oil Conservation Division (NMOCD) rules, I am notifying you of the following proposed saltwater disposal well. This letter is a notice only. No action is needed unless you have questions or objections.

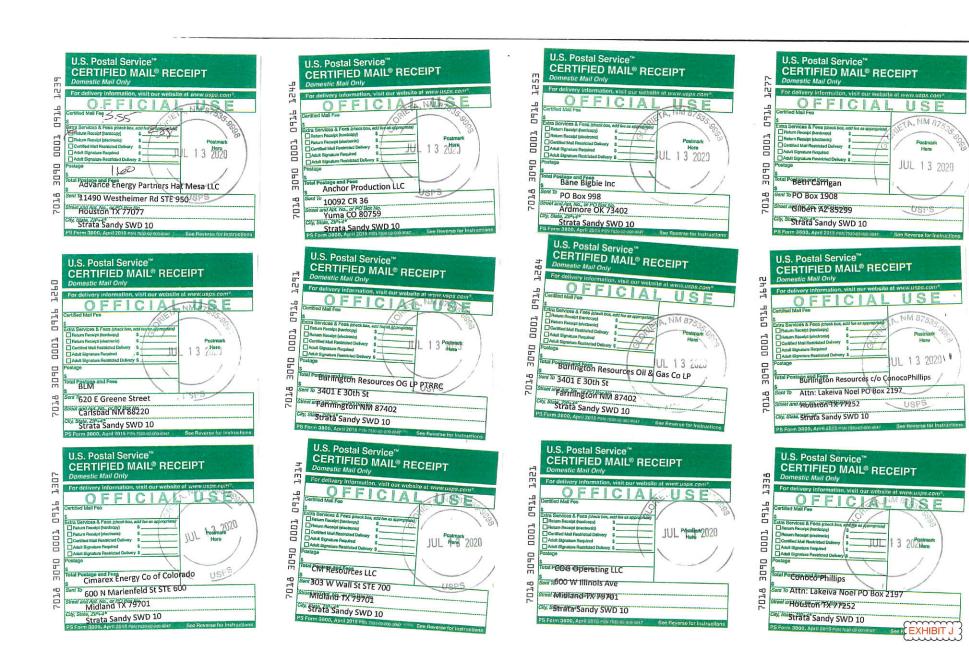
Well Name: Sandy Federal SWD 10 (BLM lease)TD = 16,500'Proposed Disposal Zone:Devonian (15,800' - 16,500')Location:2430' FNL & 460' FWL Sec. 24, T. 23 S., R. 30 E., Eddy County, NMApproximate Location:14 air miles east of Loving, NMApplicant Name:Strata Production Company(575) 622-1177Applicant's Address:P. O. Box 1030, Roswell NM 88202

<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. NMOCD 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.

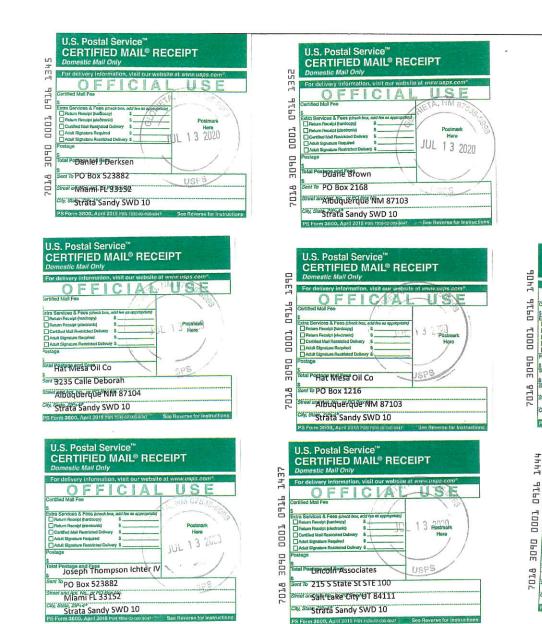
Sincerely,

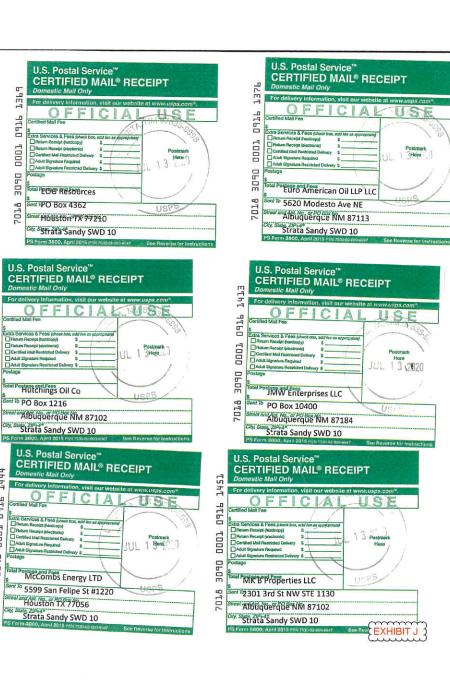
Brian Wood











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For

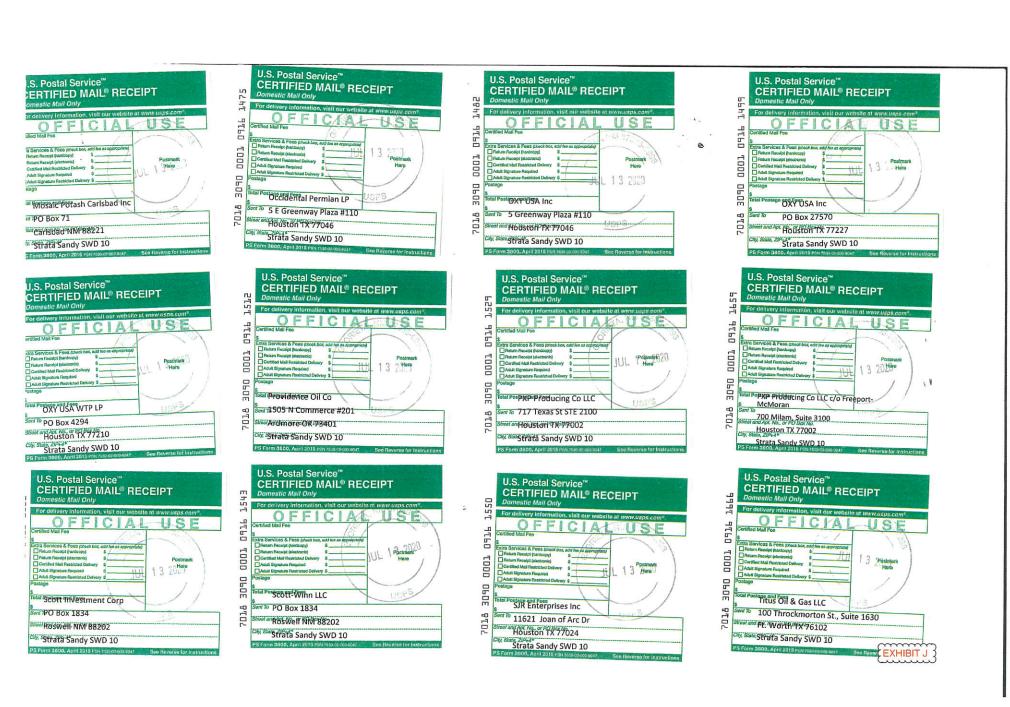
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Adult Signature Re

City.

Received by OCD: 7/14/2020 3:47:50 PM



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