Initial

Application Part I

Received: 06/03/2019

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

NEW MEXICO OIL CONSERV - Geological & Engineering 1220 South St. Francis Drive, Santo	g Bureau –
REGULATIONS WHICH REQUIRE PROCESSING AT THE	
Applicant: Trove Energy and Water, LLC	OGRID Number: <u>372488</u>
Well Name: SEC SE Federal SWD No.1	API: 30-015-xxxxx
Pool: Proposed: SWD; Devonian-Silurian	Pool Code: 97869
 TYPE OF APPLICATION: Check those which apply for [A A. Location – Spacing Unit – Simultaneous Dedicatio	DIN SWD-215 SP(proration unit) SD
DHC CTB PLC PC C [II] Injection – Disposal – Pressure Increase – Enhc WFX PMX SWD IPI E	
 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 SL E. Notification and/or concurrent approval by BL F. Surface owner G. For all of the above, proof of notification or publication 	Notice Complete vners Application Content M

- H. ☐ No notice required
- 3) **CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is accurate and complete to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications are submitted to the Division.

Note: Statement must be completed by an individual with managerial and/or supervisory capacity.

Ben Stone

Print or Type Name

6/03/2019 Date

903-488-9850

Phone Number

Signature

06/13/2019

06/03/2019

RECEIVED:

APP NO: pMAM1916442838 SWD

ABOVE THIS TABLE FOR OCD DIVISION USE ONLY

TYPE:





June 3, 2019

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

Attn: Ms. Adrienne Sandoval, Director

Re: Application of Trove Energy and Water, LLC to permit for salt water disposal the proposed SEC SE Federal SWD No.1, located in Section 24, Township 26 South, Range 31 East, NMPM, Eddy County, New Mexico.

Dear Ms. Sandoval,

Please find the enclosed form C-108 Application for Authority to Inject, supporting the above-referenced request for salt water disposal. The well will be operated as a commercial endeavor offering operators in the area additional options for produced water disposal.

Trove Energy and Water is a developing salt water disposal services to operators in southeast New Mexico and seeks to optimize efficiency, both economically and operationally, of all its operations. Approval of this application is consistent with that goal as well as the NMOCD's mission of preventing waste and protection of correlative rights.

This application for a proposed Devonian SWD interval includes the currently mandated increased One-Mile Area of Review including pertinent and available seismic information for the area and region. Published legal notice ran May 30, 2019 in the Artesia Daily Press and all offset operators and other affected parties have been notified individually. The legal notice affidavit is included with this application. The application also includes a wellbore schematic, area of review maps, affected party plat and other required information for a complete Form C-108. The well is located on federal surface and minerals and the Bureau of Land Management CFO and offset operators have been notified of this application.

I respectfully request that the approval of this salt water disposal well proceed swiftly and if you or your staff requires additional information or has any questions, please do not hesitate to call or email me.

Best regards,

Ben Stone, Partner SOS Consulting, LLC Agent for Trove Energy and Water, LLC

Cc: Application attachment and file

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

APPLICATION FOR AUTHORIZATION TO INJECT

- I. PURPOSE: Salt Water Disposal and the application QUALIFIES for administrative approval.
- II. OPERATOR: Trove Energy and Water, LLC ADDRESS: 1919 North Turner, Hobbs, NM 88240

CONTACT PARTY: Agent: SOS Consulting, LLC – Ben Stone (903) 488-9850

- III. WELL DATA: All well data and applicable wellbore diagrams are ATTACHED.
- IV. This is not an expansion of an existing project.
- V. A map is attached that identifies all wells and leases within two miles of any proposed injection well with a ONE-Mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- *VI. A tabulation is attached of data on all wells of public record within the area of review which penetrate the proposed injection zone. *There are NO (0) Wells in the subject AOR which Penetrate the proposed Devonian interval.* The data includes a description of each well's type, construction, date drilled, location, depth, and a schematic of any plugged well illustrating all plugging detail. *NO P&A Wells penetrate.*
- VII. The following data is ATTACHED on the proposed operation, including:
 - 1. Proposed average and maximum daily rate and volume of fluids to be injected;
 - 2. Whether the system is open or closed;
 - 3. Proposed average and maximum injection pressure;
 - 4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
 - 5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- *VIII. Appropriate geologic data on the injection zone is ATTACHED 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. Stimulation program a conventional acid job may be performed to clean and open the formation.
- *X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted). *Well Logs will be filed with OCD.*
- *XI. There are is 1 water well/ POD within one mile of the proposed salt water disposal well. A representative analysis is included in this application.
- XII. An affirmative statement is ATTACHED that available geologic and engineering data has been examined and no evidence was found of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.
- XIII. "Proof of Notice" section on the next page of this form has been completed and ATTACHED. There are 3 offset operators/ lessees and/or mineral owners within 1 mile and federal minerals - all have been noticed. Well location is Federal.
- 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:	Ben Stone	TITLE: SOS Consulting, LLC agent for Trove Energy	and Water,	LLC
SIGNATURE	- Sen	Jame	DATE:	6/03/2019

E-MAIL ADDRESS: ben@sosconsulting.us

* 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:

FORM C-108 - APPLICATION FOR AUTHORIZATION TO INJECT (cont.)

- III. WELL DATA The following information and data is included (See ATTACHED Wellbore Schematic):
- 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 pursuant to the following criteria is ATTACHED.

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.

C-108 - Items III, IV, V

Item III - Subject Well Data

Wellbore Diagram - PROPOSED

Item IV – Tabulation of AOR Wells

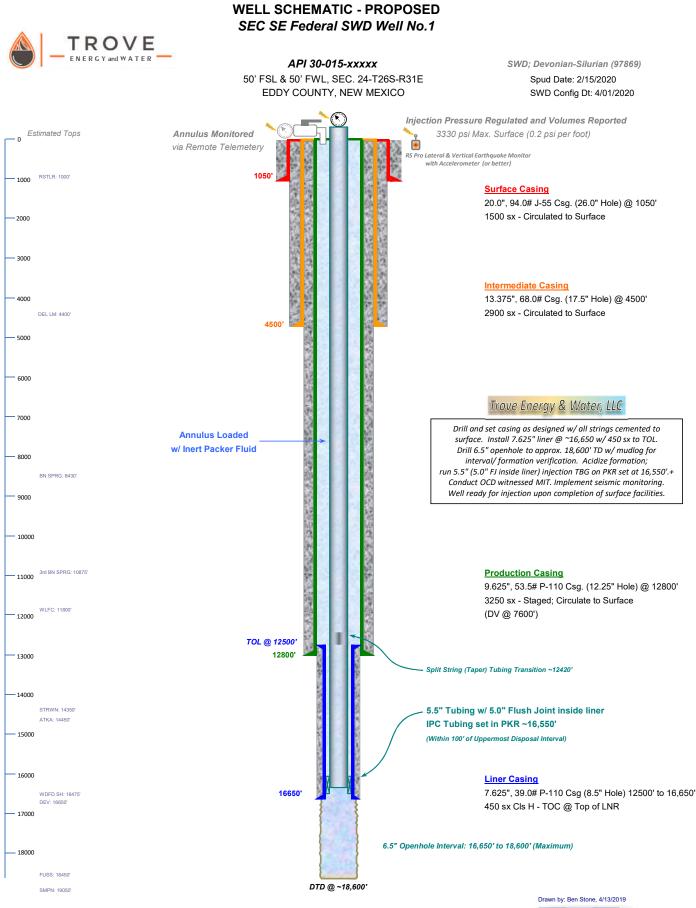
NO wells penetrate the proposed injection interval.

Item V – Area of Review Maps

1. Two Mile AOR Map with One-Mile Fresh Water Well Radius

2. One-Half Mile AOR Map

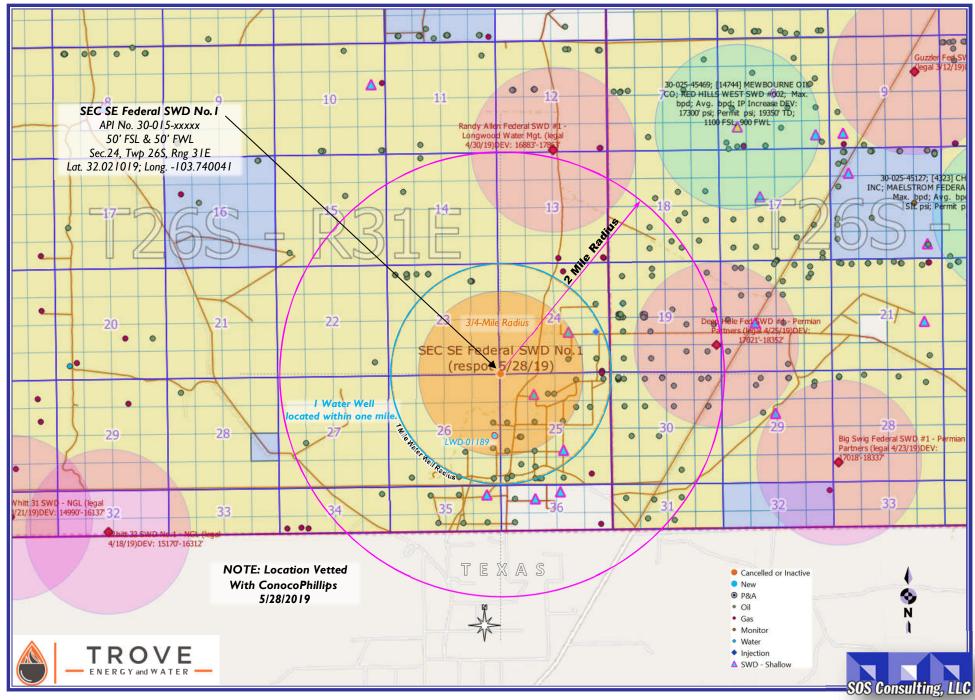
All Above Exhibits follow this page.





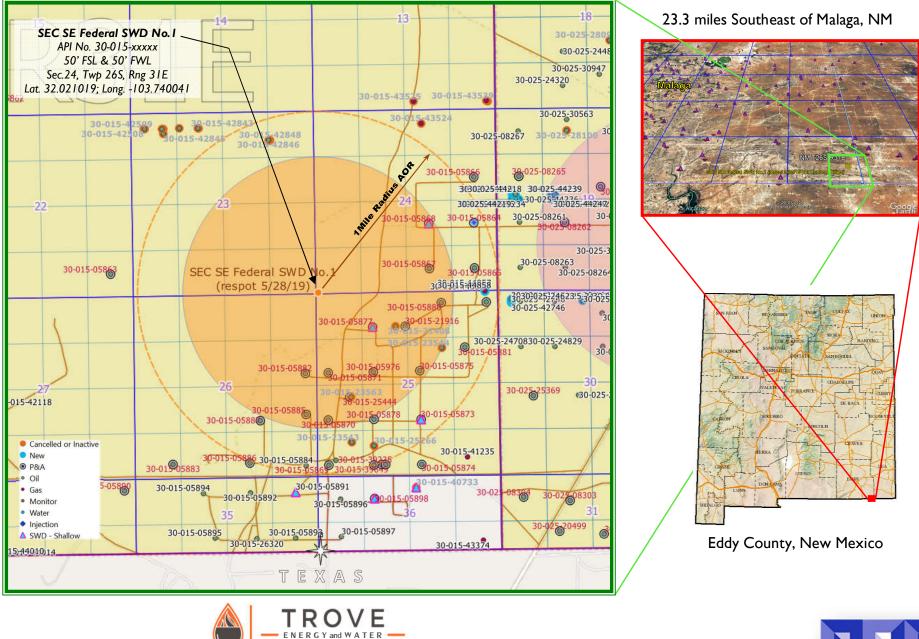
SEC SE Federal SWD No.1 - Area of Review / 2 Miles

(Attachment to NMOCD Form C-108 - Item V)



SEC SE Federal SWD Well No.1 – One Mile Area of Review / Overview Map

(Attachment to NMOCD Form C-108, Application for Authority to Inject.)



SOS Consulting, LL

C-108 ITEM X

LOGS and AVAILABLE TEST DATA

A Standard Suite of Logs will be run after drilling the well and submitted to the Division.

C-108 ITEM VII – PROPOSED OPERATION

Trove SEC SE Federal SWD #1

COMMERCIAL SWD FACILITY

Upon approval of all permits for SWD, operations would begin within 30 days. Completion of the well operations will take approximately 6-8 weeks. Facility construction including installation of the tank battery, berms, plumbing and other and associated equipment would be occurring during the same interval but at a different location from the well. In any event, it is not expected for the facility construction phase of the project to last more than 60 days, depending on availability of contractors and equipment. Facility design is currently in the planning phase with a company which specializes in such construction.

DRILL AND CONFIGURE FOR SALT WATER DISPOSAL

Interval Determination

Prior to commencing disposal, Trove Energy and Water shall submit mudlog and geophysical logs information, to the Division's District geologist and Santa Fe Engineering Bureau, showing evidence agreeable that only the permitted formation is open for disposal including a summary of depths (picks)for contacts of the formations which the Division shall use to amend any order for a final description of the depth for the injection interval. If significant hydrocarbon shows occur while drilling, the operator shall notify Artesia district office and Trove will seek written permission prior to commencing disposal.

Casing and Logging

Trove's design is to circulate all casing strings to surface. If cement does not circulate on any casing string, the Trove will run a cement bond log (CBL) or other log to determine top of cement and shall notify the Artesia district office with the top of cement (emergency phone number if after normal business hours) prior to continuing with any further cement activity with the proposed well. If cement does not tie back in to next higher casing shoe, the operator shall perform remedial cement job(s) to bring cement, at a minimum, 200 feet above the next higher casing shoe. The operator shall run a CBL (or equivalent) for the 7-5/8-inch liner to demonstrate placement cement and the cement bond with the tie-in with 9-5/8-inch casing string. All logs on the well will be copied to the Artesia district office; CBL logs and mudlogs will be provided prior to commencing disposal. Additionally, prior to commencing disposal the operator shall obtain a bottom-hole pressure of the open-hole completion. This information shall be provided with the sundry notice of commencement of disposal operations.

Monitoring and Reporting

Prior to commencing any work, an NOI sundry(ies) will be submitted to configure the well for SWD and will detail the completion workover including all work otherwise described above, any change to the procedure noted herein and to perform mechanical integrity pressure test per OCD test procedures. (Notify NMOCD 24 hours prior.) The casing/tubing annulus will be monitored for communication with injection fluid or loss of casing integrity.

C-108 ITEM VII – PROPOSED OPERATION

(continued)

OPERATIONAL SUMMARY

The SWD facility will not be fenced so that trucks may access for load disposal 24/7.

Ultimately, Trove's plans would include tying the SWD into a pipeline, when and if available, so the well and injection equipment will be a closed system and equipped with pressure limiting devices and volume meters. The annulus, loaded with an inert, anti-corrosion packer fluid, will be monitored for pressure.

SCADA System

The facility and tanks will be equipped with telemetry devices and visual alarms to alert the operator and customers of full tanks or an overflow situation. Operational details including rates, pressures, valve, tank and levels will be continually monitored and either controlled remotely or personnel dispatched for further action.

In addition to operational SCADA system control and monitoring, Trove is considering installing RS Pro Lateral & Vertical Earthquake Monitors with Accelerometer, or better for continuous monitoring. Data will be remotely accessible; monitored and shared as needed. An alternative solution being considered would employ a third party to provide seismic monitoring using public and private seismometers as available.

Rates, Pressures, Releases

Anticipated daily maximum volume is 30,000 bpd and an average of 22,500 bpd at a maximum surface injection pressure of 3330 psi (.2 psi/ft gradient) – maximum pressure will be adjusted If the top of interval is modified after well logs are run.

Potential releases will be contained and cleaned up immediately. The operator shall repair or otherwise correct the situation within 48 hours before resuming operations. OCD will be notified within 24 hours of any release greater than 5 bbls. If required, remediation will start as soon as practicable. Operator shall comply with 19.15.29 NMAC and 19.15.30 NMAC; as necessary and appropriate and OCD form C-141 will be submitted promptly.

C-108 ITEM VII – PRODUCED WATER ANAYLSES

Item VII.4 – Water Analysis of Source Zone Water

Delaware Bone Spring Wolfcamp

Item VII.5 – Water Analysis of Disposal Zone Water

Devonian

Water Analyses follow this page.

Trove Energy & Water, LLC - SEC SE Federal Project Area

SOURCE ZONE

Lab ID

DELAWARE

									Lab ID			
API No	3001510181								Sample	e ID		5532
Well Name	SUPERIOR S	TATE			002				Sample	e No		
Location	ULSTR 08	25	s	30	E		Lat / Long	32 14281	-103	3.89616		
Loouton	1980	S	66		E		Lut / Long	02.11201	County	Eddy		
0	(D							•	-		
Operator	(when sample	ə a) əld	CO	RRAI	CANYC	N			Unit I			
San	nple Date		00				sis Date		Onit 1			
						, ,						
	Sa	imple S	Source	e SW	AB			Depth (i	if known)			
	W	ater Ty	р									
ph							alkalinit	y_as_caco3_	_mgL			
ph_ter	mp_F						hardne	ss_as_caco3	_mgL			
specifi	icgravity						hardnes	ss_mgL				
specifi	icgravity_temp	F					resistivi	ity_ohm_cm				
tds_m	gL				155173		resistivi	ity_ohm_cm_	temp_			
tds_m	gL_180C						conduc	tivity				
chlorid	le_mgL				92820		conduc	tivity_temp_F	:			
sodiun	n_mgL						carbona	ate_mgL				
calciur	m_mgL						bicarbo	nate_mgL			122	
iron_m	ngL						sulfate_	_mgL			133	
barium	n_mgL						hydroxi	de_mgL				
magne	esium_mgL						h2s_m	gL				
potass	sium_mgL						co2_m	gL				
stronti	um_mgL						o2_mgl	L				
manga	anese_mgL						anionre	marks				
Remarks												



Trove Energy & Water, LLC - SEC SE Federal Project Area

SOURCE ZONE

Lab ID

BONE SPRING

							Lab ID		
API No	300253352	29					Sample		6681
Well Name	THYME AF	PY FEDE	RAL	002			Sample	No	
Location	ULSTR (01 23	S 32	E	Lat / Long	32.33657	-103	8.62470	
	165	50 N	1650	Е			County	Lea	
Operator	(when sam	pled)							
		Field	RED T	ANK			Unit G		
San	nple Date		11/27/20	01	Analysis Date				
		Sample	Source			Denth (i	f known)		
		Water T				Deptil (i	r known)		
ph				6.1	alkalini	ty_as_caco3_	mal		
	mm F			0.1					
ph_ter						ss_as_caco3	_mg∟		
specifi	cgravity			1.15	hardne	ss_mgL			
specifi	cgravity_ten	np_F			resistiv	ity_ohm_cm			
tds_m	gL			172896	resistiv	ity_ohm_cm_	temp_		
tds_m	gL_180C				conduc	tivity			
chlorid	le_mgL			104976	conduc	tivity_temp_F	:		
sodiun	n_mgL				carbon	ate_mgL			
calciur	n_mgL			0	bicarbo	nate_mgL		781	
iron_m	ngL			0	sulfate_	_mgL		1150	
barium	n_mgL			0	hydroxi	de_mgL			
magne	esium_mgL			2025	h2s_m	gL		0	
potass	ium_mgL				co2_m	gL			
stronti	um_mgL				o2_mgl	L			
manga	anese_mgL				anionre	marks			
Remarks									



Trove Energy & Water, LLC - SEC SE Federal Project Area

SOURCE ZONE

Lab ID

WOLFCAMP

API No	30025016	678							Sample	D	5096
Well Name	LAGUNA		AFE	DER	AL U	NIT 001			Sample	No	
Location	ULSTR	22	19	S	33	E	Lat / Long	32.64341	-103	3.64461	
		980	S		10	E			County	Lea	
Operator	(when sar	malad	N								
Operator	(when sai	Field		то	ΝΤΟ				Unit I		
San	nple Date		_				Analysis Date				
							-				
			ple S		e DS	Г		Depth (i	if known)		
		Wat	er Ty	р							
ph							alkalin	ity_as_caco3_	_mgL		
ph_ter	mp_F						hardne	ess_as_caco3	_mgL		
specifi	icgravity						hardne	ess_mgL			
specifi	icgravity_te	mp_F	:				resistiv	/ity_ohm_cm			
tds_m	gL					46915	resistiv	/ity_ohm_cm_	temp_		
tds_m	gL_180C						conduc	ctivity			
chlorid	le_mgL					27270	conduc	ctivity_temp_F	:		
sodiun	n_mgL						carbon	nate_mgL			
calciur	m_mgL						bicarbo	onate_mgL			714
iron_m	ngL						sulfate	_mgL		1	116
barium	n_mgL						hydrox	ide_mgL			
magne	esium_mgL	-					h2s_m	ıgL			
potass	sium_mgL						co2_m	ıgL			
stronti	um_mgL						o2_mg	ιL			
manga	anese_mgL	-					anionre	emarks			
Remarks											

Remarks



Trove Energy & Water, LLC - SEC SE Federal Project Area

DISPOSAL ZONE

DEVONIAN

ONIAN								Lab ID		
API No	30025210	82						Sample		5720
Well Name	ANTELOF	PE RI	DGE	UNIT	003			Sample	No	
Location	ULSTR	34	23	S 34	Е	Lat / Long	32.25922	-103	.46068	
	19	980	S	1650	W			County	Lea	
Operator	(when sam	npled))							
		Field	ł	ANTEL	OPE RIDGI	Ξ		Unit K		
Sam	ple Date		1	1/14/196	7	Analysis Date				
		Sam	nple So	ource UI	NKNOWN		Depth (if	known)		
		Wat	er Typ)						
ph					6.9	alkalinit	y_as_caco3_m	ngL		
ph_ten	ηp_F					hardnes	s_as_caco3_r	ngL		
specifi	cgravity					hardnes	s_mgL			
specifi	cgravity_te	mp_F				resistivi	ty_ohm_cm			
tds_mę	gL				80187	resistivi	ty_ohm_cm_te	emp_		
tds_mo	gL_180C					conduct	livity			
chlorid	e_mgL				47900	conduct	tivity_temp_F			
sodium	n_mgL					carbona	ate_mgL			
calciun	n_mgL					bicarbo	nate_mgL			476
iron_m	gL					sulfate_	mgL			900
barium	_mgL					hydroxi	de_mgL			
magne	sium_mgL					h2s_mg	ιL			
potass	ium_mgL					co2_mo	βL			
strontiu	um_mgL					o2_mgl	-			
manga	nese_mgL					anionre	marks			
Remarks										



Geologic Information

The Devonian and Silurian consist of carbonates including light colored dolomite and chert intervals interspersed with some tight limestone intervals. Several thick sections of porous dolomite capable of taking water are believed present within the subject formations in the area. Depth control data was inferred from deep wells in the area and charted contours. If the base of Devonian and top of Silurian rocks come in as expected the well will only be drilled deep enough for adequate logging rathole.

At a proposed depth of 18,600' BGL (Below Ground Level) the well will TD approximately 1,950' below the estimated top of the Devonian. Mud logging through the interval will ensure the target interval remains in Devonian and Silurian. Once Devonian is determined, the casing shoe depth will be set at an approximate maximum upper depth of 16,650' BGL. Injection will occur through the resulting openhole interval.

TROVE ATTEMPTS TO BRACKET POTENTIAL INJECTION INTERVALS BASED ON OFFSETTING WELLS, AVAILABLE NEARBY LOGS AND CONTOURS PLOTS; IT IS EXPECTED THAT ONCE DRILLING COMMENCES AND MUDLOGGING RETURNS ARE EVALUATED, THE INTERVAL MAY BE ADJUSTED ACCORDINGLY TO EXPLOIT THE DESIRED FORMATION AS DESCRIBED. C-103 SUNDRY REPORTS WITH APPROPRIATE DATA WILL BE FILED WITH THE OCD AND FINALIZED WITH THE C-105 COMPLETION REPORT.

The Devonian is overlain by the Woodford Shale and Mississippian Lime and underlain by the Middle and Lower Ordovician; Simpson, McKee and Ellenburger.

The SWD prospect is in the Carlsbad Basin. Fresh water in the area is generally available from the Rustler and Santa Rosa formations. State Engineer's records show water wells in the area with a depth to groundwater of 292 to 365 feet and an average depth of 317 feet.

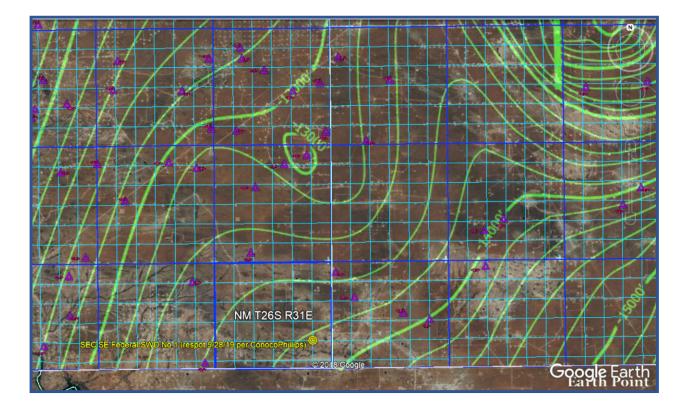
There is 1 (one) water well located within one mile of the proposed SWD. Representative analyses of two domestic water wells in the area are included.

Geologic Information

Devonian Structure Contour Intervals

The Devonian and Silurian consist of carbonates including light colored dolomite and chert intervals interspersed with some tight limestone intervals. Several thick sections of porous dolomite capable of taking water are believed present within the subject formations in the area. Depth control data was inferred from deep wells in the area and charted contours. If the base of Devonian and top of Silurian rocks come in as expected the well will only be drilled deep enough for adequate logging rathole.

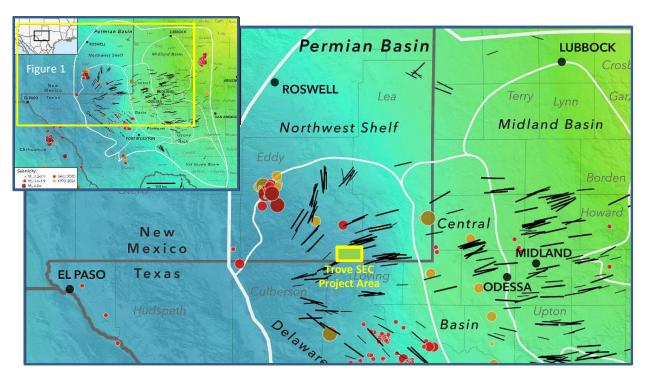
The overlay below was digitized from a classic contour map of the Devonian. The information is from various USGS and UT Bureau of Economic Geology publications. Some later contours provided by other SWD applicants show greater resolution but still tie in nicely to the depths as shown. Surface elevation at the subject site is 3155' suggesting a target depth of approximately 16,900'. Trove used a 250' bracket to propose a top interval depth of 16,650' – final depths will be based on mud and openhole logs. Area Devonian SWD well depths and proposed well depths were also considered but with significant variance, Trove will rely on logging for best interval determination.



Geological Data

EARTHQUAKE / SEISMIC INFORMATION SUPPLEMENT

Map Source: <u>State of stress in the Permian Basin, Texas and New Mexico: Implications for induced</u> <u>seismicity (Figure 1)</u>; Jens-Erik Lund Snee/ Mark Zoback, February 2018



TROVE PSE PROJECT VICINITY

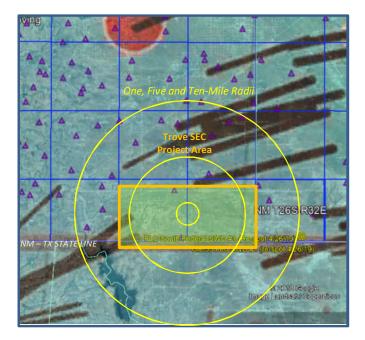


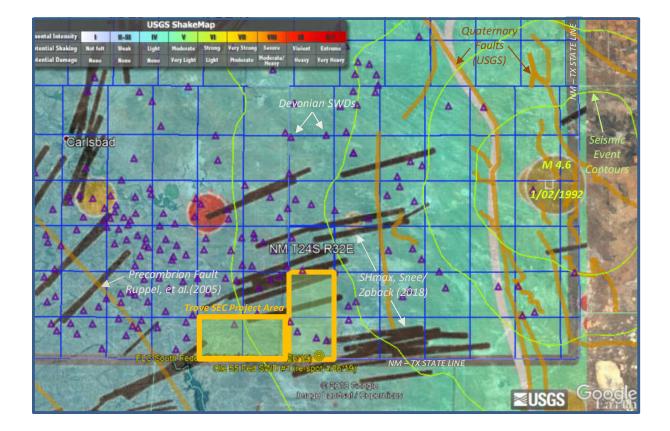
Figure 1. State of stress in the Permian Basin, Texas and New Mexico. Black lines are the measured orientations of the maximum horizontal stress (SHmax), with line length scaled by data quality. The colored background is an interpolation of measured relative principal stress magnitudes (faulting regime) expressed using the A parameter (see text for details) of Simpson (1997). Blue lines are fault traces known to have experienced normalsense offset within the past 1.6 Ma, from the USGS Quaternary Faults and Folds Database (Crone and Wheeler, 2000). The boundary between the Shawnee and Mazatzal basement domains is from Lund et al. (2015), and the Precambrian Grenville Front is from Thomas (2006). The Permian Basin boundary is from the U.S. Energy Information Administration, and the subbasin boundaries are from the Texas Bureau of Economic Geology Permian Basin Geological Synthesis Project. Earthquakes are from the USGS National Earthquake Information Center, the TexNet Seismic Monitoring Program, and Gan and Frohlich (2013). Focal mechanisms are from Saint Louis University (Herrmann et al., 2011).

Geological Data

EARTHQUAKE / SEISMIC INFORMATION SUPPLEMENT (cont.)

In the following map, a layer with USGS historical earthquake data is overlaid and, a layer showing lines to represent Precambrian faults as documented by Ruppel, et al. (2005). Finally, a layer showing all currently permitted SWDs completed or proposed to be completed in the Devonian (Silurian) formation.

The USGS earthquakes shown are well known to the area. The 2012 quake located approximately 13 miles due east of Loving is also shown (19.2 miles). This was perhaps the most significant of the area in recent years but was determined to not be related to oil and gas activity. The best known and largest in recent history was the 1992, 4.6 magnitude quake centered south of Eunice, NM (36.0 miles).



The Precambrian faults and existing Devonian SWDs are discussed in more detail on the next page.

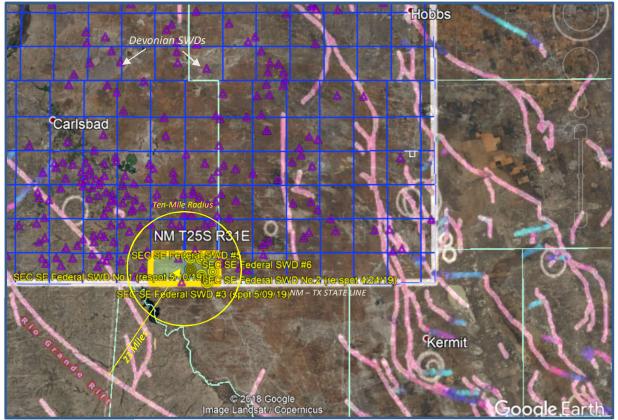
REGIONAL VIEW - DEVONIAN SWD LOCATIONS, PRECAMBRIAN FAULTS, SHmax, USGS MAGNITUDE

Geological Data

EARTHQUAKE / SEISMIC INFORMATION SUPPLEMENT (cont.)

The primary Precambrian faults in the area as documented by Ruppel, et al. (2005) is represented on this map by the thick, pink colored lines. The most significant of these is the fault associated with the Rio Grande Rift, running southeast to northwest and, runs adjacent to a portion of Hwy 285; a portion the associated fault which runs parallel approximately 15 miles northeast is also depicted below. The Trove SEC Project SWD Area is located some 23 miles from the fault. Other documented faults (USGS, 2000) are shown for eastern Lea County and extending into west Texas. Other Devonian SWDs in the area are also shown (small purple triangles) completed or proposed to be completed in the Devonian (Silurian) formation.

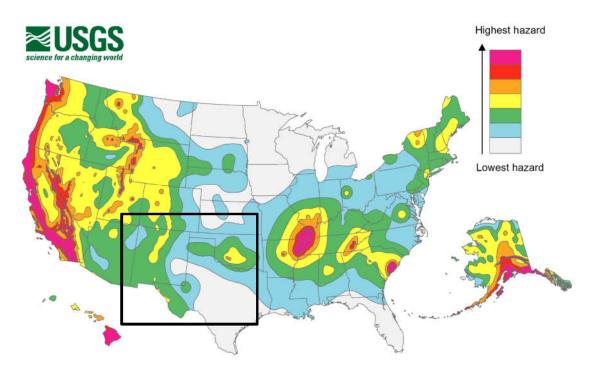
The previously referenced study by Snee and Zoback (shown on previous exhibits) evaluated the strike-slip probability using probabilistic FSP (Fault Slip Potential) analysis of known faults in the Permian Basin. The study predicts that the Precambrian fault shown here has less than a 10% probability of being critically stressed to the point of creating an induced seismicity event. The main reason for the low probability is due to the relationship of the strike of the fault to the regional S_{Hmax} orientation; the proposed SWD being well removed from the area.



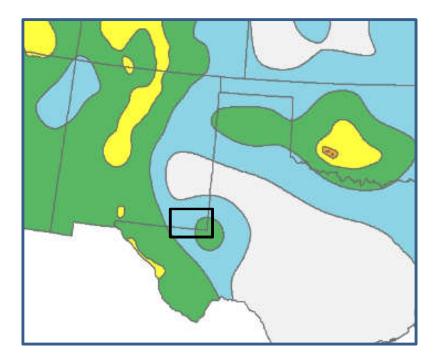
VICINITY - PERMITTED DEVONIAN SWDS, COMPOSITE FAULTS

Geological Data

EARTHQUAKE / SEISMIC INFORMATION SUPPLEMENT (cont.)



2014 map data: The USGS notes in its report that <u>fracking</u> may be to blame for a sizeable uptick in earthquakes in places like <u>Oklahoma</u>. "Some states have experienced increased seismicity in the past few years that may be associated with human activities such as the disposal of wastewater in deep wells," the report says. USGS hopes to use that data in future maps but it isn't included in this one. "Injection-induced earthquakes are challenging to incorporate into hazard models because they may not behave like natural earthquakes and their rates change based on man-made activities," the report says.



Geological Data

EARTHQUAKE / SEISMIC INFORMATION SUPPLEMENT (cont.)

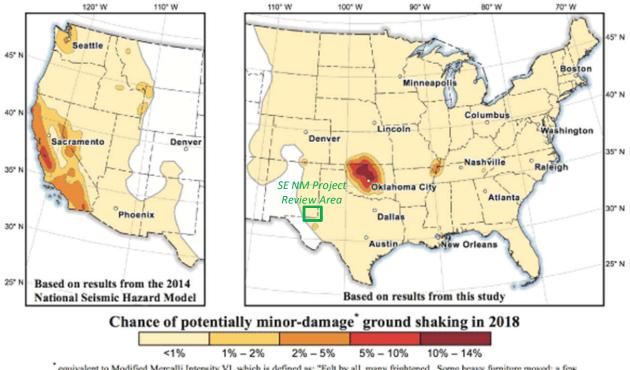
Δ 4 4 Magnitude Carlsbad Age Past hou Past day Older 25S R31E Kermit Quakes © 2018 Google Image Landset / Copanious ∕€USGS Good at 32.121776° lon -103.741543° elev 3395 ft

USGS 2014 REGIONAL MAP DATA OVERLAY IN GOOGLE EARTH W/ HISTORICAL EARTHQUAKES

An updated USGS map for 2018 is on the next page. While methodology remained essentially the same according to USGS, the interpreted results and color-coding did have some modification. However, the subject area in southeast New Mexico on both maps remains very low and on the 2018 map, the area is assigned a value of <1% of "potentially minor-damage ground shaking".

C-108 - Item VIII Geological Data

EARTHQUAKE / SEISMIC INFORMATION SUPPLEMENT (cont.)



USGS 2018 ONE-YEAR MODEL

* equivalent to Modified Mercalli Intensity VI, which is defined as: "Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight."

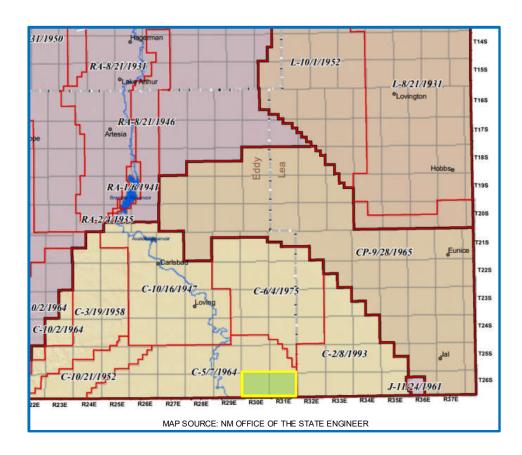
Map showing chance of damage from an earthquake in the Central and Eastern United States during 2018. Percent chances are represented as follows: pale yellow, less than 1 percent; dark yellow, 1 to 2 percent; orange, 2 to 5 percent; red, 5 to 10 percent; dark red, 10 to 12 percent. See Hazard from the western United States from the <u>2014 National Seismic Hazard Maps</u> (Petersen et al., 2014) for comparison.

The USGS has produced the 2018 one-year probabilistic seismic hazard forecast for the central and eastern United States from induced and natural earthquakes. For consistency, the updated 2018 forecast is developed using the same probabilistic seismicity-based methodology as applied in the two previous forecasts.

Based on publicly available data for the subject area, it is reasonable to believe the risk of induced seismic activity due to disposal injection into this well is extremely low.

C-108 - Item XI

Groundwater Basins - Water Column / Depth to Groundwater



The subject well is located within the Carlsbad Basin.

State Engineer's records show water wells in the area with a depth to groundwater of 292 to 365 feet and an average depth of 317 feet.

There are NO water wells located within one mile of the proposed SWD.

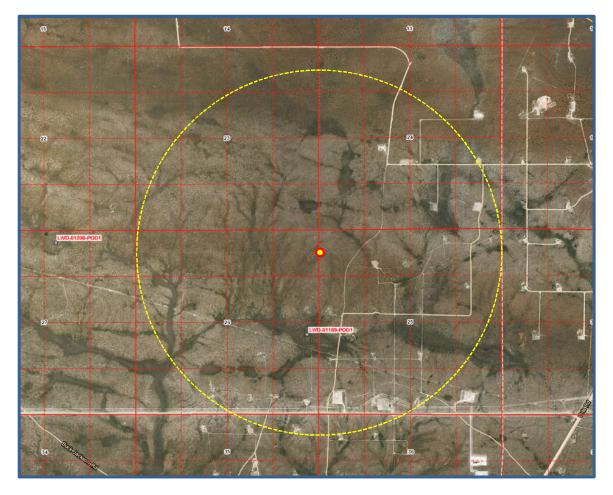


C-108 Item XI

Water Wells Within One Mile

SEC SE Federal SWD No.1 - Water Well Locator Map

There is 1 water well (POD) within a one-mile radius of the proposed SWD. A representative analysis for the area is included in this application.



Data from NM Office of the State Engineer displayed in OSE-GIS System.



C-108 ITEM XI – WATER WELLS IN AOR

Depth to Ground Water



New Mexico Office of the State Engineer 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 replace O=orphaned, C=the file is closed)	(quar						E 3=SW largest)		3 UTM in meters)		(In feel	i)
POD Number	POD Sub- Code basin	County	10,220	Q 16	100		Tws	Rng	x	Y			Water Column
C 01777	С	ED				08	26S	31E	613245	3547409* 🌍	325	300	25
C 02090	С	ED		4	4	01	26S	31E	620329	3548533* 🌍	350	335	15
C 02248	CUB	ED	1	2	3	08	26S	31E	612942	3547316* 🌍	300	292	8
C 02249	CUB	ED	1	2	3	08	26S	31E	612942	3547316* 🌍	300	292	8
C 03554 POD1	CUB	ED	2	1	4	01	26S	31E	620547	3549148 🌍	630	300	330
C 03639 POD1	CUB	ED	3	4	2	01	26S	31E	620168	3549279 🌍	700	365	335
C 04256 POD1	С	ED	4	4	2	01	26S	31E	620384	3549257 🌍	666	340	326
										Average Depth to	Water:	317 f	eet
										Minimun	n Depth:	292 f	eet
										Maximun	Depth:	365 f	eet

Record Count: 7

PLSS Search:

Township: 26S

Range: 31E

*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.

P.O. BOX 98 Ma	rtin Water Laborat	tories, Inc.		709 W. INDIANA
MIDLAND, TX. 79702				MIDLAND, TEXAS 79701
PHONE (432) 583-4521	RESULT OF WATER A	NALYSES		FAX (432) 682-8819
25 AND 10 AM	LA	BORATORY NO.		12-156
TO:Mike Lamothe	S/	MPLE RECEIVED		-12-12
PO Box 1656, Monahans, TX 79756		ESULTS REPORTED_	1.	-19-12
• • • • • • • • • • • • • • • • • • •		PO	-	
COMPANY Monachem, Inc.	LEA	SE EOC	j	
FIELD OR POOL				
SECTION BLOCK SURVEY _8-26S-31	ECOUNTYKee	EddySTATE	I N	IM
SOURCE OF SAMPLE AND DATE TAKEN: NO. 1 Ross Draw water supply well - S	ample #1 1-10-12			
NO. 2 Ross Draw water supply well - S				
		······································		
NO.3				
NO. 4				
		PROPERTIES		
CHEM	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60* F.	1.0025	1.0025		
pH When Sampled	1.0025	1.0025		
pH When Received	8,30	8.30		
Bicarbonate as HCO,	176	171		
Supersaturation as CaCO,				
Undersaturation as CaCO,			10 M	+
Total Hardness as CaCO,	172	204		
Calcium as Ca	59	53		
Magnesium as Mg	6	17		
Sodium and/or Potassium	42	. 33		
Sulfate as SO,	85	102		1
Chloride as CI	21	21		
iron as Fe	0.2	0.3		
Barium as Ba	0	0		
Turbidity, Electric				
Color as PI				
Total Solids, Calculated	389 -	397		
Temperature *F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen.				
Hydrogen Sulfide	0.0	0.0		
Resistivity, ohms/m at 77° F.	22.900	21.300		
Suspended Oll		<u> </u>		
Filtrable Solids as mg/l				
Volume Filtered, mi				
	1	<u>l</u>		
	Results Reported As Milligra		1 4	and the disc line of
Additional Determinations And Remarks	The undersigned co	ertifies the above to	be true and co	rrect to the best
of his knowledge and belief.	ar market an an ar a			
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		- fr		
Form No. 3	8	ALLO	in the second	

Greg Ogden, B.S.

. .

LATHAM PHINTING CO. - 333-1292

Fresh Water Analysis: Baker Ranch Water Well 1-26S-31E

Chlorides: 399 ppm Total Dissolved Solids: 746 ppm



5-1; TWP- 205; Ro 3IE.

Date: 22-Apr-15

. 2788 IVest County Road, Hobbs NM 88240 Phone (575) 392-5556 Fax (575) 392-7307

Gamptieny		e!!!t.amie	Ça	mely.	State:
Mewbourne	. 6	aker #1	L	.66	New Mazico
Sample Source	Weiber	d	Sample #		1
Formation			Depth		
Specific Granity	1.000		\$G @ \$u	60 °F clides	1_002
Temperature (*F)	70		Reducing A	gents	
Cations					
Socium (Cale)		m Mg/L	146	b PPM	165
Calcium		in MgA	68	in PPM	68
Magnosium		In Mo/L	29	in PPM	29
Schueble (mn (FE2)		In MgA	0.0	in PPM	¢.
Aniona	<u> </u>	•			
Chlorides		in MgA.	400	in PPM	399
Sulfates		in Mg/L	70	in PPM	70
Bicarbonates		in Mg/L	16	In PPM	18
Total Hardness (aa CaCO3)		In MpA	290	in PPM	289
Total Dissolved Solids (Calc)		in MgA.	748	in PPM	746
Equivalent NaCl Concentratio	n	in Mg/L	728	in PPM	725
Scaling Tendencies					
Calcium Carbonate Index					198
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Buton 500,000 Plant "This Calculation is only on anyme			Possible / Above 10		

Remarka re=5.079f

C-108 ITEM XIII – PROOF OF NOTIFICATION

IDENTIFICATION AND NOTIFICATION OF INTERESTED PARTIES

Exhibits for Section

Affected Parties Map

List of Interested Parties

Notification Letter to Interested Parties

Proof of Certified Mailing

Published Legal Notice

SEC SE Federal SWD Well No.1 – Affected Parties Plat

(Attachment to NMOCD Form C-108, Application for Authority to Inject.)

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K)	33MM	NESE (1)	(L)	NEON (K)	NASE (7)	NESE (11)	MANGAY (C.)	1850V (K)	(J)	NESE (13		NESW (K)	1 NAS
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	2-3 A. S.	1000			1			*****	*****			NEW MEXIC	9



— LEGEND

- T.1 NMNM-064756 Penroc Oil Corp.
- $T.2-NMLC\text{-}0068282B\ -McBride\ O\&G\ Corp.$
- T.3 NMLC-0070869 Apache Corp., Others
- T.4 NMLC-0079869A Penroc Oil Corp.



C-108 ITEM XIII – PROOF OF NOTIFICATION AFFECTED PARTIES LIST

SOS Consulting is providing electronic delivery of C-108 applications. ALL APPLICABLE AFFECTED PARTIES ARE PROVIDED A LINK IN THE NOTICE LETTER TO A SECURE SOS/ CITRIX SHAREFILE[®] SITE TO VIEW AND DOWNLOAD A FULL COPY OF THE SUBJECT C-108 APPLICATION IN PDF FORMAT.

"AFFECTED PERSON" MEANS THE DIVISION DESIGNATED OPERATOR; IN THE ABSENCE OF AN OPERATOR, A LESSEE WHOSE INTEREST IS EVIDENCE BY A WRITTEN CONVEYANCE DOCUMENT EITHER OF RECORD OR KNOWN TO THE APPLICANT AS OF THE DATE THE APPLICANT FILES THE APPLICATION; OR IN THE ABSENCE OF AN OPERATOR OR LESSEE, A MINERAL INTEREST OWNER WHOSE INTEREST IS EVIDENCED BY A WRITTEN CONVEYANCE DOCUMENT EITHER OF RECORD OR KNOWN TO THE APPLICANT AS OF THE DATE THE APPLICANT FILED THE APPLICATION FOR PERMIT TO INJECT.; PER OCD RULES NMAC 19.15.26.7, A. AND 19.15.26.8, B.2.

SURFACE OWNER

1 U.S. DEPARTMENT OF INTERIOR Bureau of Land Management Oil & Gas Division 620 E. Greene St. Carlsbad, NM 88220 Certified: 7018 1130 0000 8738 0984

OFFSET MINERALS LESSEES and OPERATORS (All Notified via USPS Certified Mail)

BLM Lease NMNM-0064756, NMLC-0079869A (T.1 and T.4 on Map) Lessee PENROC OIL CORPORATION

2 PENROC OIL CORPORATION P.O. Box 2197 Houston, TX 77252-2197 Certified: 7018 1130 0000 8738 0977

Operator

3 CONOCOPHILLIPS COMPANY P.O. Box 2197 Houston, TX 77252-2197 Certified: 7018 1130 0000 8738 0960

BLM Leases NMLC-006282B (T.2 on Map)

Lessee MCBRIDE OIL & GAS CORP. 400 N Pennsylvania Ave., Ste.1200 Roswell, NM 88201

Operator CONOCOPHILLIPS COMPANY P.O. Box 2197 Houston, TX 77252-2197

BLM Lease NMLC-0070869 (T.3 on Map) Lessee

4 APACHE CORPORATION 303 Veterans Airpark Lane Midland, TX 79705 Certified: 7018 1130 0000 8738 0953

C-108 ITEM XIII – PROOF OF NOTIFICATION AFFECTED PARTIES LIST (cont.)

OFFSET MINERALS OWNERS (Notified via USPS Certified Mail)

U.S. DEPARTMENT OF INTERIOR Bureau of Land Management Oil & Gas Division 620 E. Greene St. Carlsbad, NM 88220

REGULATORY

NEW MEXICO OIL CONSERVATION DIVISION (FedEx'ed original and copy) 1220 S. St. Francis Dr. Santa Fe, NM 87505

NEW MEXICO OIL CONSERVATION DIVISION (FedEx'ed copy) 811 S. First St. Artesia, NM 88210

SEC-SE #1



June 3, 2019

NOTIFICATION TO INTERESTED PARTIES via U.S. Certified Mail – Return Receipt Requested

To Whom It May Concern:

Trove Energy and Water, LLC, Hobbs, New Mexico, is preparing applications to the New Mexico Oil Conservation Division to drill and complete for salt water disposal the SEC SE Federal SWD Well No.1. The proposed commercial operation will be for produced water disposal from area operators. As indicated in the notice below, the well will be located in Section 24, Township 26 South, Range 31 East in Eddy County, New Mexico.

The published notice states that the interval will be from 16,650 feet to 18,600 feet into the Devonian and Silurian formations.

Following is the notice published in the Artesia Daily Press, Artesia, New Mexico on or about May 30, 2019.

LEGAL NOTICE

Trove Energy and Water, LLC, 1919 North Turner, Hobbs, NM 88240, is filing Form C-108 (Application for Authority to Inject) with the New Mexico Oil Conservation Division seeking administrative approval for a salt water disposal well. The proposed well, the SEC SE Federal SWD Well No.1 will be located 50' FSL and 50' FWL, Section 24, Township 26 South, Range 31 East, Eddy County, New Mexico; approximately 23.3 miles southeast of Malaga, NM.

Produced water from area production will be commercially disposed into the Devonian, Silurian and Fusselman formations at a maximum interval depth of 16,650' to 18,600' at a maximum surface pressure of 3330 psi and a rate limited only by such pressure. Mudlogging and e-logs will confirm final interval depths.

Interested parties wishing to object to the proposed application must file with the New Mexico Oil Conservation Division, 1220 St. Francis Dr., Santa Fe, NM 87505, (505)476-3460 within 15 days of the date of this notice or the OCD receive date, whichever is later. Additional information may be obtained from the applicant's agent, SOS Consulting, LLC, (903)488-9850 or, email info@sosconsulting.us.

You have been identified as a party who may be interested as an offset lessee or operator.

<u>You are entitled to a full copy of the application</u>. A full copy in PDF format will be posted on the SOS Consulting *ShareFile* site and available for future download (posting may lag behind the notice effort).

Use the URL link: <u>https://sosconsulting.sharefile.com/d-sc9365ab819647179</u> (Please Note: The ShareFile service is powered by Citrix Systems and is completely secure.*)

The link to this file will be active for 60 days from the date of this letter. Your company can access and download the file a maximum of five (5) times. (One copy may be downloaded and shared as needed among your company.)

If preferred, you may call SOS Consulting, LLC at 903-488-9850, or email info@sosconsulting.us, and the same PDF file copy will be expedited to you via email.

Please use a subject like "SEC SE Fed SWD #1 June 2019 PDF Copy Request".

Thank you for your attention in this matter.

Best regards,

Sen Jon

Ben Stone, SOS Consulting, LLC Agent for Trove Energy and Water, LLC

Cc: Application File

SOS Consulting is committed to providing superior quality work using technology to assist clients and affected parties in obtaining the documentation required. SOS will continue to utilize methods which are less energy and resource intensive including, the reduction of paper copies.

We hope you'll partner with us and appreciate these efforts.

* You will be asked for your email, name and company. This will not be used by anyone except keeping track of the file downloads. You will not be solicited by SOS or anyone else. Data is stored on Citrix Systems servers only.





C-108 - Item XIV

Proof of Notice (Certified Mail Receipts)



Affidavit of Publication
No. 25141
State of New Mexico
County of Eddy:
Danny Scott any A Gues
being duly so forn 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
1 Consecutive weeks/day on the same
day as follows:
First Publication May 30, 2019
Second Publication
Third Publication
Fourth Publication
Fifth Publication
Sixth Publication
Seventh Publication
Subscribed and sworn before me this
30th day of May 2019
OFFICIAL SEAL Latisha Romine NOTARY PUBLIC-STATE OF NEW MEXICO My commission expires: 511220023
Latisha Romine

Notary Public, Eddy County, New Mexico

Copy of Publication:

Legal Notice

Trove Energy and Water, LLC, 1919 North Turner, Hobbs, NM 88240, is filing Form C-108 (Application for Authority to Inject) with the New Mexico Oil Conservation Division seeking administrative approval for a salt water disposal well. The proposed well, the SEC SE Federal SWD Well No.1 will be located 50' FSL and 50' FWL, Section 24, Township 26 South, Range 31 East, Eddy County, New Mexico; approximately 23.3 miles southeast of Malaga, NM.

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Published in the Artesia Daily Press, Artesia, N.M., May 30, 2019 Legal No. 25141.

McMillan, Michael, EMNRD

From:	ben@sosconsulting.us
Sent:	Thursday, June 13, 2019 12:48 PM
То:	McMillan, Michael, EMNRD
Subject:	[EXT] RE: Trove Energy SEC SE Federal SWD Well No. 1
Attachments:	016_ADDTNL_CertMailProof_SEC-SE#1_20190613001.pdf

Mike,

Proof of additional notification attached.

Thanks, Ben

From: McMillan, Michael, EMNRD <Michael.McMillan@state.nm.us>
Sent: Thursday, June 13, 2019 12:49 PM
To: Ben Stone <ben@sosconsulting.us>
Subject: Trove Energy SEC SE Federal SWD Well No. 1

Ben:

Per our conversation, the administrative application for the Trove Energy SEC SE Federal SWD Well No. 1 has been suspended.

You must notify the SW/4 SW/4 of Section 19 and NW/4 NW/4 of Section 30, Township 26 South, Range 32 East.

Mike

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

McMillan, Michael, EMNRD

From:	ben@sosconsulting.us
Sent:	Monday, June 3, 2019 10:41 AM
То:	Goetze, Phillip, EMNRD; McMillan, Michael, EMNRD; Jones, William V, EMNRD
Subject:	[EXT] Trove Energy and Water, LLC's C-108 for SWD in its SEC SE Federal SWD #1 prospect
Attachments:	C-108_Trove_SEC-SEFed SWD#1_AsSubmitted_20190603.pdf

Gentlemen:

Please find the attached subject C-108. This location was vetted w/ ConocoPhillips – the final location is to conform with their request to accommodate their development plans.

Please let me know if additional info is needed.

Thanks, Ben

Link to the above file: https://sosconsulting.sharefile.com/d-sc40593e2c9c466c8



P.O. Box 300 - Come, TX 75431 Visit us on the web at www.sosconsulting.us!

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