

## **Solaris Water Midstream, LLC**

**Okeanos SWD Well No. 1**

**789' FSL & 507' FWL**

**Section 36, Twp 20-S, Rng 34-E**

**Lea County, New Mexico**

### **Well Program - New Drill**

**Objective: Drill new well for commercial salt water disposal into the Devonian, Silurian and Fusselman (mudlogging and e-logging to determine final depths) per SWD-(pending).**

#### **1. Geologic Information - Devonian Formation**

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

#### **Estimated Formation Tops:**

B/Fresh Water	250
T/Rustler	1935
Cherry Canyon	5938
Bone Spring	9669
Wolfcamp	11585
Strawn	12413
Atoka	12658
Morrow	13072
Mississippian	13675
Woodford Shale	14617
Devonian	14812
Fusselman	15807
TD Ordovician*	16300
Ellenburger	20500

\*Please see narrative portion of drilling/pipe specs for TD options.

#### **2. Drilling Procedure**

- a. MIRU drilling rig and associated equipment. Set up H<sub>2</sub>S wind direction indicators; brief all personnel on Emergency Evacuation Routes.
- b. All contractors conduct safety meeting prior to current task. All equipment inspected daily. Repair / replace as required.
- c. Well spud operations commence.
- d. Mud logger monitoring returns; cuttings & waste hauled to specified facility. (Sundance, Lea County)
- e. After surface casing set/drilled; if H<sub>2</sub>S levels >20ppm detected, implement H<sub>2</sub>S Plan accordingly. (e.g., cease operations, shut in well, employ H<sub>2</sub>S safety trailer & personnel safety devices, install flare line, etc. - refer to plan.)
- f. Spills contained & cleaned up immediately. Repair or otherwise correct the situation within 48 hours before resuming operations. Notify OCD within 24 hours. Remediation started ASAP if

### **Well Program - New Drill (cont.)**

- required. Operator shall comply with 19.15.29 NMAC and 19.15.30 NMAC, as appropriate.
- g. Sundry forms filed as needed - casing, cement, etc. - operations continue to completion.

### **3. Casing program - Casing designed as follows:**

STRING	HOLE SZ	DEPTH	CSG SZ	COND	WT/GRD	CLLPS/BRS	TNSN
						(Minimum Safety Factors)	
Surface	26.5"	0-575' 1100'	20.0"	New	94.0 lb. J/K-55 ST&C	1.125/1.1	1.8
Intermediate	17.5"	0-4181'	13.375"	New	68.0 lb. HCL-80 BT&C	1.125/1.1	1.8
2nd Inter	12.25"	0-11,500'	9.875"	New	62.8 lb. Q-125 LT&C	1.125/1.1	1.8
Prod/ Liner*	8.5"	11,200'-14,850'	7.625"	New	39.0 lb. P-110 FJ	1.125/1.1	1.8
Openhole*	6.5" hole	14,850'-16,260'	OH	n/a	n/a	n/a	n/a

#### **Notes:**

- ✓ On both Intermediate casing strings, the cement will be designed to circulate to surface. Both strings will have cement bond logs run (radial, CET or equivalent) to surface.
- ✓ While running all casing strings, the pipe will be kept a minimum of 1/3 full at all times to avoid approaching the collapse pressure of casing.
- ✓ \* Based on mudlogging and e-logs, 7.0" casing shoe is expected to be set at 14,850'. TD is expected to be 16,260' as determined by logging and suitable porosity has been exposed. Sundry notice will document such events and a C-105 completion report filed within 60 days.

### **4. Cementing Program:**

**Surface – LEAD Slurry:** 700 sacks of Class C containing 4% gel + 2% CaCl<sub>2</sub> + .4 pps defoamer + .125 pps cello flake + 3 pps Koal Seal. Weight 13.7 ppg, yield 1.68 ft<sup>3</sup>/sack; **TAIL Slurry:** 200 sacks of Class C Neet containing 2% CaCl<sub>2</sub>. Weight 14.8 ppg, yield 1.34 ft<sup>3</sup>/sack; 100% excess, circulate to surface.

**1st Intermediate – LEAD Slurry:** 1,100 sacks of Class C containing 4% gel + .4 pps defoamer + .125 pps cello flake + 5% NaCl. Weight 13.2 ppg, yield 1.83 ft<sup>3</sup>/sack; **TAIL Slurry:** 200 sacks of Class C Neet. Weight 14.8 ppg, yield 1.32 ft<sup>3</sup>/sack; 50% excess, circulate to surface.

**2nd Intermediate – Stage 1 LEAD Slurry:** 1,000 sacks of 50/50 POZ containing 10% gel + .4 pps defoamer + .125 pps cello flake + 1 pps Koal Seal + 5% NaCl. Weight 11.9 ppg, yield 2.473 ft<sup>3</sup>/sack; **TAIL Slurry:** 400 sacks of Class H containing 2% retarder + .2 pps defoamer. Weight 15.6 ppg, yield 1.18 ft<sup>3</sup>/sack; 25% excess. DV TOOL ~5800'; **Stage 2 LEAD Slurry:** 700 sacks of 50/50 POZ containing 10% gel + .4 pps defoamer + .125 pps cello flake + 1 pps Koal Seal + 5% NaCl. Weight 11.9 ppg, yield 2.473 ft<sup>3</sup>/sack; **TAIL Slurry:** 200 sacks of Class H containing 2% retarder + .2 pps defoamer. Weight 15.6 ppg, yield 1.18 ft<sup>3</sup>/sack; 35% excess, circulate to surface.

**Prod Liner – Slurry:** 400 sacks of 50/50 POZ Class H containing .3% retarder + .7% fluid loss additive + .2% dispersant + .4 pps defoamer + .1% Anti-Settling agent. Weight 15.2 ppg, yield 1.32 ft<sup>3</sup>/sack. 35% excess; TOC calculated @ Top of liner 11,700'.

### **Well Program - New Drill (cont.)**

**5. Pressure Control** - BOP diagram is attached to this application. All BOP and related equipment shall comply with well control requirements as described NMOCD Rules and Regulations and API RP 53,

Section 17. Minimum working pressure of the BOP and related equipment required for the drilling shall be 5000 psi. The NMOCD Hobbs district office shall be notified a minimum of 4 hours in advance for a representative to witness BOP pressure tests. The test shall be performed by an independent service company utilizing a test plug (no cup or J-packer). The results of the test shall be recorded on a calibrated test chart submitted to the OCD district office. Test shall be conducted at:

- a. Installation;
- b. after equipment or configuration changes;
- c. at 30 days from any previous test, and;
- d. anytime operations warrant, such as well conditions

**6. Mud Program & Monitoring** - Mud will be balanced for all operations as follows:

DEPTH	MUD TYPE	WEIGHT	FV	PV	YP	FL	Ph
0-575' ✓	FW Spud Mud	8.5-9.2	70-40	20	12	NC	10.0
575'-4181'	Brine Water	9.8-10.2	28-32	NC	NC	NC	10.0
4181'-11,500'	FW/Gel	8.7-9.0	28-32	NC	NC	NC	9.5-10.5
11,500'-14,850'	XCD Brine Mud	11.0-	45-48	20	10	<5	9.5-10.5
14,850'-16,260'	FW Mud	8.4-8.6	28-30	NC	NC	NC	9.5-10.5

Mud and all cuttings monitored w/ cuttings recovered for disposal. Returns shall be visually and electronically monitored. In the event of H<sub>2</sub>S, mud shall be adjusted appropriately by weight and H<sub>2</sub>S scavengers.

**7. Auxiliary Well Control and Monitoring** - Hydraulic remote BOP operation, mudlogging to monitor returns.

**8. H<sub>2</sub>S Safety** - This well and related facilities are not expected to have H<sub>2</sub>S releases. However, there may be H<sub>2</sub>S in the area. There are no private residences or public facilities in the area but a contingency plan has been developed. Solaris Water Midstream, LLC will have a company representative available to personnel throughout all operations. If H<sub>2</sub>S levels greater than 10ppm are detected or suspected, the H<sub>2</sub>S Contingency Plan will be implemented at the appropriate level.

H<sub>2</sub>S Safety - There is a low risk of H<sub>2</sub>S in this area. The operator will comply with the provisions of NMAC 19.15.11 and BLM Onshore Oil and Gas Order #6.

- a) Monitoring - all personnel will wear monitoring devices.
- b) Warning Sign - a highly visible H<sub>2</sub>S warning sign will be placed for obvious viewing at the vehicular entrance point onto location.
- c) Wind Detection - two (2) wind direction socks will be placed on location.
- d) Communications - will be via cellular phones and/or radios located within reach of the driller, the rig floor and safety trailer when applicable.
- e) Alarms - will be located at the rig floor, circulating pump / reverse unit area and the flareline and will be set for visual (red flashing light) at 15 ppm and visual and audible (115 decibel siren) at 20 ppm.

**Well Program - New Drill (cont.)**

- f) Mud program - If H<sub>2</sub>S levels require, proper mud weight, safe drilling practices and H<sub>2</sub>S scavengers will minimize potential hazards.
- g) Metallurgy - all tubulars, pressure control equipment, flowlines, valves, manifolds and related equipment will be rated for H<sub>2</sub>S service if required.

***The Solaris Water Midstream, LLC H<sub>2</sub>S Contingency Plan will be implemented if levels greater than 10ppm H<sub>2</sub>S are detected.***

**9. Logging, Coring and Testing – Solaris Water Midstream, LLC expects to run;**

- a. Mud logging through the interval will ensure the target interval remains Devonian and Silurian.
- b. CBL (Radial, CET or equivalent) on both intermediate casing strings.
- c. Standard porosity log suite from TD to approximately 15,000'.
- d. No corings or drill tests will be conducted. (The well may potentially be step rate tested in the future if additional injection pressures are required.)

**10. Potential Hazards - No abnormal pressures or temperatures are expected.**

No loss of circulation is expected to occur with the exception of drilling into the target disposal zone. All personnel will be familiar with the safe operation of the equipment being used to drill this well.

The maximum anticipated bottom-hole pressure is 9500 psi and the maximum anticipated bottom-hole temperature is 210° F.

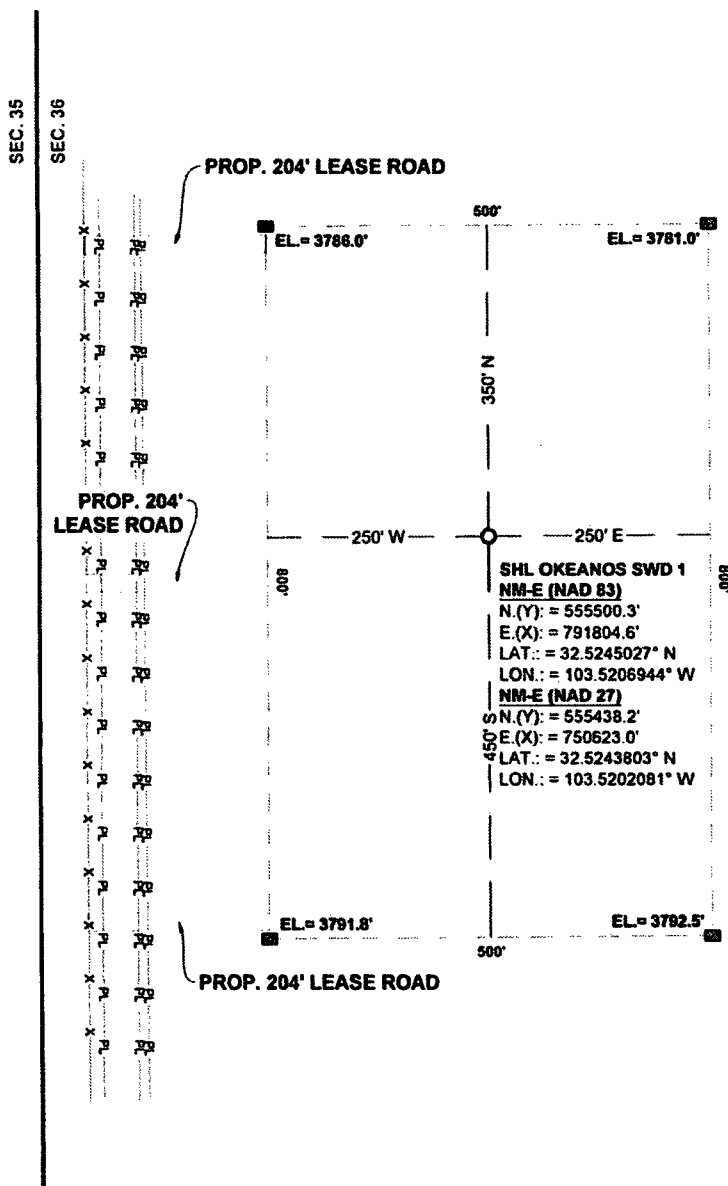
**11. Waste Management** - All drill cuttings and other wastes associated with and drilling operations will be transported to the Lea County Sundance facility (or alternate), permitted by the Environmental Bureau of the New Mexico Oil Conservation Division.

**12. Anticipated Start Date** - Upon approval of all permits for SWD, operations would begin within 30 days. Completion of the well operations will take six to seven weeks. Installation of the tank battery, berms, plumbing and other and associated equipment would be occurring during the same interval. In any event, it is not expected for the construction phase of the project to last more than 60 days, depending on availability of contractors and equipment. At the time of this submittal, and subject to the availability of the drilling contractor, the anticipated start date is:

**December 15, 2017.**

**13. Configure for Salt Water Disposal** – Subsequent to SWD permit approval from OCD and 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 BLM and 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. Anticipated daily maximum volume is 25,000 bpd and average of 15,000 bpd at a maximum surface injection pressure of 2970 psi (0.2 psi/ft to uppermost injection interval, i.e., casing shoe). If satisfactory disposal rates cannot be achieved at default pressure of .2 psi/ft, Solaris Water Midstream, LLC will conduct a step-rate test and apply for an injection pressure increase 50 psi below parting pressure.

# SITE LOCATION



**GRAPHIC SCALE 1" = 200'**

**SECTION 36 T20S, R34E, N.M.P.M.**

COUNTY: LEA STATE: NM

**DESCRIPTION: 789' FSL & 507' FWL**

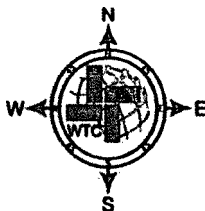
**OPERATOR: SOLARIS MIDSTREAM**

WELL NAME: OKEANOS SWD 1



**W T C, INC.**

405 S.W. 1st Street  
Andrews, TX 79714  
(432) 523-2181



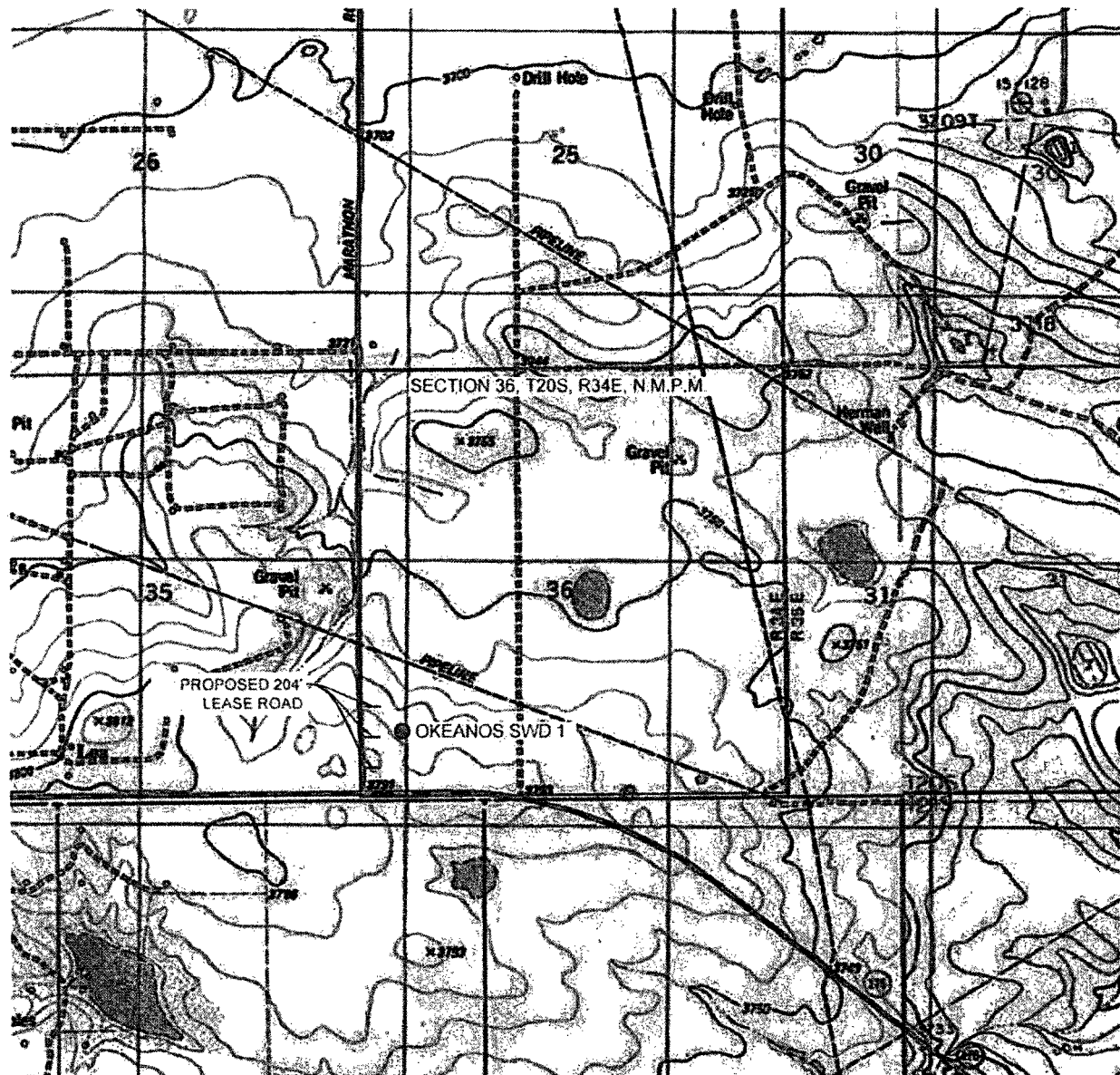
**DRIVING DIRECTIONS:**

**BEGINNING AT THE INTERSECTION OF HWY 176 AND COUNTY ROAD 27A (MARATHON RD.) LEA COUNTY, NEW MEXICO; HEAD NORTH ON COUNTY ROAD 27A ±705 FEET. THE FLAGGED LOCATION IS ±500 FEET EAST FROM COUNTY ROAD 27A.**



**JOB No.: WTC52101**

# LOCATION VERIFICATION MAP



0 1000 2000 4000

GRAPHIC SCALE 1" = 2000'

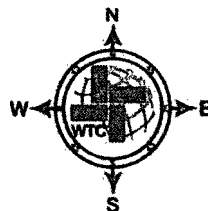
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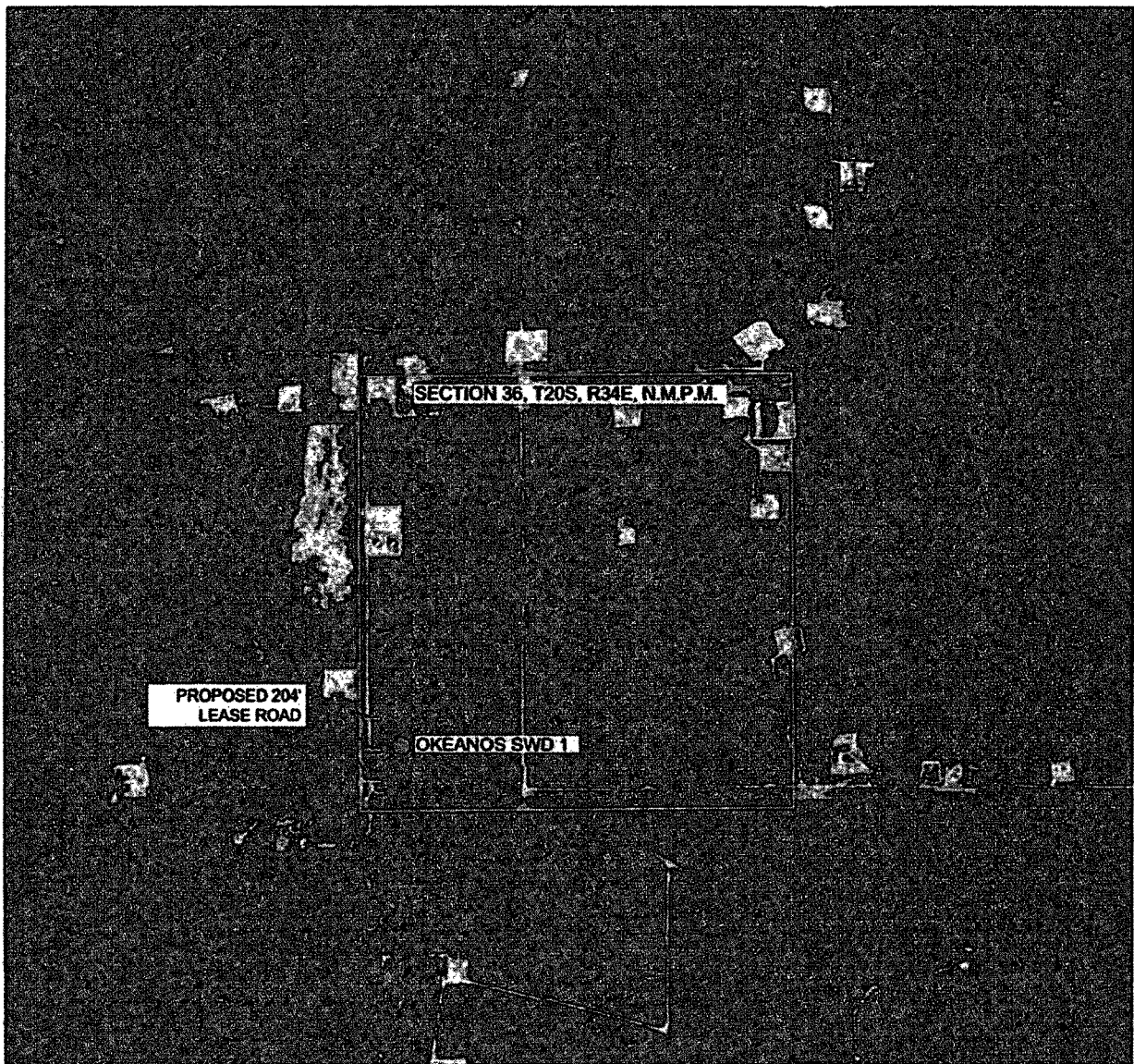


**WTC, INC.**  
405 S.W. 1st Street  
Andrews, TX 79714  
(432) 523-2181



JOB No.: WTC52101

# AERIAL MAP



0 1000 2000 4000

GRAPHIC SCALE 1" = 2000'

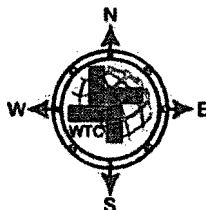
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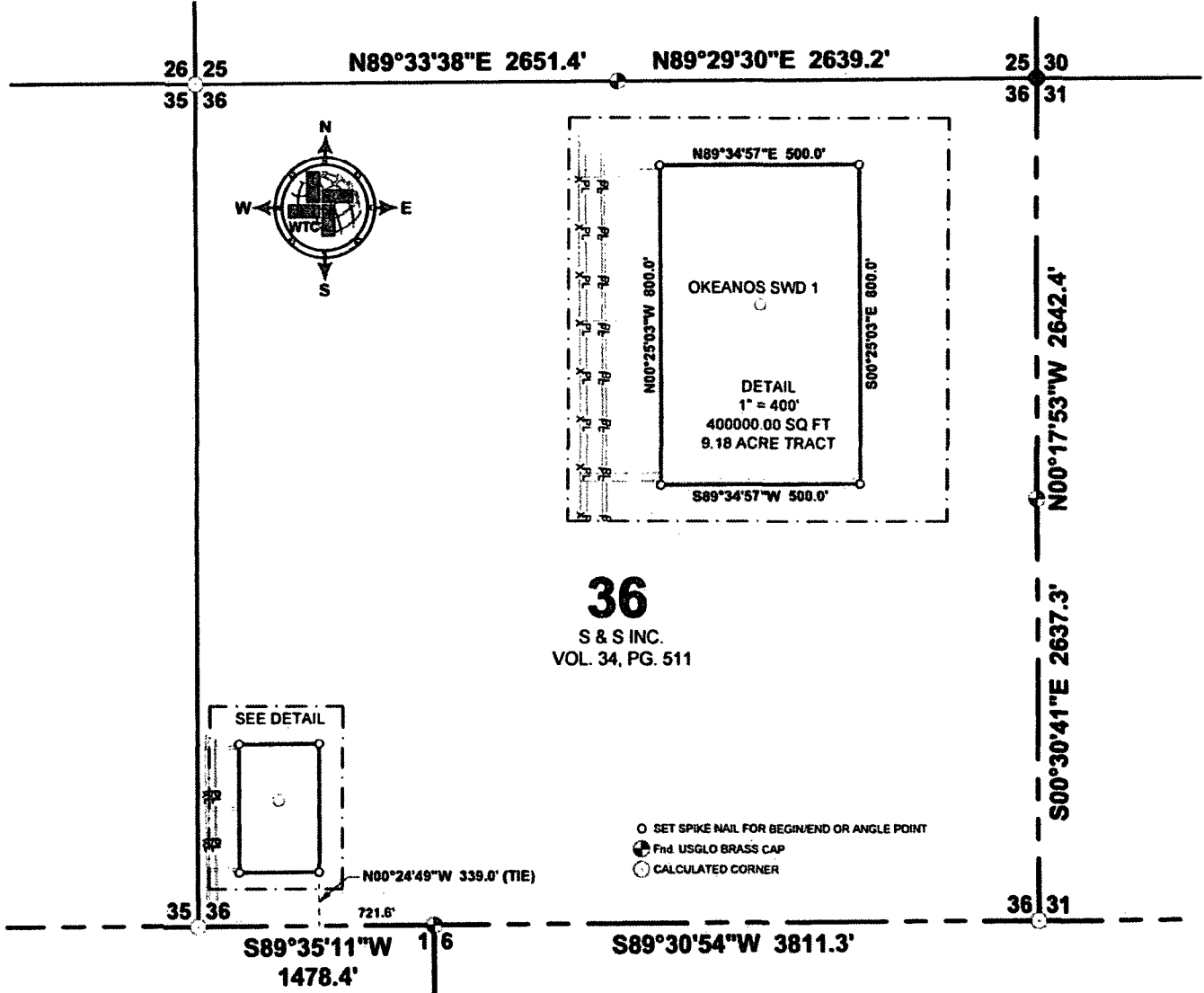


**WTC, INC.**  
405 S.W. 1st Street  
Andres, TX 79714  
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JOB No.: WTC52101

SECTION 36, TOWNSHIP 20 SOUTH, RANGE 34 EAST,  
LEA COUNTY, N.M.



36

S & S INC.  
VOL. 34, PG. 511

DESCRIPTION

DESCRIPTION OF A 9.18 ACRE TRACT OF LAND SITUATED IN SECTION 36, TOWNSHIP 20 SOUTH, RANGE 34 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:  
**BEGINNING** AT N.(Y) 555052.1' - E.(X) 792057.9', A ONE-HALF INCH IRON ROD WITH RED PLASTIC CAP MARKED "GWS 5356" (RPC), SET FOR THE SOUTHEAST CORNER HEREOF, WHICH LIES S.89°35'11"W., 721.6 AND N.00°24'49"W., 339.0 FEET FROM A BRASS CAP MARKED "1-6", FOUND ON THE SOUTH LINE OF SAID SECTION 36;  
**THENCE** S.89°34'57"W., 500.0 FEET TO A RPC, SET FOR THE SOUTHWEST CORNER HEREOF;  
**THENCE** N.00°25'03"W., 800.0 FEET TO A RPC, SET FOR THE NORTHWEST CORNER HEREOF;  
**THENCE** N.89°34'57"E., 500.0 FEET TO A RPC, SET FOR THE NORTHEAST CORNER HEREOF;  
**THENCE** S.00°25'03"E., 800.0 FEET TO THE POINT OF BEGINNING AND CONTAINING 9.18 ACRES OF LAND.

NOTES:

BASIS OF BEARING, COORDINATES, AND DISTANCES ARE A TRANSVERSE MERCATOR PROJECTION OF THE NEW MEXICO STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, BASED ON CONTROL POINT ORION AT N=555243.381' - E=788835.531', WITH A CONVERGENCE ANGLE OF -00°25'54.31" AND A COMBINED SCALE FACTOR OF 0.999800993



I, JAMES E. TOMPKINS, NEW MEXICO PROFESSIONAL SURVEYOR NO. 14729, DO HEREBY CERTIFY THAT THIS PLAT AND THE ACTUAL SURVEY ON THE GROUND UPON WHICH IT IS BASED WERE PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION; THAT I AM RESPONSIBLE FOR THIS SURVEY; THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO; AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

*James E. Tompkins* 09/19/2017  
 JAMES E. TOMPKINS, N.M. P.E.S. No. 14729  
 SURVEY DATE: 09/11/2017 DRAFT: M.Y.  
 JOB NO.: WTC52101 SHEET: 01 OF 02



A PROPOSED  
 9.18 ACRE TRACT  
 SITUATED IN SECTION 36,  
 T-20-S, R-34-E, N.M.P.M.,  
 LEA COUNTY, NEW MEXICO



WTC, INC.  
 405 S.W. 1st Street  
 Andrews, TX 79714  
 (432) 523-2181



**SECTION 36, TOWNSHIP 20 SOUTH, RANGE 34 EAST,  
LEA COUNTY, N.M.**

**DESCRIPTION ROAD "A"**  
DESCRIPTION OF A 0.09 ACRE TRACT OF LAND SITUATED IN SECTION 36, TOWNSHIP 20 SOUTH, RANGE 34 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:  
BEGINNING AT N.(Y) 555917.2' - E.(X) 792052.5', A SPIKE NAIL, SET FOR THE SOUTHEAST CORNER HEREOF, WHICH LIES N 48°10'34"W, 1649.9 FEET, FROM A BRASS CAP MARKED "1-6", FOUND ON THE SOUTH LINE OF SAID SECTION 36;  
THENCE S 89°34'57"W, 204.4 FEET TO A SPIKE NAIL, SET FOR THE SOUTHWEST CORNER HEREOF;  
THENCE N 00°25'03"W, 20.0 FEET TO A SPIKE NAIL, SET FOR THE NORTHWEST CORNER HEREOF;  
THENCE N 89°34'57"E, 204.4 FEET TO A SPIKE NAIL, SET FOR THE NORTHEAST CORNER HEREOF;  
THENCE S 00°25'03"E, 20.0 FEET TO THE POINT OF BEGINNING AND CONTAINING 0.09 ACRES OF LAND.

**DESCRIPTION "B"**  
DESCRIPTION OF A 0.09 ACRE TRACT OF LAND SITUATED IN SECTION 36, TOWNSHIP 20 SOUTH, RANGE 34 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:  
BEGINNING AT N.(Y) 555438.5' - E.(X) 791555.1', A SPIKE NAIL, SET FOR THE SOUTHEAST CORNER HEREOF, WHICH LIES N.59°35'01"W, 1422.6 FEET, FROM A BRASS CAP MARKED "1-6", FOUND ON THE SOUTH LINE OF SAID SECTION 36;  
THENCE S 89°34'57"W, 204.4 FEET TO A SPIKE NAIL, SET FOR THE SOUTHWEST CORNER HEREOF;  
THENCE N 00°25'03"W, 20.0 FEET TO A SPIKE NAIL, SET FOR THE NORTHWEST CORNER HEREOF;  
THENCE N 89°34'57"E, 204.4 FEET TO A SPIKE NAIL, SET FOR THE NORTHEAST CORNER HEREOF;  
THENCE S 00°25'03"E, 20.0 FEET TO THE POINT OF BEGINNING AND CONTAINING 0.09 ACRES OF LAND.

**DESCRIPTION ROAD "C"**  
DESCRIPTION OF A 0.09 ACRE TRACT OF LAND SITUATED IN SECTION 36, TOWNSHIP 20 SOUTH, RANGE 34 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:  
BEGINNING AT N.(Y) 555058.5' - E.(X) 791557.9', A SPIKE NAIL, SET FOR THE SOUTHEAST CORNER HEREOF, WHICH LIES N 74°28'00"W, 1270.4 FEET, FROM A BRASS CAP MARKED "1-6", FOUND ON THE SOUTH LINE OF SAID SECTION 36;  
THENCE S 89°34'57"W, 204.4 FEET TO A SPIKE NAIL, SET FOR THE SOUTHWEST CORNER HEREOF;  
THENCE N 00°25'03"W, 20.0 FEET TO A SPIKE NAIL, SET FOR THE NORTHWEST CORNER HEREOF;  
THENCE N 89°34'57"E, 204.4 FEET TO A SPIKE NAIL, SET FOR THE NORTHEAST CORNER HEREOF;  
THENCE S 00°25'03"E, 20.0 FEET TO THE POINT OF BEGINNING AND CONTAINING 0.09 ACRES OF LAND.

**NOTES:**  
BASIS OF BEARING, COORDINATES, AND DISTANCES ARE A TRANSVERSE MERCATOR PROJECTION OF THE NEW MEXICO STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, BASED ON CONTROL POINT ORION AT N = 555243.381' - E = 788335.531', WITH A CONVERGENCE ANGLE OF 00°25'54.31" AND A COMBINED SCALE FACTOR OF 0.999992693.

**SCALE: 1" = 1000'**

**JAMES E. TOMPKINS, N.M. P.S.**  
SURVEY DATE: 09/11/2017  
JOB NO.: WTC52101

**SOLARIS MIDSTREAM**  
THREE PROPOSED 0.09 ACRE TRACTS SITUATED IN SECTION 36, T-20-S, R-34-E, N.M.P.M., LEA COUNTY, NEW MEXICO

**WTC, INC.**  
425 S.W. 1st Street  
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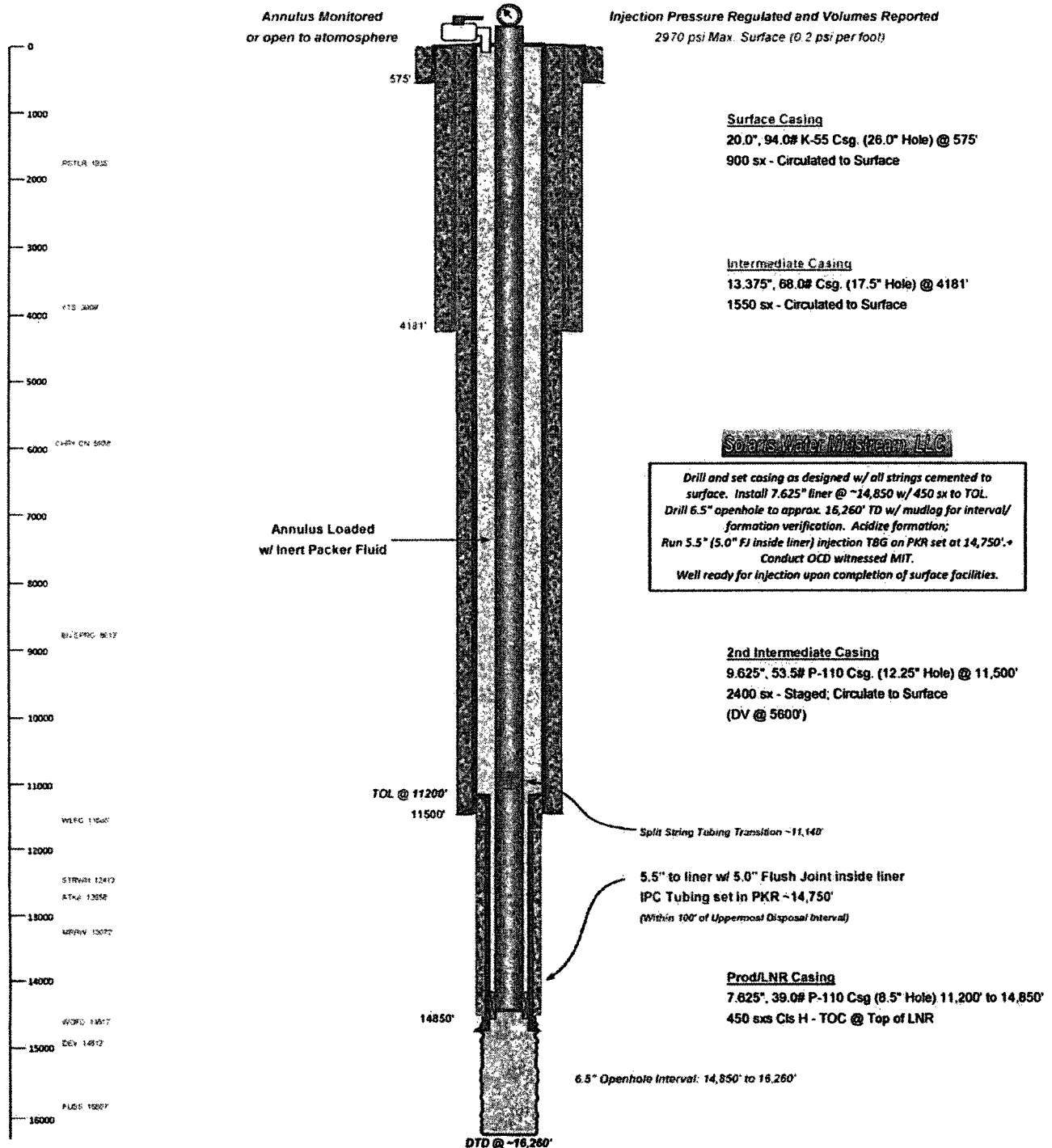
## WELL SCHEMATIC - PROPOSED Okeanos SWD Well No.1

API 30-025-xxxx  
789' FSL & 507' FWL, SEC. 36-T20S-R34E  
LEA COUNTY, NEW MEXICO

SWD; Devonian-Silurian (97869)

Spud Date: 1/15/2018

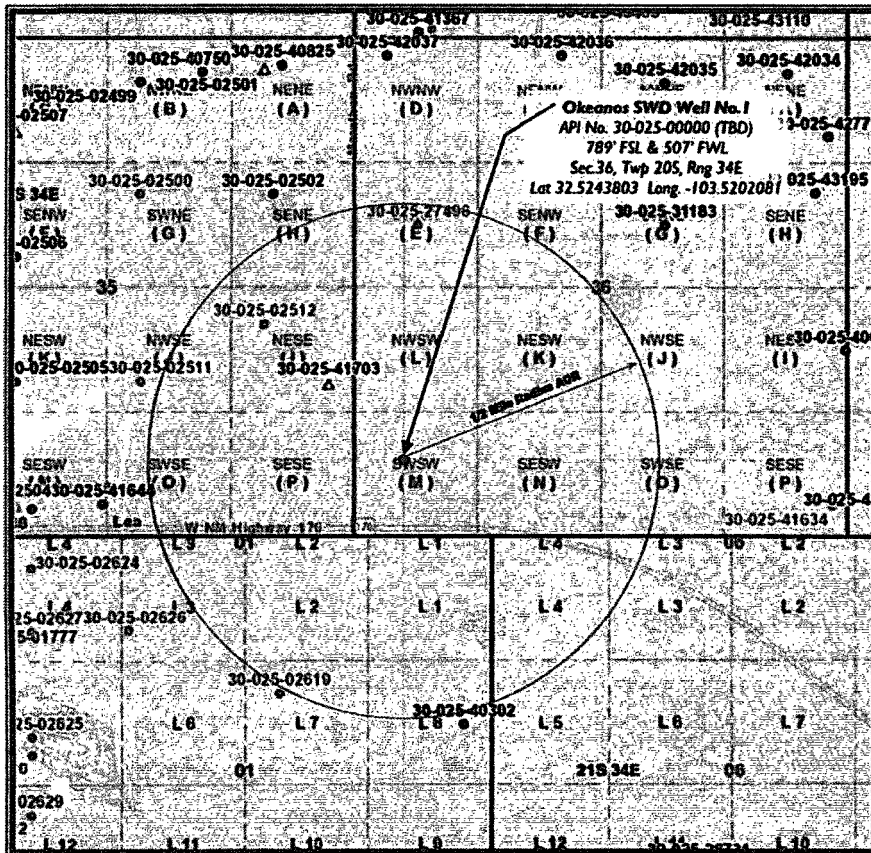
SWD Config Dt: 2/15/2018



Drawn by Ben Stone, 10/11/2017

# Okeanos SWD Well No.1 - Area of Review / Overview Map

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



~21.9 miles W/NW of Eunice, NM



Lea County, New Mexico

