

**STATE OF NEW MEXICO  
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**AMENDED APPLICATION OF NGL WATER  
SOLUTIONS PERMIAN, LLC  
FOR APPROVAL OF SALT WATER  
DISPOSAL WELL IN EDDY COUNTY,  
NEW MEXICO**

**CASE NO. 20404 (WHITT 31)**

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# **Exhibit 1**

**STATE OF NEW MEXICO  
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**APPLICATION OF NGL WATER  
SOLUTIONS PERMIAN, LLC  
TO APPROVE SALT WATER  
DISPOSAL WELL IN EDDY  
COUNTY, NEW MEXICO.**

**CASE NO. 20404**

**AMENDED APPLICATION**

NGL Water Solutions Permian, LLC ("NGL"), OGRID No. 372338, through its undersigned attorneys, hereby makes this amended application to the Oil Conservation Division pursuant to the provisions of N.M. Stat. Ann. § 70-2-12, for an order approving drilling of a salt water disposal well in Eddy County, New Mexico. In support of this application, NGL states as follows:

- (1) NGL submitted an application for the Whitt 31 SWD #1 well on March 5, 2019. That application contained a typographical error in the designated range and footages.
- (2) NGL submits this amended application to correct those errors.
- (3) NGL proposes to drill the Whitt 31 SWD #1 well at a surface location 1,191 feet from the North line and 2,335 feet from the **West line** of Section 31, Township 26 South, **Range 29 East**, NMPM, Eddy County, New Mexico for the purpose of operating a salt water disposal well.
- (4) NGL seeks authority to inject salt water into the Silurian-Devonian formation at a depth of 14,990' to 16,137'.



(5) NGL further seeks approval of the use of 7 inch tubing inside the surface and intermediate casings and 5 ½ inch tubing inside the liner and requests that the Division approve a maximum daily injection rate for the well of 50,000 bbls per day.

(6) NGL anticipates using an average pressure of 2,247 psi for this well, and it requests that a maximum pressure of 2,998 psi be approved for the well.

(7) A proposed C-108 for the subject well is attached hereto in Attachment A.

(8) The granting of this application will avoid the drilling of unnecessary wells, will prevent waste, and will protect correlative rights.

WHEREFORE, this application is set for hearing before an Examiner of the Oil Conservation Division on April 4, 2019; and NGL requests that after notice and hearing, the Division enter its order approving this application.

Respectfully submitted,

MODRALL, SPERLING, ROEHL, HARRIS  
& SISK, P.A.

By: Deana M. Bennett

Deana Bennett  
Post Office Box 2168  
500 Fourth Street NW, Suite 1000  
Albuquerque, New Mexico 87103-2168  
Telephone: 505.848.1800  
*Attorneys for Applicant*

Revised March 23, 2017

RECEIVED:	REVIEWER:	TYPE:	APP NO:
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ABOVE THIS TABLE FOR OCD DIVISION USE ONLY

**NEW MEXICO OIL CONSERVATION DIVISION**  
- Geological & Engineering Bureau -  
1220 South St. Francis Drive, Santa Fe, NM 87505



**ADMINISTRATIVE APPLICATION CHECKLIST**

THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND REGULATIONS WHICH REQUIRE PROCESSING AT THE DIVISION LEVEL IN SANTA FE

**Applicant:** NGL WATER SOLUTIONS PERMIAN LLC

**OGRID Number:** 372338

**Well Name:** WHITT 31 SWD #1

**API:** TBD

**Pool:** SWD; SILURIAN DEVONIAN

**Pool Code:** 96101

**SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION INDICATED BELOW**

**1) TYPE OF APPLICATION:** Check those which apply for [A]

**A. Location - Spacing Unit - Simultaneous Dedication**

☐ NSL ☐ NSP (PROJECT AREA) ☐ NSP (PRORATION UNIT) ☐ SD

**B. Check one only for [I] or [II]**

**[I] Commingling - Storage - Measurement**

☐ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM

**[II] Injection - Disposal - Pressure Increase - Enhanced Oil Recovery**

☐ WFX ☐ PMX ☒ SWD ☐ IPI ☐ EOR ☐ PPR

**2) NOTIFICATION REQUIRED TO:** Check those which apply.

- A. ☒ Offset operators or lease holders  
B. ☐ Royalty, overriding royalty owners, revenue owners  
C. ☒ Application requires published notice  
D. ☒ Notification and/or concurrent approval by SLO  
E. ☒ Notification and/or concurrent approval by BLM  
F. ☒ Surface owner  
G. ☐ For all of the above, proof of notification or publication is attached, and/or,  
H. ☐ No notice required

**FOR OCD ONLY**

- ☐ Notice Complete  
☐ Application Content Complete

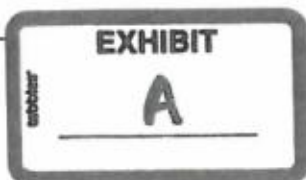
- 3) CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is **accurate** and **complete** to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications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

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

CHRIS WEYAND

Print or Type Name

Signature



02/19/2019

Date

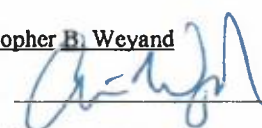
512-600-1764

Phone Number

CHRIS@LONQUIST.COM

e-mail Address

APPLICATION FOR AUTHORIZATION TO INJECT

- I. PURPOSE: Secondary Recovery Pressure Maintenance X Disposal Storage  
Application qualifies for administrative approval? X Yes No
- II. OPERATOR: NGL WATER SOLUTIONS PERMIAN, LLC  
ADDRESS: 1509 W WALL ST // STE 306 // MIDLAND, TX 79701  
CONTACT PARTY: SARAH JORDAN PHONE: (432) 685-0005 x1989
- III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection.  
Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? Yes X No  
If yes, give the Division order number authorizing the project: \_\_\_\_\_
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
  2. Whether the system is open or closed;
  3. Proposed average and maximum injection pressure;
  4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
  5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- \*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- \*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).
- \*XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
- NAME: Christopher B. Weyand TITLE: Consulting Engineer  
SIGNATURE:  DATE: 2/20/2009  
E-MAIL ADDRESS: chris@lonquist.com
- \* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: \_\_\_\_\_

### III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

- (1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

### XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

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

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and,
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

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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.

Side 1

# INJECTION WELL DATA SHEET

OPERATOR: NGL WATER SOLUTIONS PERMIAN, LLC

WELL NAME & NUMBER: WHITT 31 SWD #1

WELL LOCATION: 1,191' FSL & 3,335' FWL 4 31 26S 29E  
FOOTAGE LOCATION UNIT LETTER SECTION TOWNSHIP RANGE

## WELLBORE SCHEMATIC

## WELL CONSTRUCTION DATA

### Surface Casing

Hole Size: 24.000"

Casing Size: 20.000"

Cemented with: 757 sx.

or \_\_\_\_\_ ft<sup>3</sup>

Top of Cement: Surface

Method Determined: Circulation

### 1<sup>st</sup> Intermediate Casing

Hole Size: 17.500"

Casing Size: 13.375"

Cemented with: 1,648 sx.

or \_\_\_\_\_ ft<sup>3</sup>

Top of Cement: Surface

Method Determined: Circulation

### 2<sup>nd</sup> Intermediate Casing

Hole Size: 12.250"

Casing Size: 9.625"

Cemented with: 2,805 sx.

or \_\_\_\_\_ ft<sup>3</sup>

Top of Cement: Surface

Method Determined: Circulation

Production Liner

Hole Size: 8.500"

Casing Size: 7.625"

Cemented with: 958 sx.

or \_\_\_\_\_ ft<sup>3</sup>

Top of Cement: 9,100'

Method Determined: Calculation

Total Depth: 16,137'

Injection Interval

14,990 feet to 16,137 feet

(Open Hole)

### INJECTION WELL DATA SHEET

Tubing Size: 7", 26 lb/ft, P-110, TCPC from 0' - 9,000' and 5.500", 17 lb/ft, P-110 TCPC from 9,000' - 14,960'  
Lining Material: Duoline

Type of Packer: 7-5/8" x 5-1/2" TCPC Permanent Packer with High Temp Elastomer and Full Inconel 925 trim

Packer Setting Depth: 14,960'

Other Type of Tubing/Casing Seal (if applicable): \_\_\_\_\_

#### Additional Data

1. Is this a new well drilled for injection?        X   Yes             No

If no, for what purpose was the well originally drilled? N/A

2. Name of the Injection Formation: Devonian, Silurian, Fusselman and Montoya (Top 100')
3. Name of Field or Pool (if applicable): SWD; Silurian-Devonian
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, new drill.
5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area:  
Delaware: 2,643'  
Cherry Canyon: 3,550'  
Bone Spring: 6,383'  
Wolfcamp: 9,443'



# Whitt 31 SWD

Eddy County NM

AFE

TD

16,137'

Directions to Site SW of Sec 32, T26S, R29E. From Loving travel South on Hwy 285 2.4 miles and Turn East (left) on Catfish Rd. Travel 1.4 miles and location will be on the left  
Lat/Long - 32.0088889, -104.00750000

Vertical Injection - Devonian, Fusselman, Montoya

Drill and Complete Cost

\$9.2MM

GL/KB

2880/

Geologic Tops (MD ft)	Section	Problems	Bit/BHA	Mud	Casing	Logging	Cement (HOLD)	Injection String
Rustler 300'  Surface TD 500'	Surface Drill 24" 0' - 500' Set and Cement 20" Casing	Loss Circulation Hole Cleaning Wellbore stability in the Red Beds	24" Mill Tooth Bit + Bit sub w/ float 17 + 17" NBS + 1X8" DC + 17" IBS + 1X8" DC + SS + 4X8" DC's + X/O + 5" HWDP	Spud Mud  MW< 9.0	500' of 20" 94# J55 BTC Centralizers - bottom 2 joints and every 3rd jt thereafter, Cement basket 5th jt from surface	Mud loggers on site by Drillout of Surf.	757sx of Halcem 3hr TT 50% Excess 1000psi CSD after 10hrs	9000' of 7" P110 26# TCPC
Castile 905'  Delaware 2,643'	1st Intermediate Drill 1790' of 17-1/2" Hole 850' - 2640' Set and Cement 13-3/8" Casing	Seepage Losses Possible H2S Anhydrite Salt	17-1/2" Varel PDC Bit + 9 5/8" X 8" 7/8 4.0 Combo MM w/ 17" Steel NBS + 17" IBS + 2X8" DC's + SS + 4X8" DC's + 18X6" DC's + X/O + HWDP	Brine	5M A Section Casing Bowl 2640' of 13-3/8" 68# HCL80 BTC Centralizers - bottom jt, every 3rd joint in open hole and 2 jt ins de the surface casing	Gyro Survey	Halcem, 1648sx, 13.7ppg 30% Excess 1000psi CSD after 10 hrs Cement to Surface	
1st Int TD - 2,640' 9-5/8" DV/ECP 2,740' Bell Canyon 2682 Cherry Canyon 3,550' Brushy Canyon 4,559'	2nd Intermediate Drill 6960' of 12-1/4" Hole 2640' - 9600' Set 9-5/8" Intermediate Casing and Cement in 3 Stages	Seepage to Complete Loss Water Flows  Some Anhydrite H2S possible  Production in the Lower Wolfcamp	12-1/4" Smith XS 7165 AxeBlade PDC Bit, sub, 8" 7/8 4.0 0.16 MM w/ 12" NBS, ALS Roller Reamer DeMag, UBHO sub, ALS 12" RR/UBHO/NMDC, SS, 6 jts: 8" DC, X/O sub, 18 jts: 6" DC, X/O sub, 8" Drilling Jars HWDP + 5" DP to Surface	Cut Brine	10M B Section 9600' of 9 5/8" 53.5# HCL80 BTC Special Drift to 8.535"  Externally Coat 3850' Between DV Tools -DV/ECP tool at at 2740' (DV Tool 100' Below Previous Casing shoe)  -DV Tool w/ no ECP placed nominally above the Bone Springs top  Centralizers - bottom jt, 100' aside of DV tool, every 3rd joint in open hole and 5 within the surface casing, ensure centralizers are 9-3/4" to fit Coated Pipe.	12.25" Open Hole: MWD GR Triple combo, Caliper, CBL of 13-3/8" Casing to surface  Cased Hole: CBL/Pressure Pass to 1000 psi of 9-5/8" Casing before drillout	Stage 3: 10% Excess 576sx Halcem 13.7ppg 1000psi CSD after 10 hrs Cement to Surface	
9-5/8" DV 6,400' Bone Springs 6,383'					Stage 2: 50% Excess 1,004 sx Halcem 13.7ppg 1000psi CSD after 10 hrs			
TOC - Stage 1 Tail - 8,700'  7-5/8" Liner Top 9,100'  Wolfcamp 9,443' 2nd Int TD - 9,600'					Stage 1: 1220sx Halcem 1.37ppg, 50% XS 1000psi CSD after 10hrs	Duoline Internally Coated Injection Tubing		
Strawn 12,034' Atoka 12,256' Morrow 12,924' Miss Lime 14,582' Woodford 14,822' Injection Packer 14,960' Devonian 14,980' 3rd Int TD 14,990'	3rd Intermediate Liner Drill 5470' of 8-1/2" Hole 9700' - 15170'	Pressure in the Atoka  Hard Drilling in the Atoka & Morrow	8-1/2" Smith XS 7165 AxeBlade PDC Bit, sub, 6-3/4" 7/8 5.7 MM w/ 8" NBS, UBHO sub, 8" NMIBS/UBHO/NMDC, SS, 18 jts: 6" DC 6" Drilling Jars HWDP + 5" DP to Surface	Weighted WBM 11.0 ppg- 13.5 ppg (MAX)	5890' of 7-5/8" 39# HCP110 EZGO FJ3 (Gas Tight) VersaFlex Packer Hanger  Centralizers on and 1 jt above shoe jt and then every 2nd jt.	8.5" Open Hole: MWD GR Triple combo, Caliper of 8.5" Open Hole  Cased Hole: SCBL/Pressure Pass to 1000 psi of 7-5/8" Casing before drillout	958sx of Neocem 13.2 ppg 50% Excess 1000psi CSD after 12hrs	7-5/8" x 5-1/2" TCPC Permanent Packer with High Temp Elastomer and full Inconel 925 trim
Fusselman - 15,414'  Montoya - 16,037' TD - 16,137'	Injection Interval Drill 1500 of 6 1/2" hole 14990 - 16137'	Chert is possible  Loss of Circulation and or Flows are expected  BHT estimated at 280F	6-1/2" Smith U611S PDC Bit, sub, 5" 7/8 2.6 0.26 1.5FBH MM w/ 6" NBS, 6" NMIBS, UBHO/NMDC, SS, X/O sub, 24 jts: 4-3/4" HWDP + 4" DP to Surface	Brine Water - flows possible	Openhole completion	MWD GR  Triple Combo with FMI and CMR Tool	Displace with clean heavy brine	



**NGL Water Solutions Permian, LLC**

**Whitt 31 SWD No. 1**

**FORM C-108 Supplemental Information**

**III. Well Data**

**A. Wellbore Information**

1.

Well information	
Lease Name	Whitt 31 SWD
Well No.	1
Location	S-31 T-26S R-29E
Footage Location	1,191' FNL & 2,335' FWL

2.

**a. Wellbore Description**

Casing Information				
Type	Surface	Intermediate	Production	Liner
OD	20"	13.375"	9.625"	7.625"
WT	0.635"	0.480"	0.545"	0.500"
ID	19.124"	12.415"	8.535"	6.625"
Drift ID	18.936"	12.259"	8.535"	6.500"
COD	21.00"	14.375"	10.625"	7.625"
Weight	94 lb/ft	68 lb/ft	53.5 lb/ft	39 lb/ft
Grade	J-55	HCL-80	HCL-80	HC-P110
Hole Size	24"	17.5"	12.25"	8.5"
Depth Set	500'	2,640'	9,600'	9,100' – 14,990'

**b. Cementing Program**

Cement Information				
Casing String	Surface	Intermediate	Production	Liner
Lead Cement	Extenda Cem	Halccm	Halccm	Neocem
Lead Cement Volume	161	1,648	Stage 1: 1,220 sx Stage 2: 1,004 sx Stage 3: 576 sx	958
Tail Cement	Halccm			
Tail Cement Volume	596			
Cement Excess	50%	30%	10%,50%,50%	50%
TOC	Surface	Surface	Surface	9,100'
Method	Circulate to Surface	Circulate to Surface	Circulate to Surface	Logged

3. Tubing Description

Tubing Information		
OD	7"	5.5"
WT	0.362"	0.304"
ID	6.276"	4.892"
Drift ID	7.875"	6.050"
COD	6.151"	4.653"
Weight	26 lb/ft	17 lb/ft
Grade	P-110 TCPC	P-110 TCPC
Depth Set	0'-9,000'	9,000'-14,960'

Tubing will be lined with Duoline.

4. Packer Description

7-5/8" x 5-1/2" TCPC Permanent Packer with High Temp Elastomer and Full Inconel 925 trim

B. Completion Information

1. Injection Formation: Devonian, Silurian, Fusselman, Montoya (Top 100')
2. Gross Injection Interval: 14,990' – 16,137'

Completion Type: Open Hole

3. Drilled for injection.
4. See the attached wellbore schematic.
5. Oil and Gas Bearing Zones within area of well:

Formation	Depth
Delaware	2,643'
Cherry Canyon	3,550'
Bone Spring	6,383'
Wolfcamp	9,443'

## VI. Area of Review

No wells within the area of review penetrate the proposed injection zone.

## VII. Proposed Operation Data

### 1. Proposed Daily Rate of Fluids to be Injection:

Average Volume: 40,000 BPD  
Maximum Volume: 50,000 BPD

### 2. Closed System

### 3. Anticipated Injection Pressure:

Average Injection Pressure: 2,247 PSI (surface pressure)  
Maximum Injection Pressure: 2,998 PSI (surface pressure)

4. The injection fluid is to be locally produced water. It is expected that the source water will predominantly be from the Bone Spring, Delaware, Avalon, and Wolfcamp formations. Attached are produced water sample analyses taken from the closest wells that feature samples from the above mentioned formations.
5. The disposal interval is non-productive. No water samples are available from the surrounding area.

### VIII. Geological Data

The Devonian formation is a dolomitic ramp carbonate that occurs below the Woodford shale and above the Fusselman formation. Strata found in the Devonian formation include two major groups, the Wristen Buildups and the Thirtyone Deepwater Chert, with the Wristen being more abundant. The Wristen Groups is composed of mixed limestone and dolomites with mudstone to grainstone and boundstone textures. Porosity in the Wristen group is a result of both primary and secondary development. Present are moldic, vugular, karstic (including collapse breccia) features that allow for higher porosities and permeabilities. The Thirtyone Formation contains two end-member reservoir facies, skeletal packstones/grainstones and spiculitic chert, with most of the porosity and permeability found in the coarsely crystalline cherty dolomite. These particular characteristics allow for this formation to be a tremendous Salt Water Disposal horizon.

#### A. Injection Zone: Siluro-Devonian Formation

Formation	Depth
Rustler Anhydrite	300
Delaware	2,643
Bone Spring	6,383
Wolfcamp	9,443
Strawn	12,034
Atoka	12,256
Morrow	12,924
Mississippian	14,582
Woodford	14,822
Devonian	14,980
Fusselman	15,414
Montoya	16,037

#### B. Underground Sources of Drinking Water

There are three water wells within 1-mile of the proposed Whitt 31 SWD #1 location. Mesquite Disposal Pit Well No. B-1, B-2, and B-3 are the three well names, and the drilled depths range from 35-40 ft. Water wells in the surrounding area have an average depth of 206 ft and an average water depth of 118 ft generally producing from the Santa Rosa. The upper Rustler may also be another USDW and will be protected. Active Texas oil and gas wells that were within 2 miles of the proposed Whitt 32 SWD #1 location had an average groundwater protection requirement depth of 440 ft based on the base of the Rustler.

#### IX. Proposed Stimulation Program

Stimulate with up to 50,000 gallons of acid.

#### X. Logging and Test Data on the Well

There are no logs or test data on the well. During the process of drilling and completion resistivity, gamma ray, and density logs will be run.

#### XI. Chemical Analysis of Fresh Water Wells

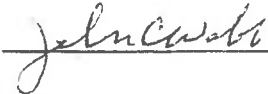
There are three water wells that exist within one mile of the well location, but all wells had been plugged. A map and State of Texas Well Report is attached.

XII. Affirmative Statement of Examination of Geologic and Engineering Data

Based on the available engineering and geologic data we find no evidence of open faults or any other hydrologic connection between the disposal zone (in the proposed **Whitt 31 SWD #1**) and any underground sources of drinking water.

NAME: John C. Webb

TITLE: Sr. Geologist

SIGNATURE: 

DATE: 2/23/2017

**District I**  
1625 N. French Dr., Hobbs, NM 88240  
Phone: (575) 393-6161 Fax: (575) 393-0720  
**District II**  
811 S. First St., Artesia, NM 88210  
Phone: (575) 748-1283 Fax: (575) 748-9720  
**District III**  
1000 Rio Brazos Road, Aztec, NM 87410  
Phone: (505) 334-6178 Fax: (505) 334-6170  
**District IV**  
1220 S. St. Francis Dr., Santa Fe, NM 87505  
Phone: (505) 476-3460 Fax: (505) 476-3462

**State of New Mexico**  
**Energy Minerals and Natural Resources**  
**Oil Conservation Division**  
**1220 South St. Francis Dr.**  
**Santa Fe, NM 87505**

Form C-101  
Revised July 18, 2013

☐ AMENDED REPORT

**APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE**

<sup>1</sup> Operator Name and Address NGL WATER SOLUTIONS PERMIAN, LLC 1509 W WALL ST, STE 306 MIDLAND, TX 79701		<sup>2</sup> OGRID Number 372338 <sup>3</sup> API Number TBD
<sup>4</sup> Property Code	<sup>5</sup> Property Name WHITT 31 SWD	<sup>6</sup> Well No. 1

**<sup>7</sup> Surface Location**

UL - Lot	Section	Township	Range	Lot Idn	Feet from	N/S Line	Feet From	E/W Line	County
4	31	26S	29E	N/A	1,191'	NORTH	2,335'	WEST	EDDY

**<sup>8</sup> Proposed Bottom Hole Location**

UL - Lot	Section	Township	Range	Lot Idn	Feet from	N/S Line	Feet From	E/W Line	County
-	-	-	-	-	-	-	-	-	-

**<sup>9</sup> Pool Information**

Pool Name SWD: Silurian-Devonian	Pool Code 96101
-------------------------------------	--------------------

**Additional Well Information**

<sup>11</sup> Work Type N	<sup>12</sup> Well Type SWD	<sup>13</sup> Cable/Rotary R	<sup>14</sup> Lease Type Private	<sup>15</sup> Ground Level Elevation 2,920'
<sup>16</sup> Multiple N	<sup>17</sup> Proposed Depth 16,137'	<sup>18</sup> Formation Siluro-Devonian	<sup>19</sup> Contractor TBD	<sup>20</sup> Spud Date ASAP
Depth to Ground water 118'		Distance from nearest fresh water well 3,472'		Distance to nearest surface water > 1 mile

☐ We will be using a closed-loop system in lieu of lined pits

**<sup>21</sup> Proposed Casing and Cement Program**

Type	Hole Size	Casing Size	Casing Weight/ft	Setting Depth	Sacks of Cement	Estimated TOC
Surface	24"	20"	94 lb/ft	500'	757	Surface
Intermediate	17.5"	13.375"	68 lb/ft	2,640'	1,648	Surface
Production	12.25"	9.625"	53.5 lb/ft	9,600'	2,805	Surface
Prod. Liner	8.5"	7.625"	39 lb/ft	14,990'	958	9,100'
Tubing	N/A	7"	26 lb/ft	0' - 9,000'	N/A	N/A
Tubing	N/A	5.5"	17 lb/ft	9,000' - 14,960'	N/A	N/A

**Casing/Cement Program: Additional Comments**

See attached schematic.

**<sup>22</sup> Proposed Blowout Prevention Program**

Type	Working Pressure	Test Pressure	Manufacturer
Double Hydraulic/Blinds, Pipe	10,000 psi	8,000 psi	TBD - Schaffer/Cameron

<sup>23</sup> I hereby certify that the information given above is true and complete to the best of my knowledge and belief.  
I further certify that I have complied with 19.15.14.9 (A) NMAC ☐ and/or 19.15.14.9 (B) NMAC ☒ if applicable.  
Signature:

Printed name: Christopher B. Weyand

Title: Consulting Engineer

E-mail Address: chris@lonquist.com

Date: 02/20/2019

Phone: (512) 600-1764

**OIL CONSERVATION DIVISION**

Approved By:

Title:

Approved Date:

Expiration Date:

Conditions of Approval Attached

District I  
1625 N. French Dr., Hobbs, NM 88240  
Phone: (575) 393-6161 Fax: (575) 393-0720  
District II  
811 S. First St., Artesia, NM 88210  
Phone: (575) 748-1283 Fax: (575) 748-9720  
District III  
1000 Rio Brazos Road, Artesia, NM 87410  
Phone: (505) 334-6178 Fax: (505) 334-6170  
District IV  
1220 S. St. Francis Dr., Santa Fe, NM 87505  
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico  
Energy, Minerals & Natural Resources Department  
OIL CONSERVATION DIVISION  
1220 South St. Francis Dr.  
Santa Fe, NM 87505

Form C-102  
Revised August 1, 2011  
Submit one copy to appropriate  
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

<sup>1</sup> API Number		<sup>2</sup> Pool Code 96101		<sup>3</sup> Pool Name SWD; Silurian-Devonian	
<sup>4</sup> Property Code		<sup>5</sup> Property Name Whitt 31 SWD			<sup>6</sup> Well Number 1
<sup>7</sup> OGRID No. 372338		<sup>8</sup> Operator Name NGL Water Solutions Permian LLC			<sup>9</sup> Elevation 1920.00±

<sup>10</sup> Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
4	31	26S	29E	N/A	1191'	North	2335'	West	Eddy

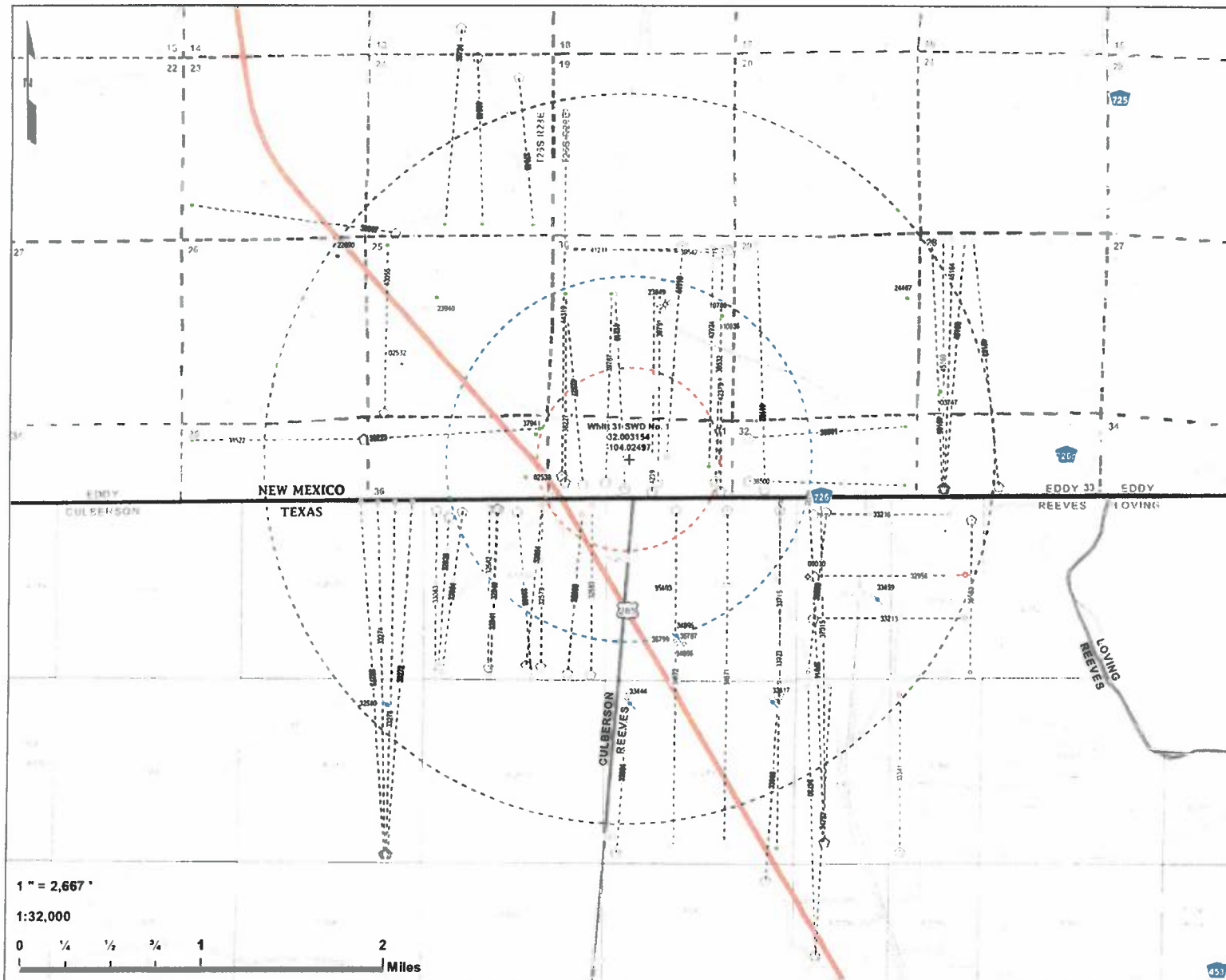
<sup>11</sup> Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
<sup>12</sup> Dedicated Acres	<sup>13</sup> Joint or Infill	<sup>14</sup> Consolidation Code	<sup>15</sup> Order No.						

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

<p>PROPOSED WHITT 31 SWD #1</p> <p>NMSP-E (NAD27) N=364,965.78 E=595,737.68</p> <p>NMSP-E (NAD83) N=365,023.02 E=636,923.28 LAT=32°00'11.35" LONG=104°01'29.89"</p>		<p><sup>17</sup> OPERATOR CERTIFICATION</p> <p>I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling.</p> <p>I hereby acknowledged by the division</p> <p><i>[Signature]</i> 2/20/2017 Signature Date</p> <p>Chris Weyand Printed Name chris@lonquist.com E-mail Address</p>
		<p><sup>18</sup> SURVEYOR CERTIFICATION</p> <p>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.</p> <p>12/19/2018 Date of Survey</p> <p>Signature and Seal of Professional Surveyor</p> <p>25114 <i>[Signature]</i> Certificate Number</p>





**Whitt 31 SWD No. 1**  
**2 Mile Area of Review**  
 NGL Water Solutions Permian, LLC  
 Eddy County, NM

PCS: NAD 1983 SPCS NM-E FIPS 3001 (US Ft.)

Drawn by: SJL Date: 1/9/2019 Approved by: C8W

**LONQUIST & CO LLC**

PERMISSION ENGINEERS ENERGY ADVISORS

AUSTIN HOUSTON WICHITA DENVER CALGARY

- + Whitt 31 SWD No. 1
- 12 Mile Radius
- 1 Mile Radius
- 2 Mile Radius
- OO-Section (NM-PLSS 2nd Div.)
- Section (NM-PLSS 1st Div.)
- Township/Range (NM-PLSS)
- Texas Abstracts
- Counties
- States
- Latent
- NM - API (30-015-...) SHL Status - Type (Count)
- Horizontal Surface Location (26)
- Plugged (Site Released) - Oil (9)
- Plugged (Not Released) - Salt Water Disposal (1)
- NM - API (30-015-...) BHL Status - Type (Count)
- Active - Oil (15)
- Active - Gas (4)
- Permitted - Oil (3)
- Permitted - Gas (4)
- Plugged (Site Released) - Oil (2)
- TX - API (42-109/389-...) SHL Status - Type (Count)
- Horizontal Surface Location (31)
- Active - Salt Water Disposal (5)
- Permitted - Salt Water Disposal (3)
- Permit - Expired (1)
- Dry Hole (1)
- TX - API (42-109/389-...) BHL Status - Type (Count)
- Active - Oil (2)
- Active - Gas (13)
- Permitted - Oil/Gas (8)
- Shut In - Gas (2)
- Permit - Expired (4)
- Canceled Location (2)

WHITT Data Sources: NM DCD, DrillingInfo (2019)



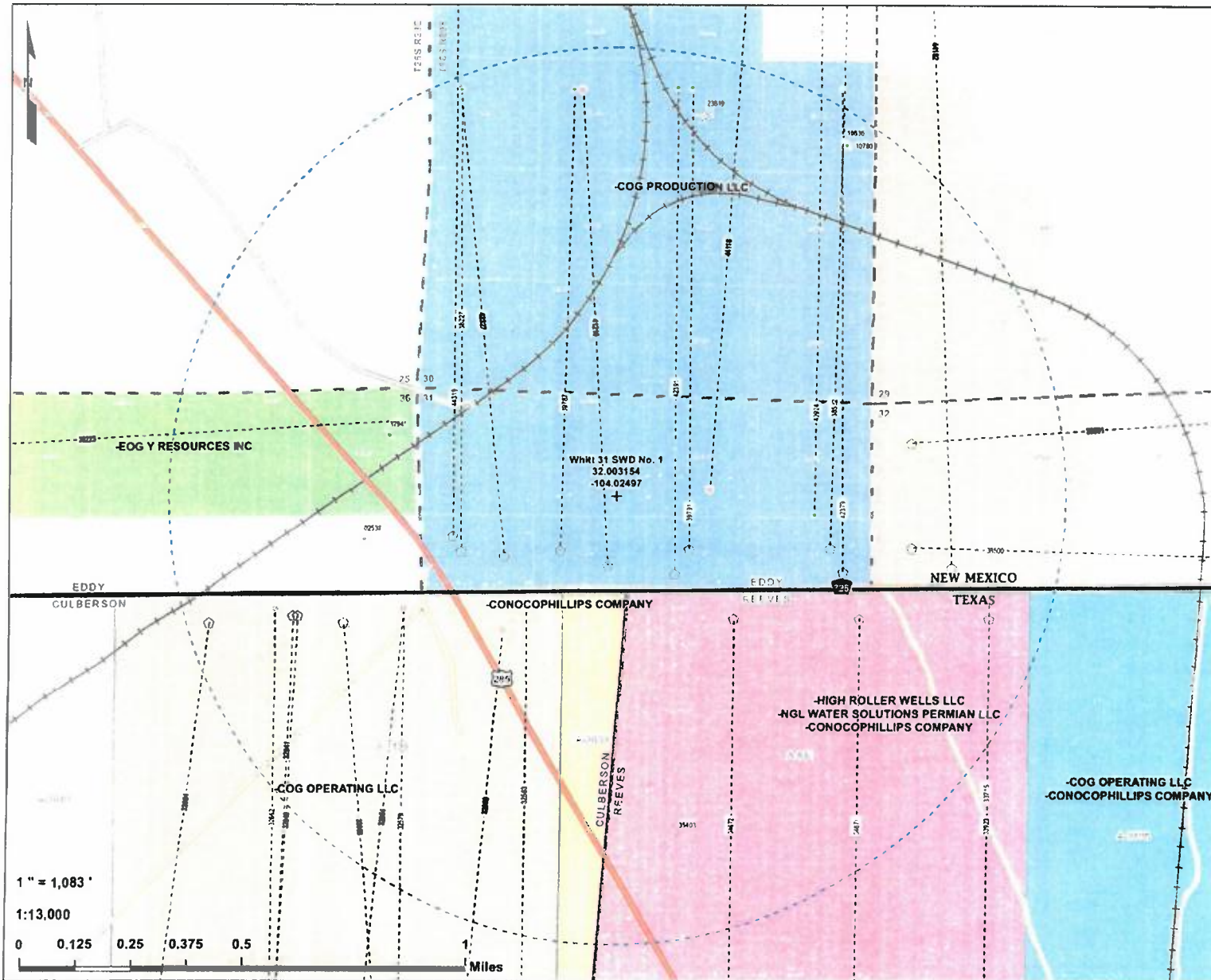
1" = 2,667'

1:32,000

0 1/4 1/2 3/4 1 2 Miles

**Whitt 31 SWD No. 1  
1 Mile Area of Review List**

API	WELL NAME	WELL TYPE	STATUS	OPERATOR	TVD (FT.)	LATITUDE (NAD83 DD)	LONGITUDE (NAD83 DD)	DATE DRILLED
3001502538	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	2766	32.0018120000	-104.034561200	10/3/1960
3001510780	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	395	32.0144806000	-104.016288800	4/4/1966
3001510836	PRE-ONGARD WELL #001	O	P	PRE-ONGARD WELL OPERATOR	2841	32.0145493000	-104.016288800	5/9/1966
3001523849	PERKINS SWD #001	S	H	COG PRODUCTION, LLC	4229	32.0154495000	-104.021606400	12/17/2010
3001537941	BUHO BQH STATE #002	O	P	EOG Y RESOURCES, INC.	165	32.0051804000	-104.033599900	6/30/2010
3001538223	BUHO BQH STATE #001H	O	A	EOG Y RESOURCES, INC.	7058	32.0048676000	-104.049636800	8/10/2011
3001538227	COPPERHEAD FEE A #001H	O	A	COG PRODUCTION, LLC	11703	32.0014076000	-104.030868500	8/8/2011
3001538500	SIDEWINDER #001H	O	P	COG PRODUCTION, LLC	9	32.0014343000	-104.013748200	6/18/2011
3001538501	SIDEWINDER #002H	O	P	COG PRODUCTION, LLC	7028	32.0052414000	-103.999687200	11/6/2011
3001538532	COPPERHEAD 31 FEDERAL COM #001H	O	A	COG PRODUCTION, LLC	6781	32.0014305000	-104.016845700	5/2/2011
3001539787	COPPERHEAD FEE A #002H	O	A	COG PRODUCTION, LLC	7043	32.0014153000	-104.027092000	2/12/2012
3001539791	COPPERHEAD 31 FEDERAL COM #002H	O	A	COG PRODUCTION, LLC	8302	32.0014229000	-104.022201500	3/6/2012
3001541210	COPPERHEAD FEE A #004H	G	A	COG PRODUCTION, LLC	10647	32.0009170000	-104.025290000	3/28/2017
3001542327	COPPERHEAD FEE A #003H	O	A	COG PRODUCTION, LLC	8295	32.0012321000	-104.029220600	12/8/2014
3001542379	COPPERHEAD 31 FEDERAL COM #003H	O	N	COG PRODUCTION, LLC	13701	32.0006599000	-104.016357400	
3001542391	RIDGE NOSE FEDERAL COM #001H	O	A	COG PRODUCTION, LLC	6377	32.0006523000	-104.022750900	2/10/2015
3001543924	COPPERHEAD 31 FEDERAL COM #003H	O	A	COG PRODUCTION, LLC	10736	32.0197870000	-104.017210000	11/3/2016
3001544118	COPPERHEAD 31 FEDERAL COM #021H	G	A	COG PRODUCTION, LLC	10759	32.0201850000	-104.020036000	5/5/2017
3001544192	SIDEWINDER FEDERAL COM #004H	G	A	COG OPERATING LLC	10757	32.0007825000	-104.012251500	6/7/2017
3001544319	COPPERHEAD 31 FEE #020H	G	A	COG PRODUCTION, LLC	10708	32.0019120000	-104.031175000	11/1/2017
4210932579	CARPENTER C UNIT #203H	G	A	COG OPERATING LLC	8199	31.9867811622	-104.033068059	7/29/2013
4210932583	CARPENTER D UNIT #204H	G	A	COG OPERATING LLC	8240	31.9860278235	-104.028398613	11/20/2013
4210932662	CARPENTER B UNIT #202H	G	A	COG OPERATING LLC	8220	31.9867315047	-104.038012154	3/19/2014
4210932664	CARPENTER A UNIT #201H	G	A	COG OPERATING LLC	7512	31.9991482832	-104.040454071	5/24/2014
4210932668	CARPENTER F UNIT #224H	G	A	COG OPERATING LLC	10799	31.9862013627	-104.030588364	4/29/2014
4210932854	CARPENTER C UNIT #207H	O	A	COG OPERATING LLC	9350	31.9868746034	-104.034449051	8/16/2015
4210932940	CARPENTER E UNIT #223H	G	S	COG OPERATING LLC	9653	31.9993753042	-104.037081714	5/8/2016
4210932941	CARPENTER E UNIT #222H	G	A	COG OPERATING LLC	10523	31.9993753019	-104.037249568	4/27/2016
4210933068	CARPENTER F UNIT #226H	G	A	COG OPERATING LLC	10579	31.9991330958	-104.035334485	5/15/2017
4238933715	RAMSEY AA 1 #1H	O	C	CONOCOPHILLIPS COMPANY	0	31.9843553178	-104.010865335	
4238933923	ALL IN BS #102H	O	A	CONOCOPHILLIPS COMPANY	8333	31.9991372474	-104.010835248	11/18/2013
4238934671	ALL IN BS #103H	O	X	CONOCOPHILLIPS COMPANY	0	31.9991619757	-104.015741200	
4238934672	ALL IN BS #104H	O	X	CONOCOPHILLIPS COMPANY	0	31.9991752611	-104.020502186	
4238935403	HWY 285 SWD #2	S	X	NGL WATER SOLUTIONS PERMIAN LLC	0	31.9922305898	-104.022500981	



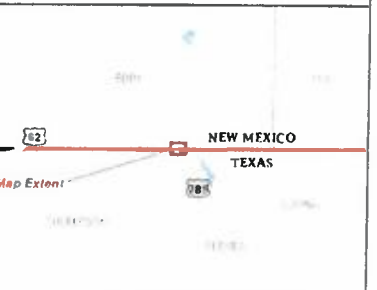
**Whitt 31 SWD No. 1**  
**1 Mile Offset Operators**  
**NGL Water Solutions Permian, LLC**  
**Eddy County, NM**

PCS: NAD 1983 SPCS NM E FIPS 3001 (US Ft.)  
 Drawn by: SJL Date: 1/10/2019 Approved by: C8W

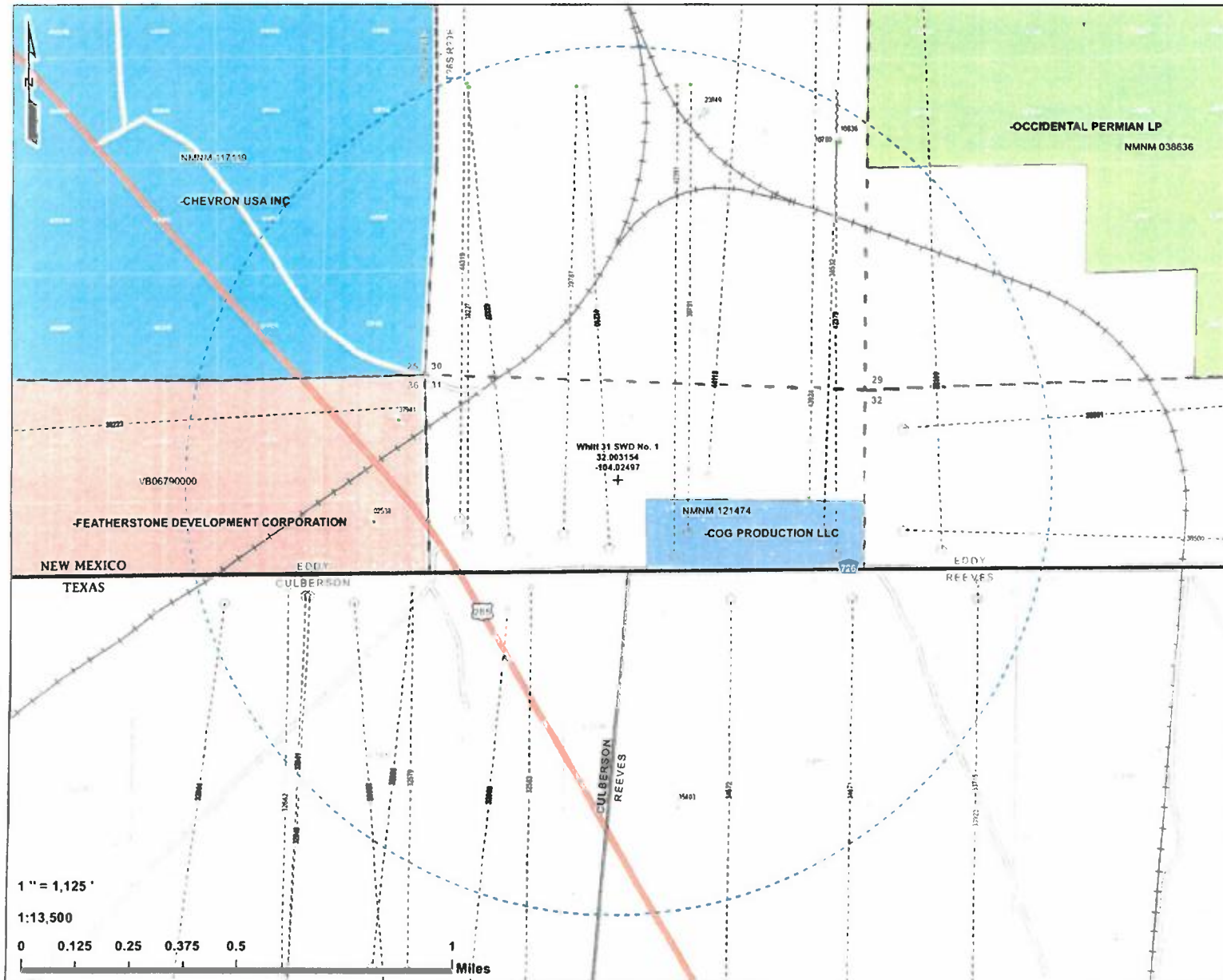
**LONQUIST & CO. LLC**  
 PETROLEUM ENGINEERS ENERGY ADVISORS  
 AUSTIN HOUSTON WICHITA DENVER CALGARY

- + Whitt 31 SWD No. 1
- 1 Mile Radius
- OG Section (NM-PLSS 2nd Div.)
- Section (NM-PLSS 1st Div.)
- Township/Range (NM-PLSS)
- Texas Abstracts
- Counties
- States
- Laterals
- NM API (30-015-...) BHL Status - Type (Count)
  - Horizontal Surface Location (15)
  - Plugged (Site Released) - Oil (4)
  - Plugged (Not Released) - Salt Water Disposal (1)
- NM API (30-015-...) BHL Status - Type (Count)
  - Active - Oil (8)
  - Active - Gas (4)
  - Permitted - Oil (1)
  - Plugged (Site Released) - Oil (2)
- TX API (42-109/389-...) BHL Status - Type (Count)
  - Horizontal Surface Location (13)
  - Permit - Expired (1)
- TX API (42-109/389-...) BHL Status - Type (Count)
  - Active - Oil (2)
  - Active - Gas (7)
  - Shut In - Gas (1)
  - Permit - Expired (2)
  - Canceled Location (1)
- Operators
  - COG OPERATING LLC
  - COG OPERATING LLC - CONOCOPHILLIPS COMPANY
  - COG PRODUCTION LLC
  - CONOCOPHILLIPS COMPANY
  - EOG Y RESOURCES INC
  - HIGH ROLLER WELLS LLC - NGL WATER SOLUTIONS PERMIAN LLC, CONOCOPHILLIPS COMPANY

Well Data Sources: NM OGD, DrillingInfo (2019)







**Whitt 31 SWD No. 1**  
**1 Mile Offset Lessees**  
**NGL Water Solutions Permian, LLC**  
**Eddy County, NM**

PCS NAD 1983 SPCS NM-E FIPS 3001 (US FL.)

Drawn by: S/JL    Date: 1/14/2019    Approved by: CBV

**LONQUIST & CO. LLC**  
 PETROLEUM ENGINEERS    ENERGY ADVISORS

AUSTIN   HOUSTON   WICHITA   DENVER   CALGARY

---

**Legend**

- + Whitt 31 SWD No. 1
- 1 Mile Radius
- OO-Section (NM-PLSS 2nd Div.)
- Section (NM-PLSS 1st Div.)
- Township/Range (NM-PLSS)
- Texas Abstracts
- Counties
- States
- NM - BLM (O&G Leases)
- NM - SLO (O&G Leases)
- Laterals
- NM API (30-015...) BHL Status - Type (Count)
- Horizontal Surface Location (15)
- Plugged (Site Released) - Oil (4)
- Plugged (Not Released) - Salt Water Disposal (1)
- NM API (38-015...) BHL Status - Type (Count)
- Active - Oil (8)
- Active - Gas (4)
- Permitted - Oil (1)
- Plugged (Site Released) - Oil (2)
- TX API (42-109/389...) BHL Status - Type (Count)
- Horizontal Surface Location (13)
- Permit - Expired (1)
- TX API (42-109/389...) BHL Status - Type (Count)
- Active - Oil (2)
- Active - Gas (7)
- Shut In - Gas (1)
- Permit - Expired (2)
- Canceled Location (1)

**Lessees**

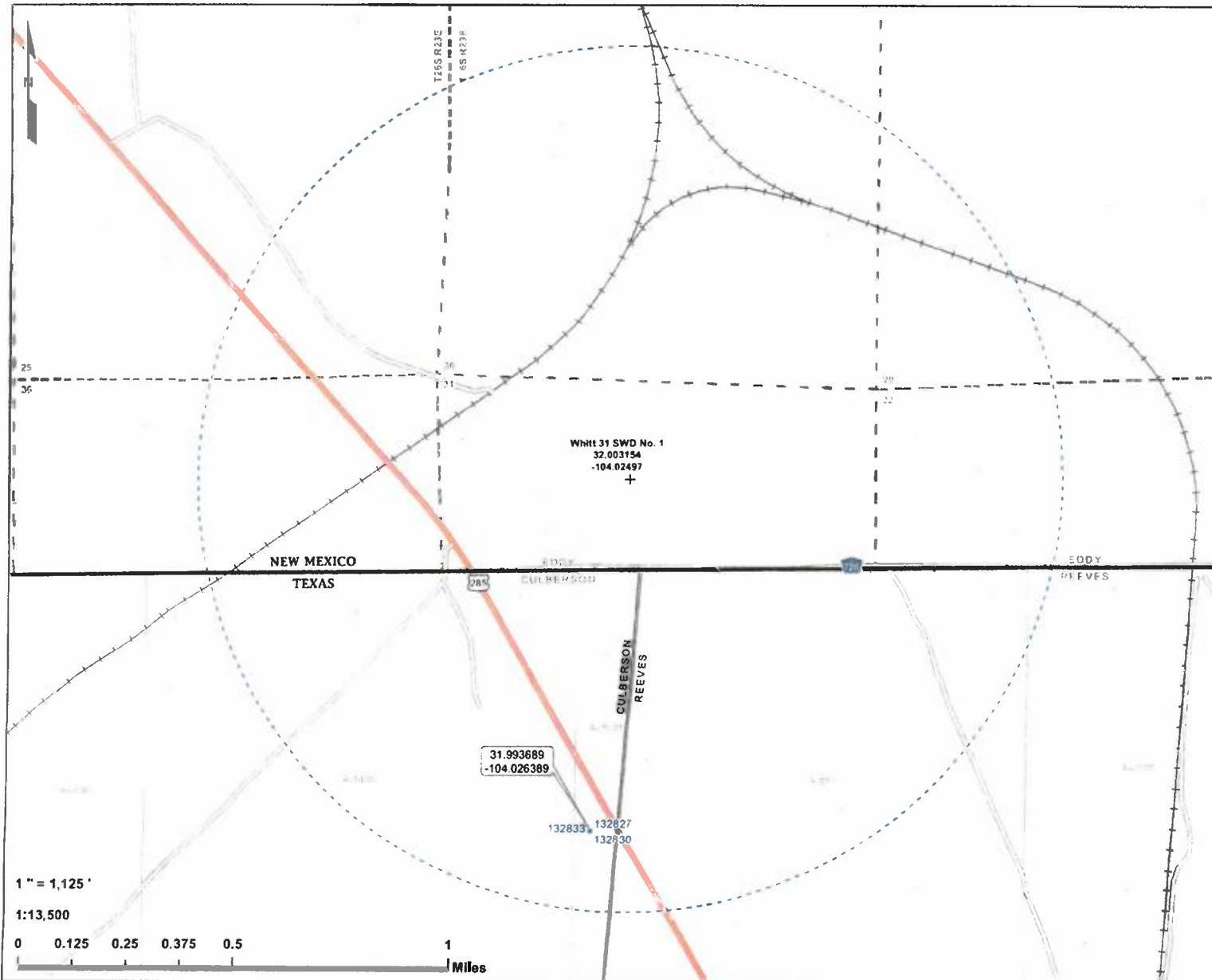
- CHEVRON USA INC
- COG PRODUCTION LLC
- FEATHERSTONE DEVELOPMENT CORPORATION
- OCCIDENTAL PERMIAN LP

Well Data Sources: NM DCD, DrillingInfo (2019)

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**Map Extent**

wellname	api	county	formation	ph	ids_mgl	sodium_mgl	calcium_mgl	iron_mgl	magnesium_mgl	manganese_mgl	chloride_mgl	bicarbonate_mgl	sulfate_mgl	co2_mgl
SNAPPING 2 STATE #013H	3001542113	EDDY	BONE SPRING 3RD SAND	6.5	94965.6	31352.7	3678.6	31.7	483.6	0.83	57489.5	244	355.2	200
SNAPPING 2 STATE #013H	3001542113	EDDY	BONE SPRING 3RD SAND	7	94518.2	30031.5	3402.8	19.9	438.2		58782.2		365	200
SNAPPING 2 STATE #013H	3001542113	EDDY	BONE SPRING 3RD SAND	7.2	94863.9	30224.8	3424	14.8	444		59015.2		399.7	100
SNAPPING 2 STATE #014H	3001542688	EDDY	WOLF CAMP	7.3	81366.4	26319.4	7687.4	26.1	326.7		50281.7		327.9	150
SNAPPING 2 STATE #013H	3001542113	EDDY	BONE SPRING 3RD SAND	6.8	91289.1	28721.3	3440.7	16.3	437.4		56957.4	24	330	
FED #001	3001527421	EDDY	DELAWARE	5.7	255593						160000	139	1332	
USA #001	3001504776	EDDY	DELAWARE	6.6	176882						108700	122	618	20
SNAPPING 10 FEDERAL #005H	3001504776	EDDY	BONE SPRING 7ND SAND	6.6	136161.9	44458.5	6280.8	29.7	781.3	0	84470	122	618	20
SNAPPING 10 FEDERAL #005H	3001504994	EDDY	BONE SPRING 7ND SAND	6.6	138376	44458.5	6280.8	29.7	781.3	0	84470	122	618	20
SNAPPING 10 FEDERAL #001H	3001537899	EDDY	AVALON UPPER	6.5	199638.8	68948.2	7560.4	111.2	1572.8	2.19	118195	366	632	500
SNAPPING 11 FEDERAL #001H	3001538193	EDDY	AVALON UPPER	6.1	725189.8	77010.7	8743.8	636.1	1649.2	6.75	134075	366	632	1100
SNAPPING 2 STATE #003H	3001539036	EDDY	AVALON UPPER	6.5	223019	76001.7	10437.8	209.9	192.4	4.5	131072	366	632	500
SNAPPING 2 STATE #006H	3001539162	EDDY	AVALON UPPER	6.5	179788.5	71525.7	617.4	21.8	109.6	0	101374	3660	844	500
SNAPPING 2 STATE #006H	3001539162	EDDY	AVALON UPPER	6.5	179938	71525.7	617.4	21.8	109.6	0	101374	3660	844	500
SNAPPING 10 FEDERAL #003H	3001539864	EDDY	BONE SPRING 7ND SAND	6.5	157439.2	48495.7	6731.3	23.1	801.4	1.06	94055	244	3700	100
USA #001	3001504776	EDDY	DELAWARE		150733						98120	137	616	
USA #001	3001504776	EDDY	DELAWARE		159967						97900	137	1100	
E.D WHITE FEDERAL NCT 1 #003	3001505886	EDDY	DELAWARE		212112						132100	195	475	
FED #001	3001527421	EDDY	DELAWARE	7.4	265727						158000	37	3600	
FED #001	3001527421	EDDY	DELAWARE	7.6	255336						156000	76	790	
FED #001	3001527421	EDDY	DELAWARE	8.5	263330						157000	78	3700	
SNAPPING 10 FEDERAL #001H	3001537899	EDDY	AVALON UPPER	7.1	209352.4	70089.5	7377	203	1557	2.5	127730	146.4	600	600
SNAPPING 11 FEDERAL #001H	3001538193	EDDY	AVALON UPPER	7.1	196576.7	68797.3	5059	12	1066	0.9	118943	122	872	380
SNAPPING 11 FEDERAL #001H	3001538193	EDDY	AVALON UPPER	7	203078.9	72261.4	4407	112	904	1.5	122172	1098	658	80
SNAPPING 2 STATE #001Y	3001539104	EDDY	AVALON UPPER	7	167560.1	57137	3886	42	776	0.6	97161	1403	756	70



**Whitt 31 SWD No. 1**

**Water Wells within 1 Mile**

**NGL Water Solutions Permian, LLC**

**Eddy County, NM**

PCS NAD 1983 SPCS NM-E FIPS 3001 (US Ft.)

Drawn by: SJL    Date: 1/9/2019    Approved by: CBW

**LONQUIST & CO LLC**

PETROLEUM ENGINEERS    ENERGY ADVISORS

AUSTIN    HOUSTON    WICHITA    DENVER    CALGARY

**+** Whitt 31 SWD No. 1

**o** Water Well (3) (Labeled with Well Report #)

**---** 1 Mile Radius

**---** OO-Section (NM-PLSS 2nd Div.)

**---** Section (NM-PLSS 1st Div.)

**---** Township/Range (NM-PLSS)

**---** Texas Abstracts

**---** Counties

**---** States

Water Well Data Source: Texas Water Development Board (2019)

**NEW MEXICO**

**TEXAS**

Map © Xre n r

# **Exhibit 2**

**Exhibits of Chris Weyand**  
**On Behalf of NGL Water Solutions Permian, LLC**



**STATE OF NEW MEXICO  
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**AMENDED APPLICATION OF NGL WATER  
SOLUTIONS PERMIAN, LLC  
FOR APPROVAL OF SALT WATER  
DISPOSAL WELL IN EDDY COUNTY,  
NEW MEXICO**

**CASE NO. 20404 (WHITT 31)**

**AFFIDAVIT OF CHRIS WEYAND**

STATE OF TEXAS )  
 ) ss.  
COUNTY OF TRAVIS )

I, Chris Weyand, make the following affidavit based upon my own personal knowledge.

1. I am over eighteen (18) years of age and am otherwise competent to make the statements contained herein.

2. I am a Staff Engineer at Lonquist & Co., LLC. My responsibilities at Lonquist & Co., LLC include saltwater disposal well permitting efforts in New Mexico as well as other states and jurisdictions.

3. I graduated from Texas A&M University in 2010 with an engineering degree.

4. I am familiar with the application that NGL Water Solutions Permian, LLC ("NGL") has filed in this matter.

5. In Case No. 20404, NGL (OGRID No. 372338) seeks an order approving the Whitt 31 SWD #1 well, which is a salt water disposal well.

6. I compiled a list of all parties entitled to notice within a one-mile area of review. I reviewed County and Division records to determine the parties entitled to notice, including the

owner of the surface (NGL) and leasehold operators or other affected person. With respect to affected parties, I determined whether there was an operator, as shown in the Division records, or a designated unit operator, and if not, whether there were any working interests whose interest is evidenced by a written conveyance document either of record; and as to any tract or interest not subject to an existing oil and gas lease, whether there were mineral interest owner whose interest is evidenced by a written conveyance document either of record; and whether the United States or state of New Mexico owns the mineral estate in the spacing unit or identified tract or any part thereof, the BLM or state land office, as applicable.

7. The area of review was evaluated for offset wellbores penetrating the injection formation and to determine notice parties as part of the C-108 Application.

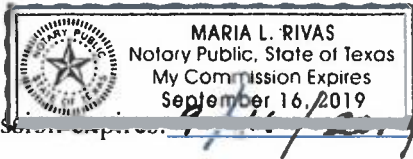
8. The Whitt 31 SWD #1 well is located approximately 2,335 feet from State Trust Lands (those lands are located in Sec. 36-T26S-R28E). Based on my review of the information available to me, the Whitt 31 SWD #1 well is located approximately 2,335 feet from State minerals (located in Sec. 36-T26S-R28E).

9. I attest that the information provided herein is correct and complete to the best of my knowledge and belief.

*[Signature page follows]*

  
Chris Weyand

SUBSCRIBED AND SWORN to before me this 30 th day of April, 2019 by Chris Weyand.



  
Notary Public

My commission expires 9/16/2019

# **Exhibit 3**

**Exhibits of Scott Wilson**  
**On Behalf of NGL Water Solutions Permian, LLC**

**STATE OF NEW MEXICO  
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**AMENDED APPLICATION OF NGL WATER  
SOLUTIONS PERMIAN, LLC  
FOR APPROVAL OF SALT WATER  
DISPOSAL WELL IN EDDY COUNTY,  
NEW MEXICO**

**CASE NO. 20404  
(WHITT 31)**

**AFFIDAVIT OF SCOTT J. WILSON**

STATE OF NEW MEXICO            )  
  ) ss.  
COUNTY OF BERNALILLO        )

I, Scott J. Wilson, make the following affidavit based upon my own personal knowledge.

1.     I am over eighteen (18) years of age and am otherwise competent to make the statements contained herein.

2.     I am the Senior Vice President for Ryder Scott Company in Denver, Colorado. My responsibilities at Ryder Scott Company include the performance of reserve appraisals, technical evaluations, and reservoir analysis.

3.     I have obtained a bachelor's degree in petroleum engineering from the Colorado School of Mines, and a master's degree business from the University of Colorado. I have worked as a petroleum engineer since 1983.

4.     I am familiar with the amended application that NGL Water Solutions Permian, LLC ("NGL") has filed in this matter, and I have conducted a nodal analysis and reservoir study

related to the area which is the subject matter of the application. A copy of my study is attached hereto as Exhibit A.

5. The applicant, NGL (OGRID No. 372338), seeks an order approving the Whitt 31 SWD #1 well (Case No. 20404) which is a salt water disposal well.

6. The well will be spaced out and will not be located closer than approximately 1 mile from other disposal wells, approved for injection into the Devonian and Silurian formations.

7. The approved injection zone for the wells is located below the base of the Woodford Shale formation and above the Ordovician formation, which consists of significant shale deposits.

8. The wells will primarily be injecting fluids into the Wristen Group and Fusselman formations, with some fluids potentially being injected into the Upper Montoya Group. Each of these sub-formations or zones are located within what is commonly referred to by operators and the Division as the "Devonian Silurian" formations. These zones consist of a very thick sequence of limestone and dolostone which has significant primary and secondary porosity and permeability that is collectively between 800 to 1,800 feet thick.

9. I have reviewed step rate tests for similar disposal wells drilled within the area and conducted a nodal analysis. It is my opinion that a large percentage of surface pressure it was encountering using smaller diameter tubing was a result of friction pressure. In Case No. 15720 evidence had been presented to the Division showing that up to 85% of this surface pressure was due to friction. Increasing the tubing size would reduce friction and would conserve pump horsepower, fuel, and reduce emissions.

10. My nodal analysis indicates that increasing the tubing size to 7" by 5 ½" would not significantly increase reservoir pressures over a twenty-year time period. The injection zone is located within a reservoir with significant thickness which consists of high permeability rocks,

which results in only very small pressure increases even when injection is increased to a rate of 40,000 barrels per day over a 20 year period.

11. It is my opinion that increasing the tubing size will not cause fractures in the formation. Wellhead pressures are set at a maximum that is below the formation fracture pressure and, as a result, it is impossible to get above the formation fracture pressure while honoring wellhead pressure constraints. Consequently, it is highly unlikely that increasing the tubing size in the wells would result in fractures to the formation.

12. I have also studied the potential impact on pore pressures and put together a simulation of the radial influence that the wells would have if larger tubing is used for a period of time. A copy of this study is included within Exhibit A to this affidavit. This study shows that it is anticipated that there will be a minimal impact on reservoir pressures and that the majority of fluids will not travel greater than 1 mile in 20 years.

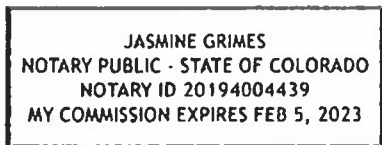
13. My studies further indicate that additional injection wells located one mile away from the wells, will not create any materially adverse pressures in the formation.

14. I attest that the information provided herein is correct and complete to the best of my knowledge and belief.

15. The granting of these applications is in the interests of conservation and the prevention of waste.

*[Signature page follows]*





Scott J. Wilson  
Scott J. Wilson

SUBSCRIBED AND SWORN to before me this 26 th day of April, 2019 by Scott J. Wilson.

Jasmine Grimes  
Notary Public

My commission expires: 2/5/23



# NGL Water Solutions, LLC

**Typical Wellbore Hydraulics Models predict a 30% increase in maximum injection rate between 5.5 tubing and 7x5.5 tubing.**

Alpha2

Reservoir Data

Pressure = 5974.00 psia

kh = 11900.0

Skin = 0.00

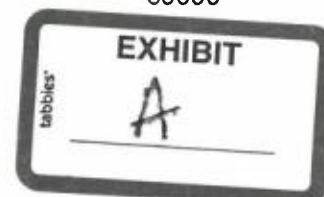
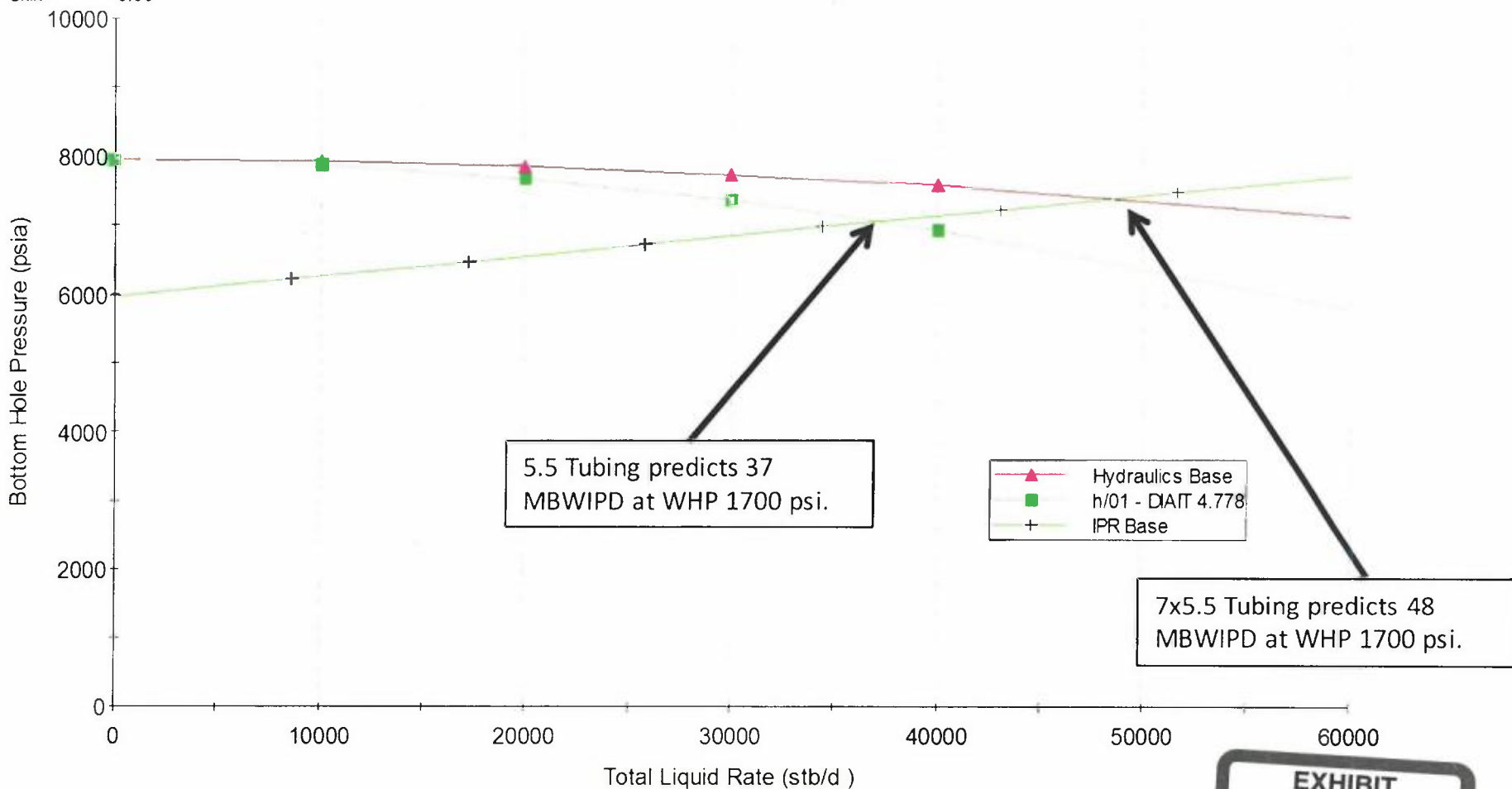
Alpha 2 WellboreSize Sensitivity.snp

Rate vs. Pressure25-Sep-18 14:50:13

WB Depth (MD ft)= 13870

WHP (psia) = 1700.00

Tubing I.D. = 6.276 (s1)





# NGL Water Solutions, LLC

Exh. 2

Increased injection rate per well equates to fewer injectors.

Alpha2

Reservoir Data

Pressure = 5974.00 psia

kh = 11900.0

Skin = 0.00

Alpha 2 Wellbore Size Sensitivity.snp

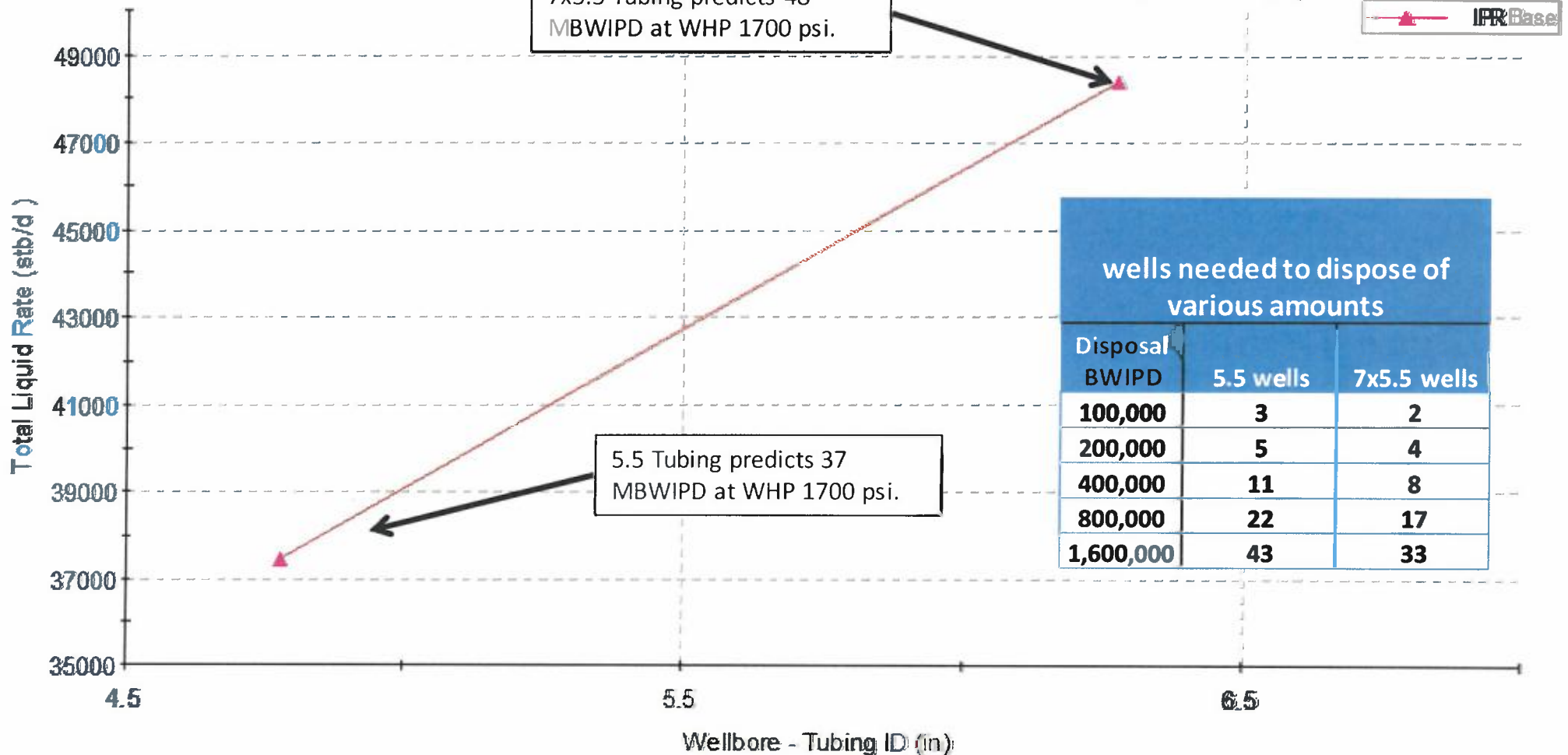
Rate vs. Wellbore - Tubing ID (in)

25-Sep-18 17:06:22

WB Depth (VD ft) = 13870

WHPres (psia) = 1700.00

Tubing ID = 6.276 (s1)



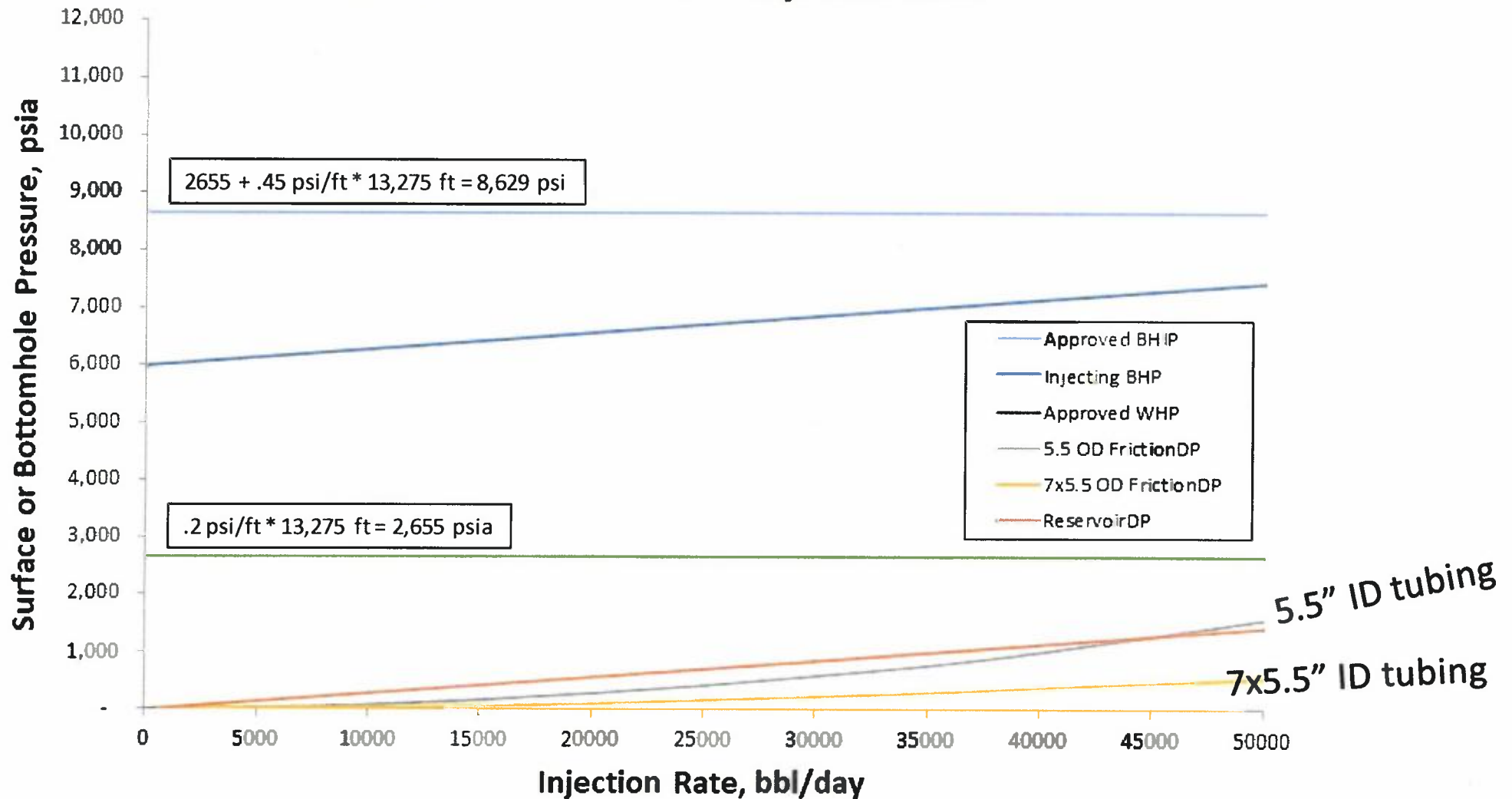


# NGL Water Solutions, LLC

Increasing tubing size will decrease friction losses and conserve horsepower.

2 example tubing sizes and their impact on friction losses.

Pressure losses at various injection rates



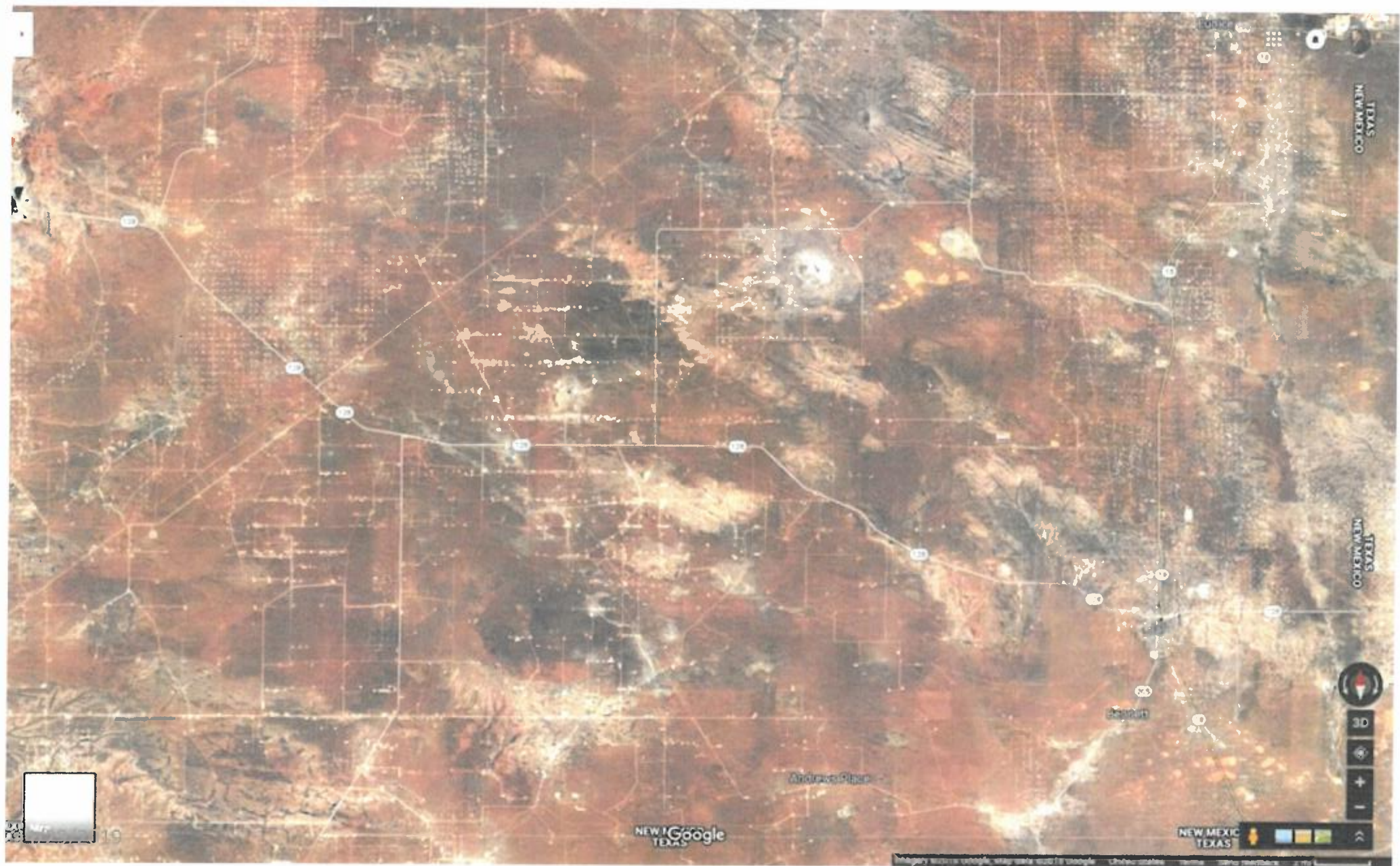




# NGL Water Solutions, LLC

Exh. 4

Terrain is level and infrastructure is plentiful.

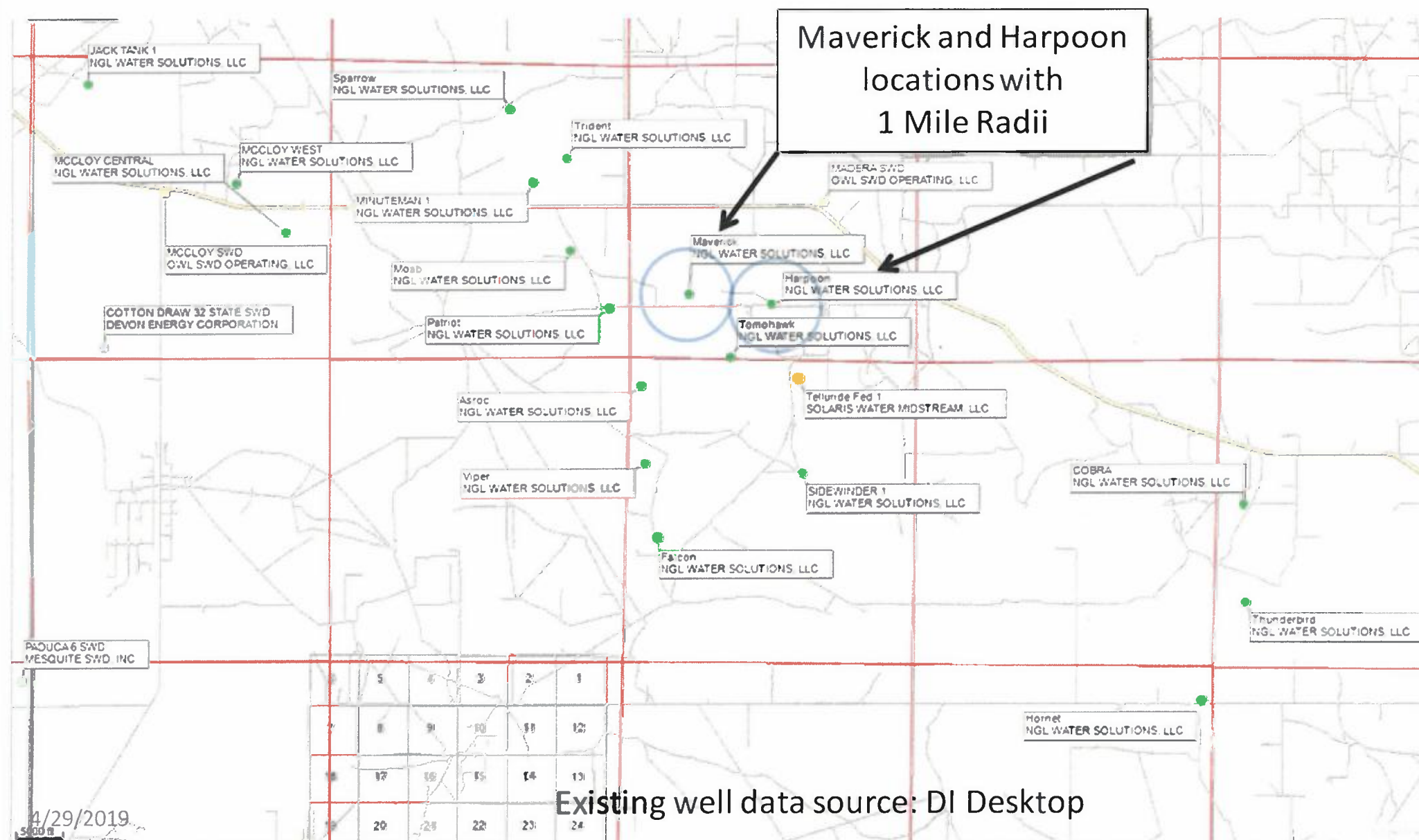




# NGL Water Solutions, LLC

Exh. 5

Wells injecting water into the Devonian formation in the area.  
Area is roughly 30 miles (E-W) by 20 miles (N-S)



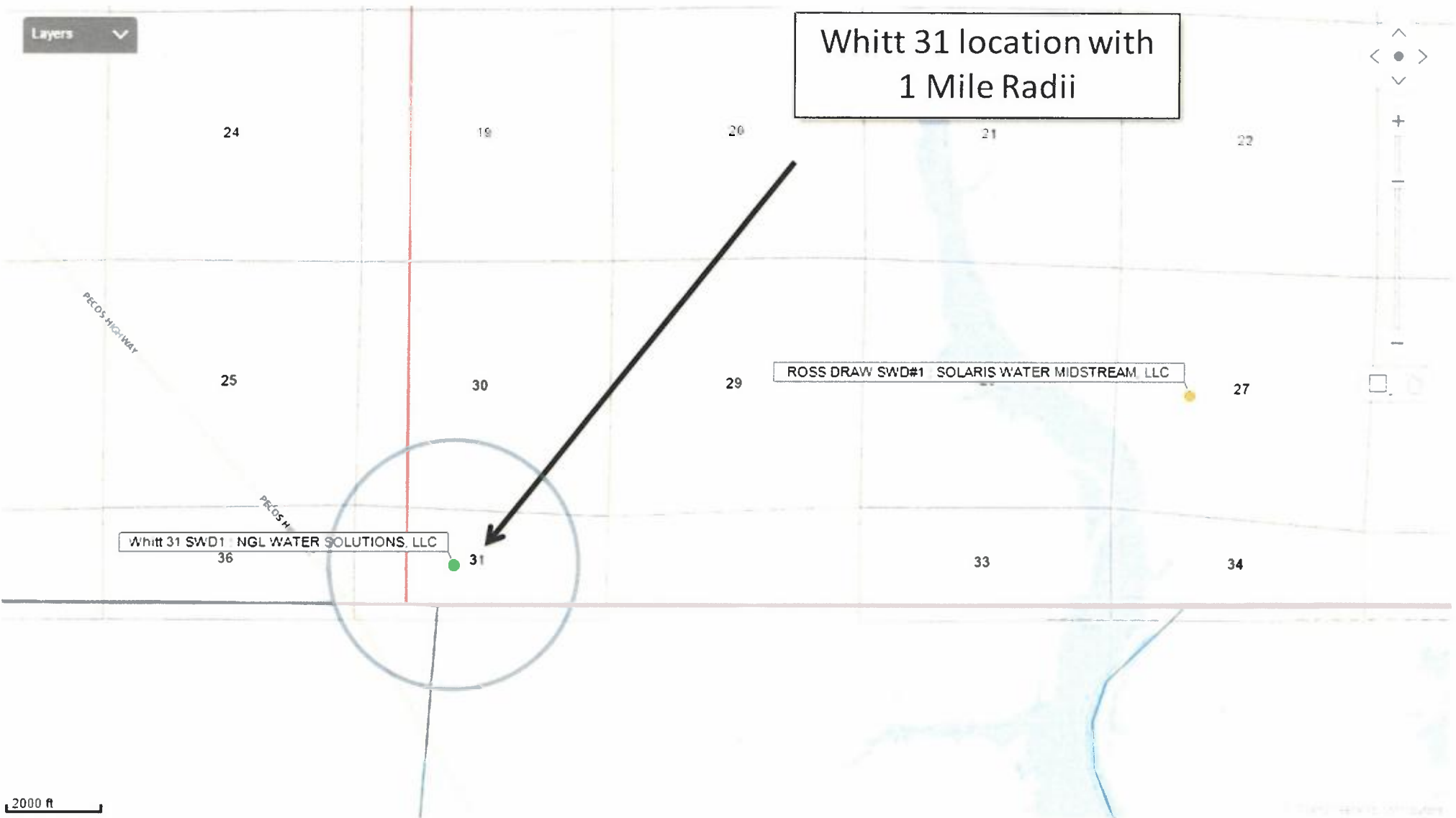




# NGL Water Solutions, LLC

Exh. 6

Wells injecting water into the Devonian formation in the area.  
Area is roughly 36 miles (E-W) by 20 miles (N-S).



Existing well data source: DI Desktop

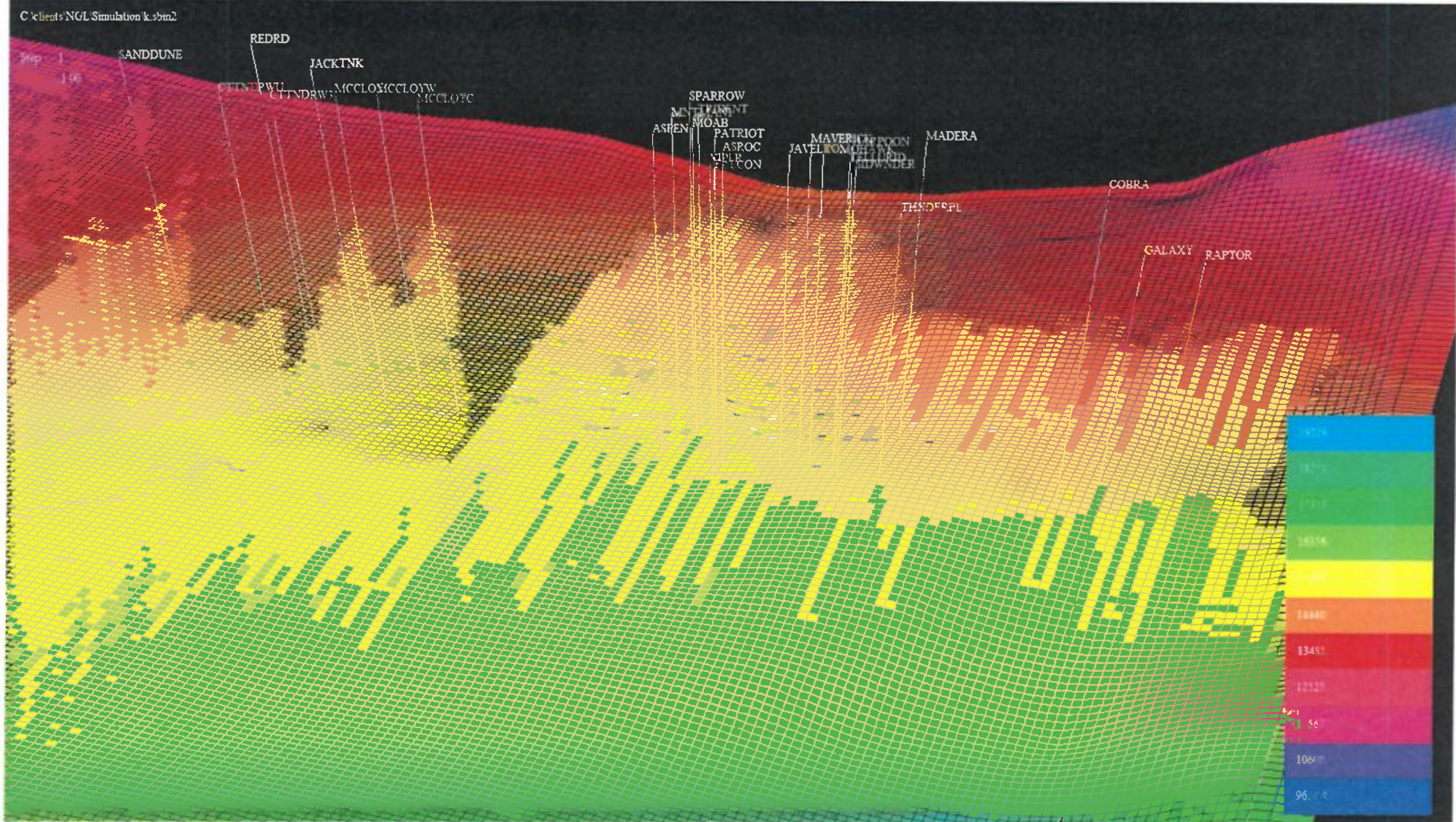
4/29/2019



# NGL Water Solutions, LLC

## Simulation Grid matches Structure and Thickness.

Reservoir Simulation grid incorporates the NGL proposed wells and the close offsets. Observation wells are placed in grid corners to monitor the large scale pressure distribution.





 $\infty$ [illegible]



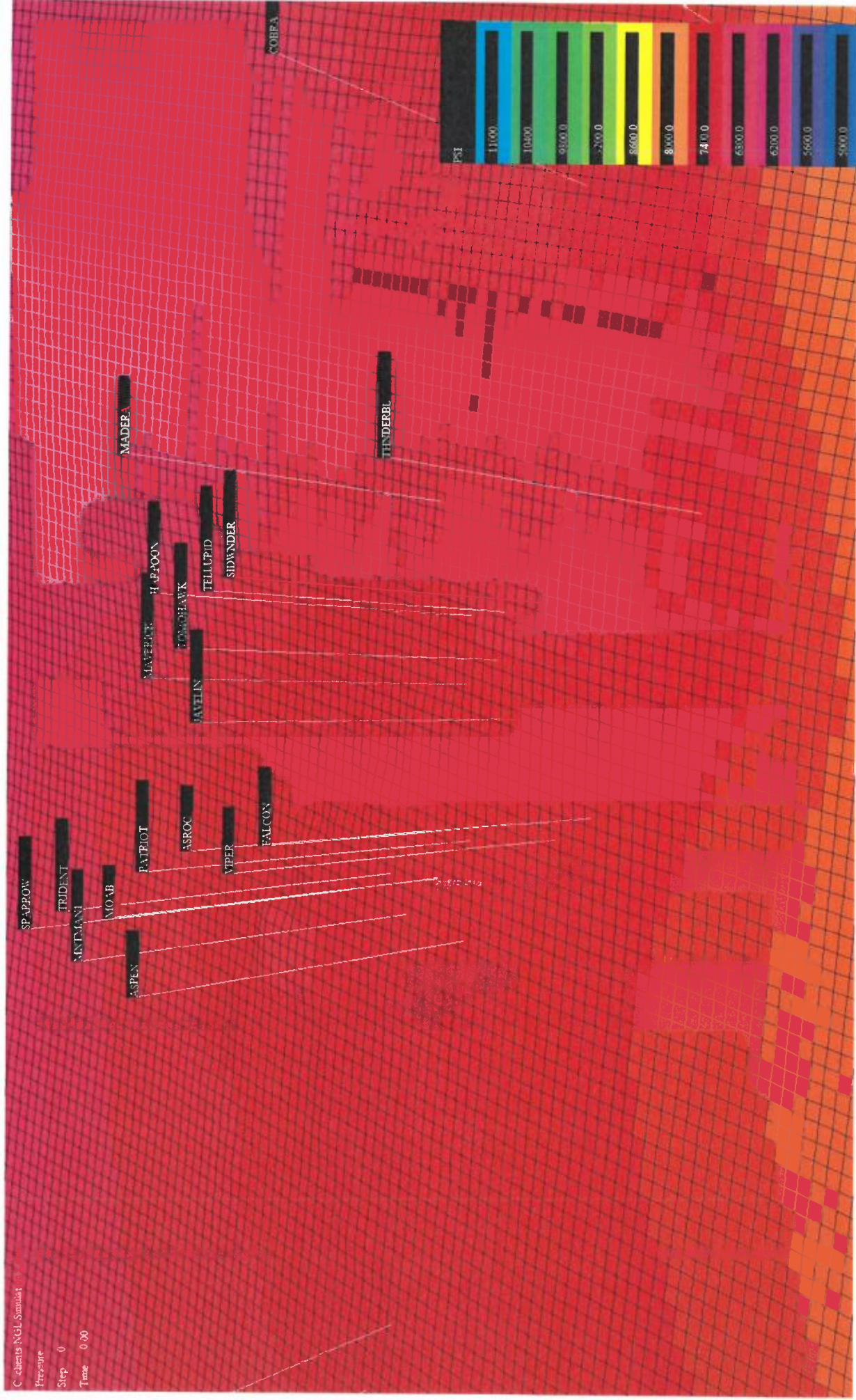






# NGL Water Solutions, LLC

Initial pressure is equilibrated by the model based on grid cell depth, fluids(water) and capillary pressure.



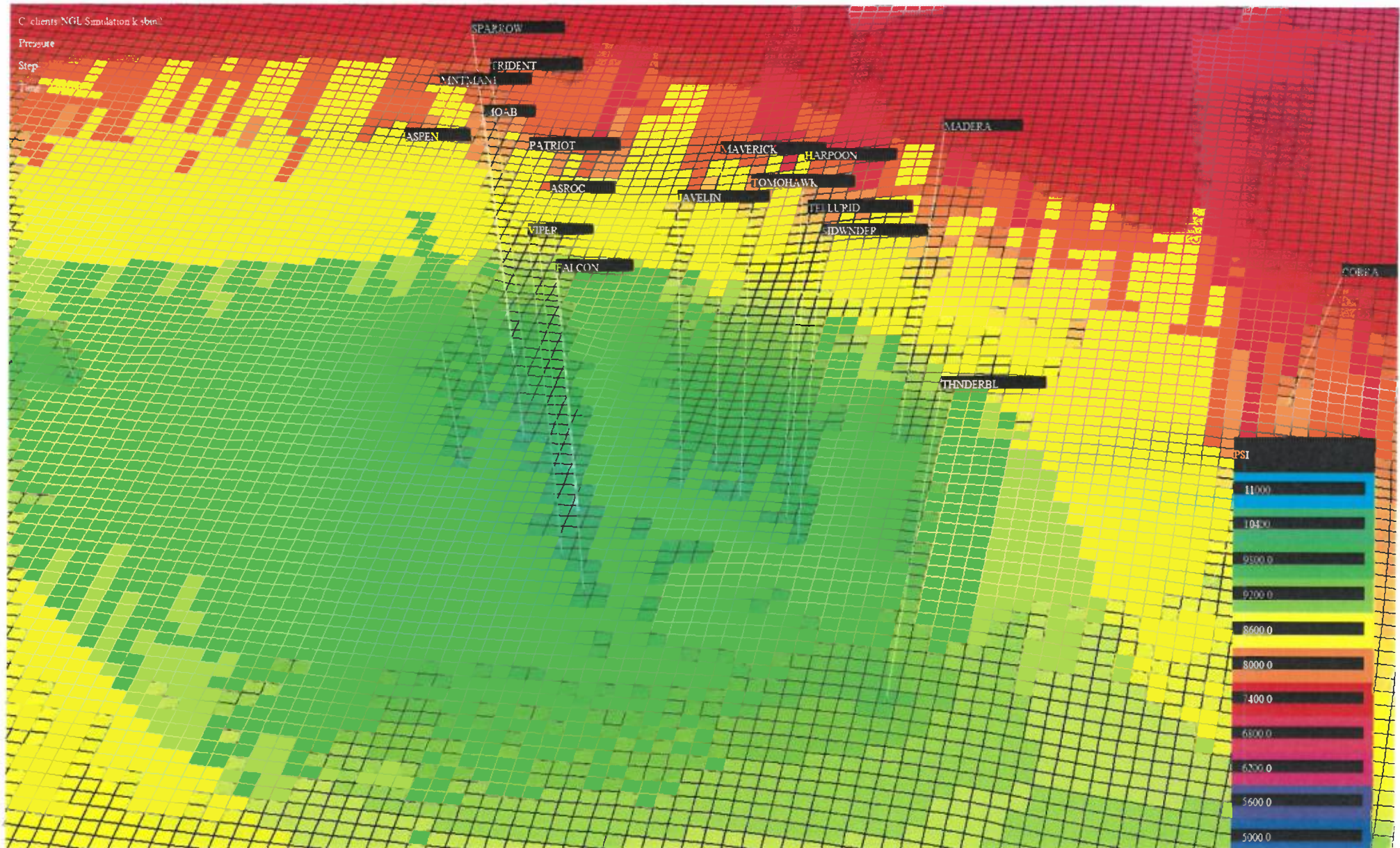




# NGL Water Solutions, LLC

11

Pressure at 20 years is affected by original pressure, injected volumes, and the ability of the reservoir to dissipate pressure.







# NGL Water Solutions, LLC

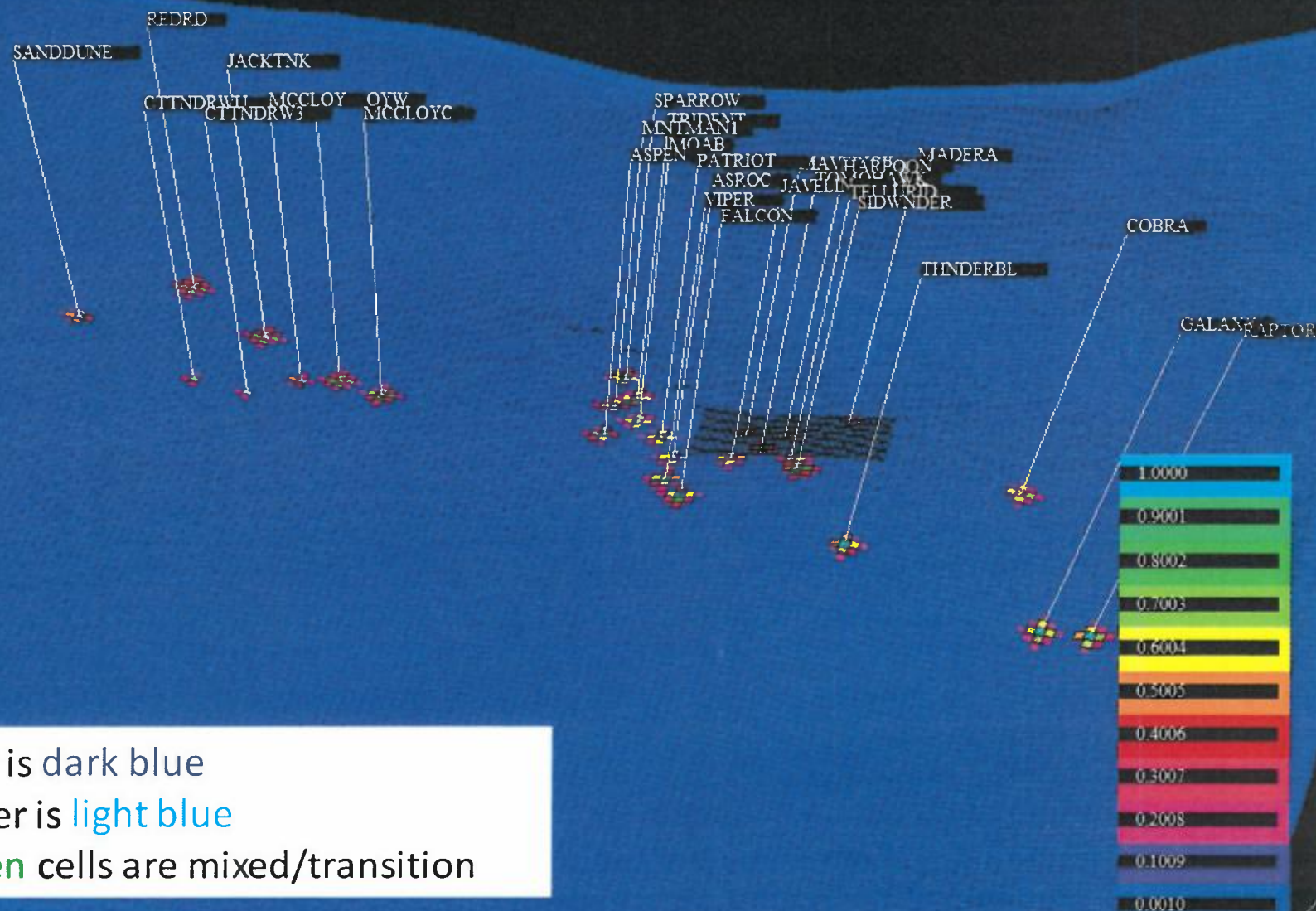
Large scale saturation profiles after 20 years of injection.

C:\clients\NGL\hearing\20190502\_A.sbin2

SWAT

Step 103

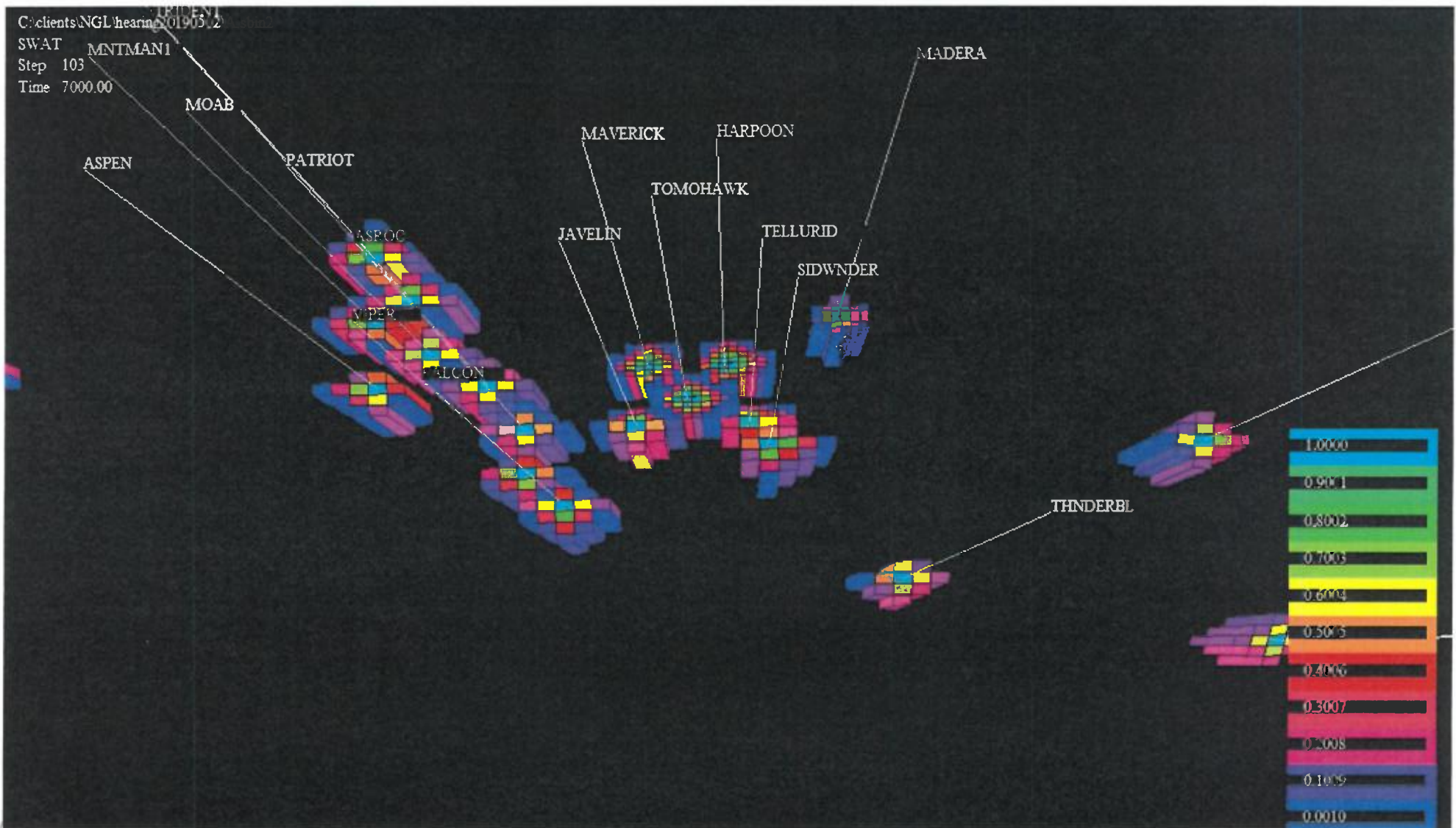
Time 7000.00





# NGL Water Solutions, LLC

Detailed saturation profiles after 20 years of injection.  
Maverick, Harpoon, Tomahawk, Madera wells in refined grid  
with 610' Cells. Other Cells are 1320' on each side.



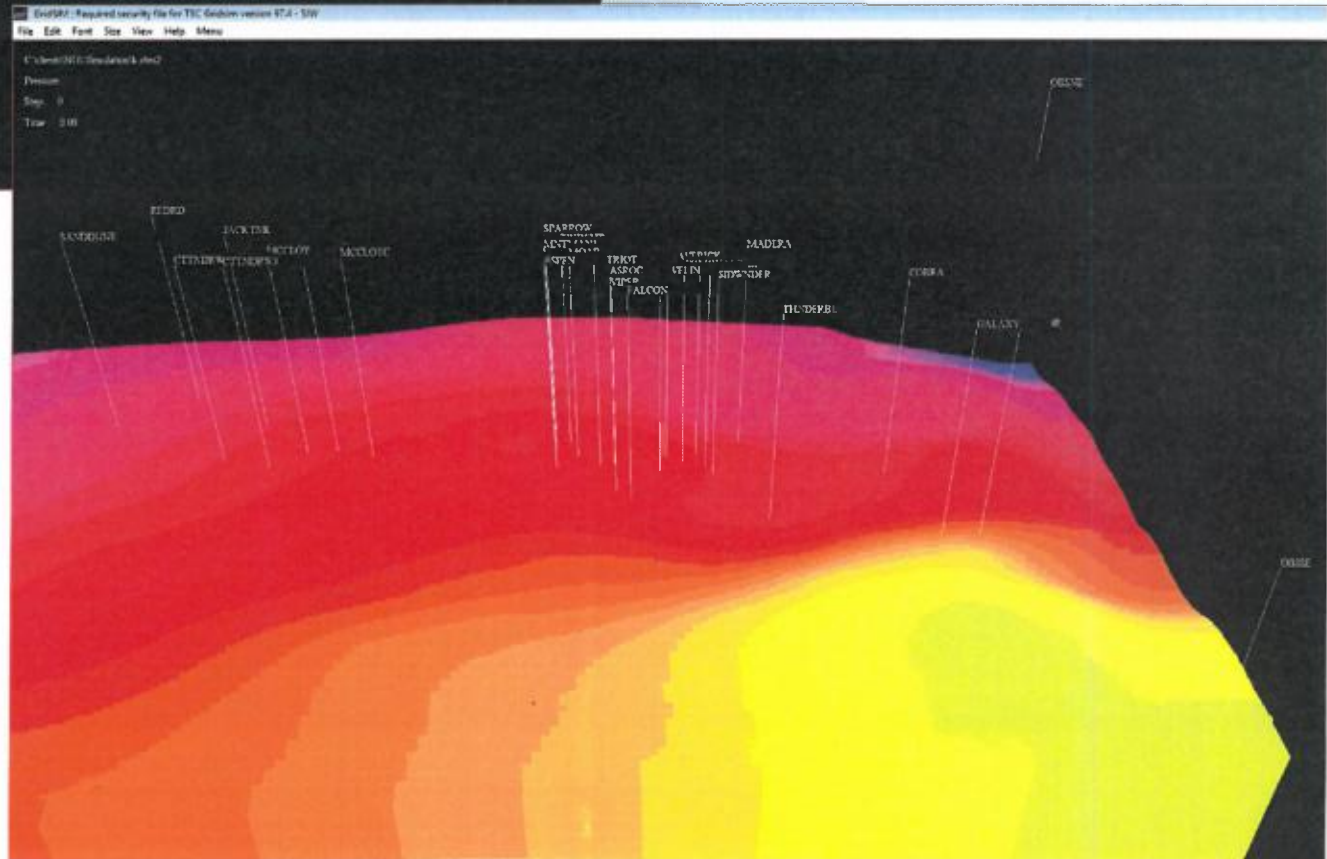




Exh. 15

**2019  
(0 years)**

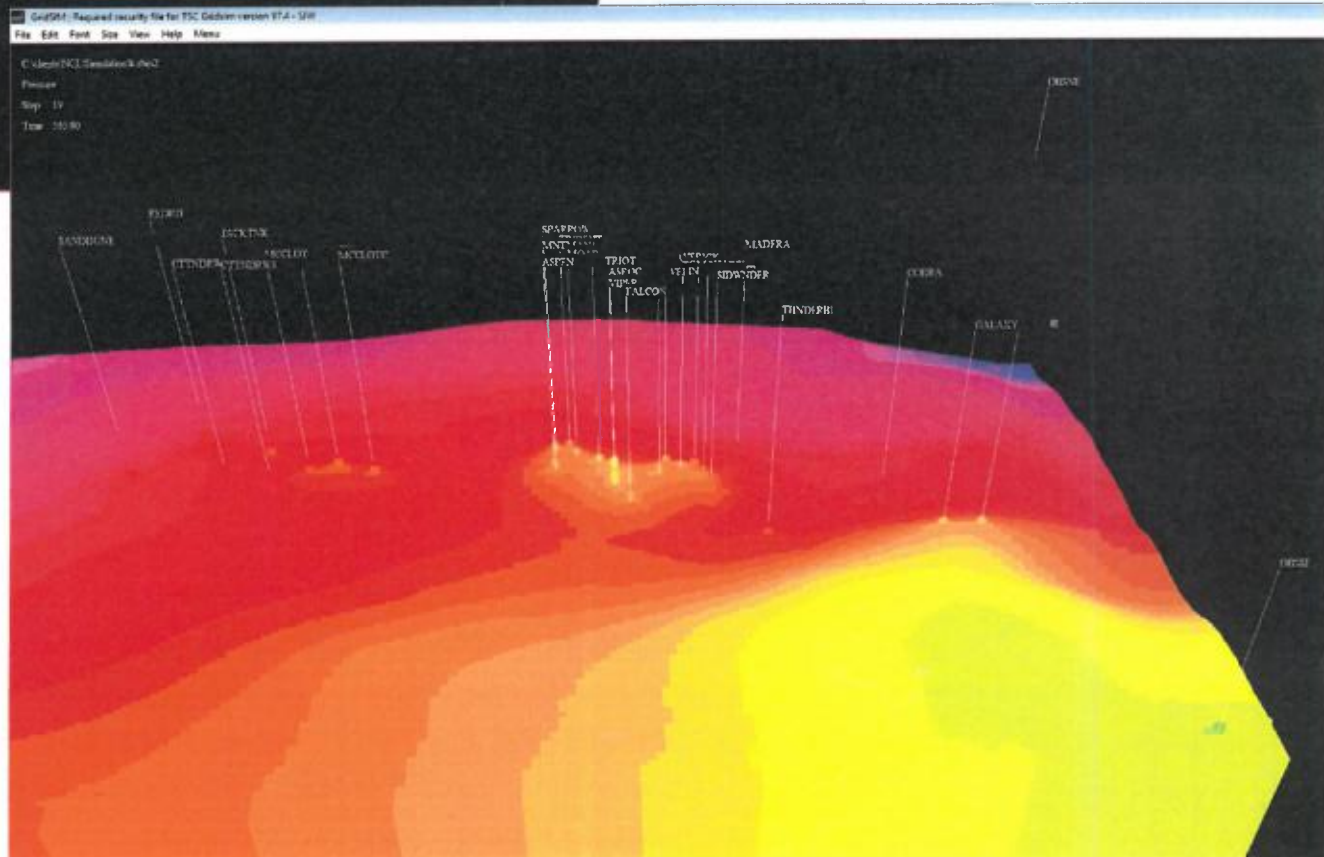
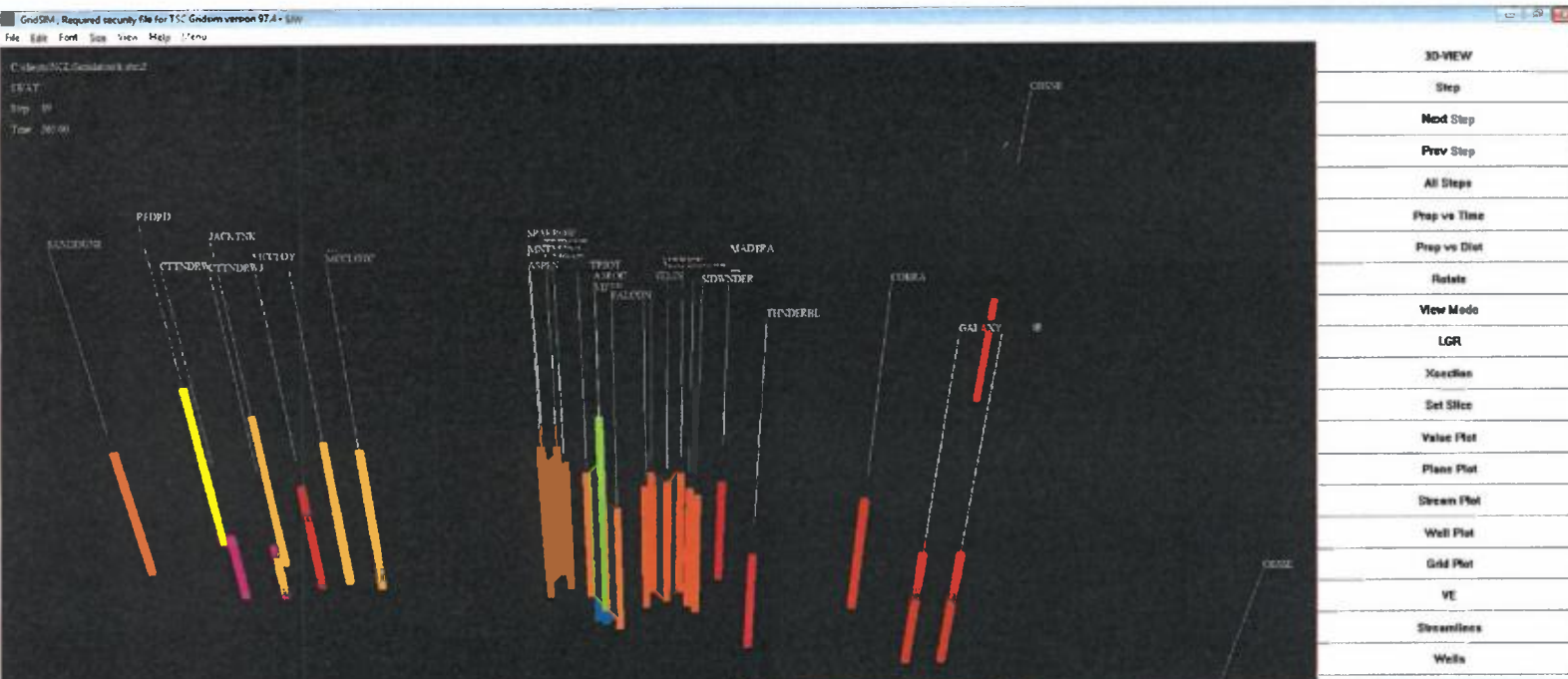
# Water movement & Pressure





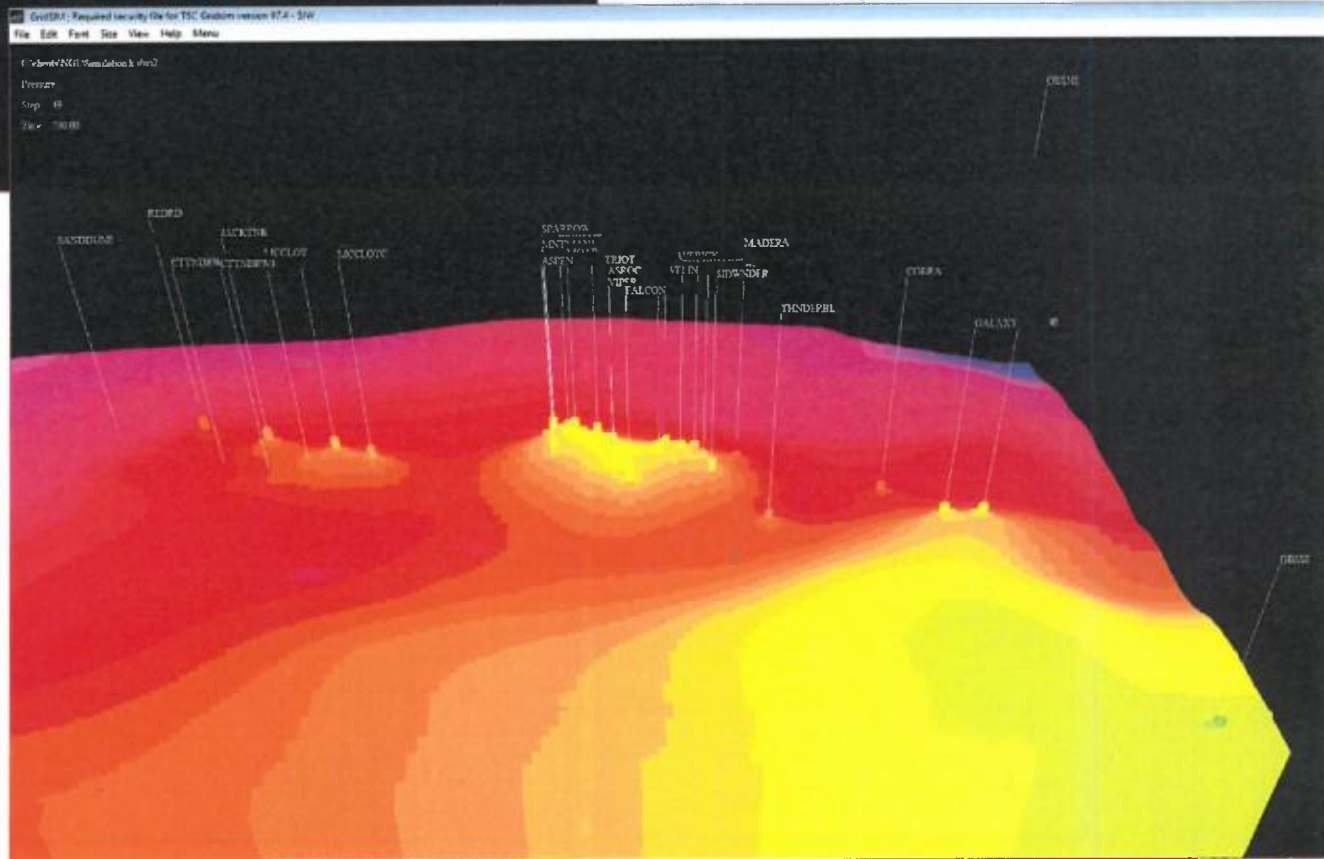
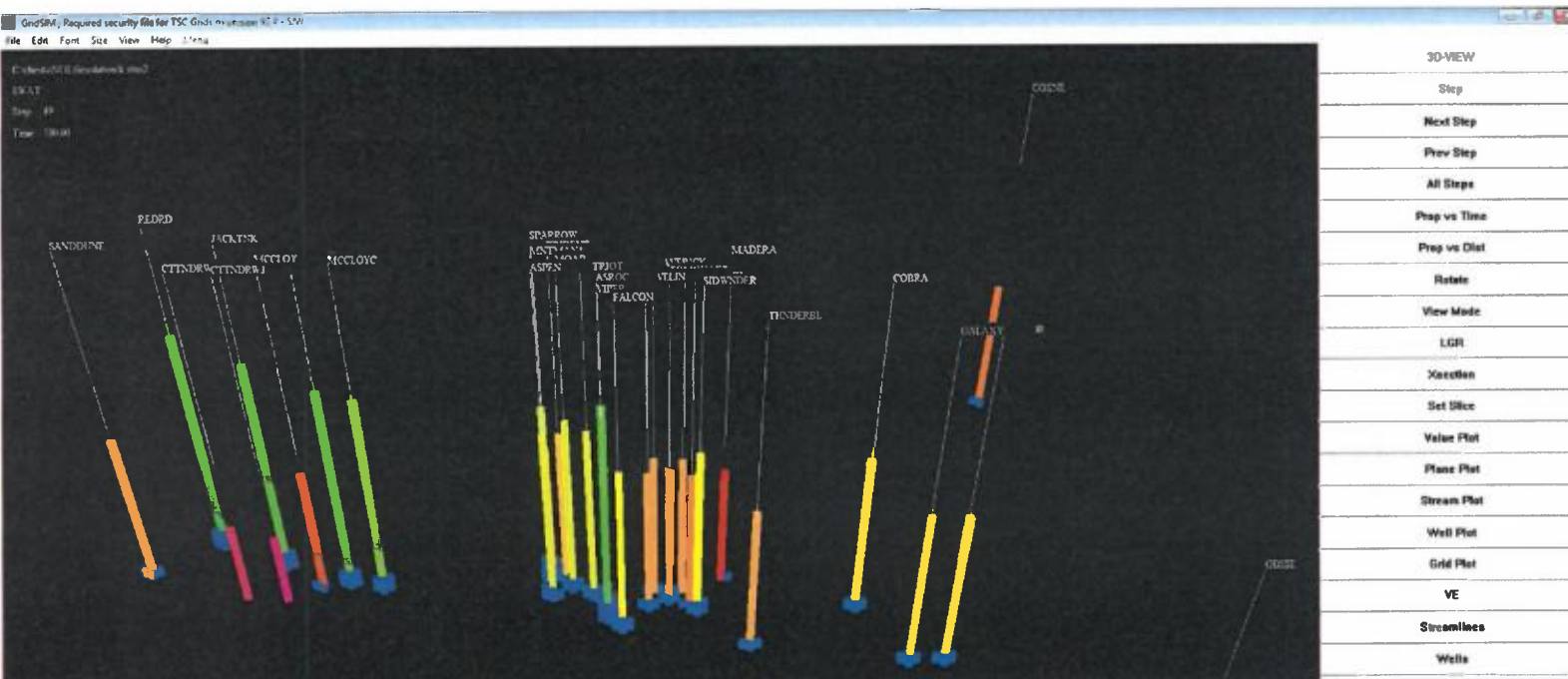
**2020  
(1 year)**

# Water movement & Pressure



**2021  
(2 years)**

# Water movement & Pressure

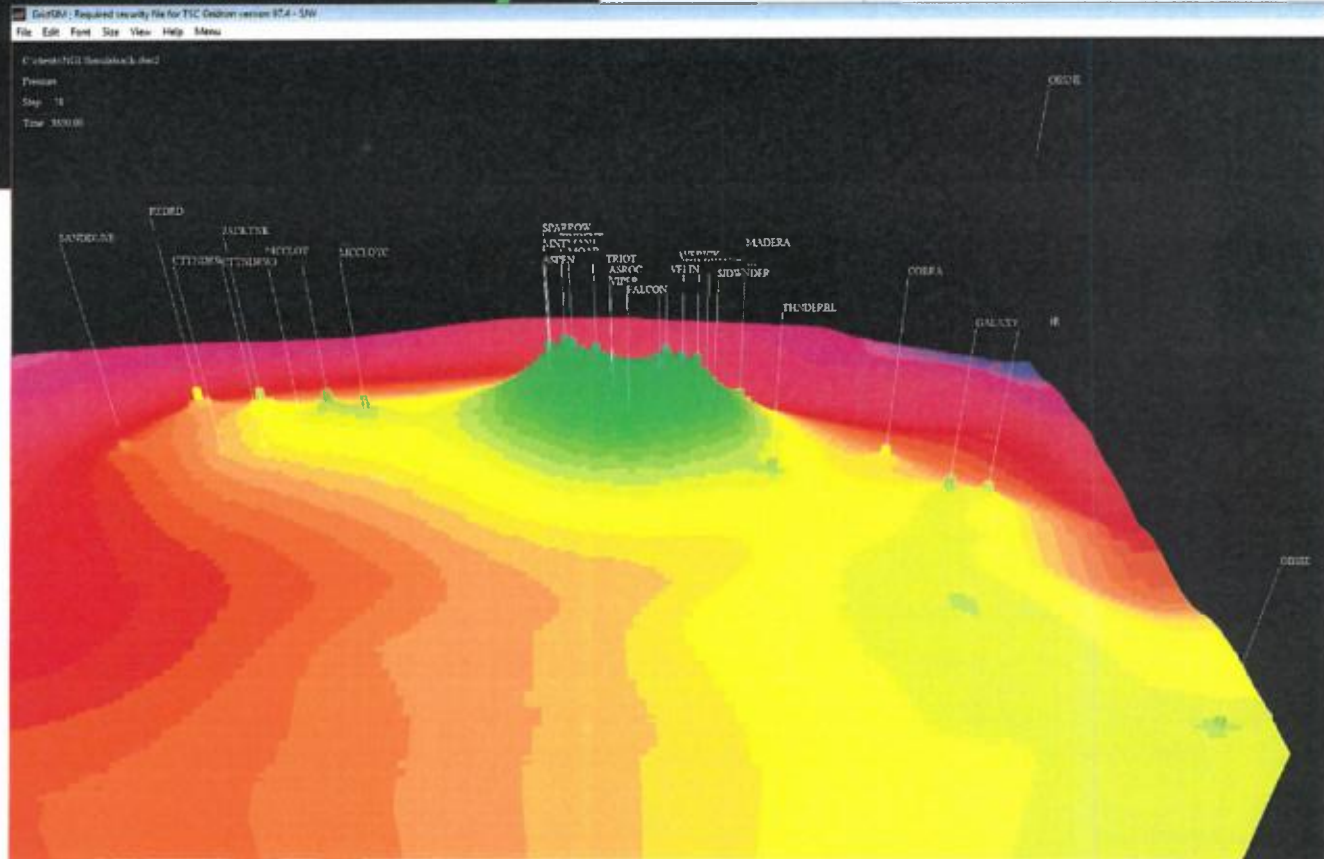
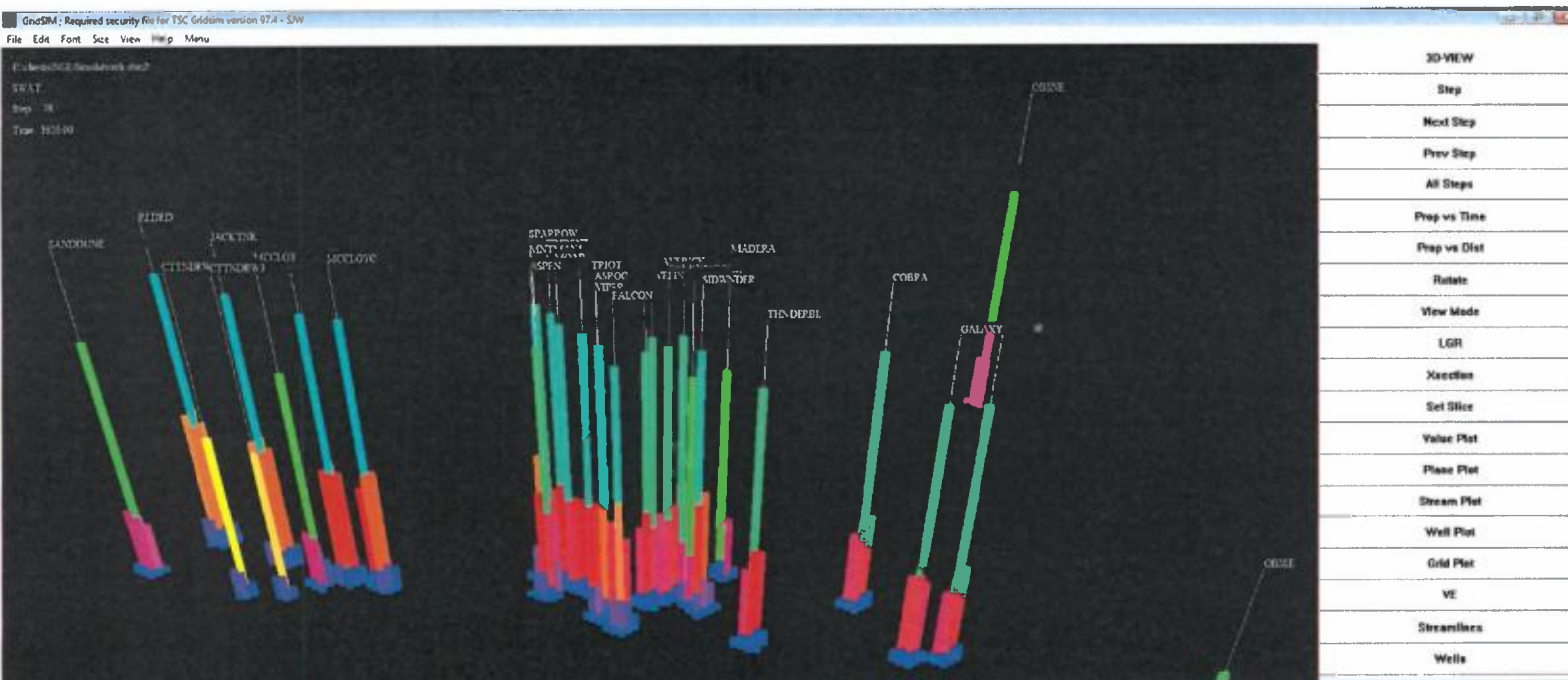




Exh. 18

**2029  
(10 years)**

# Water movement & Pressure

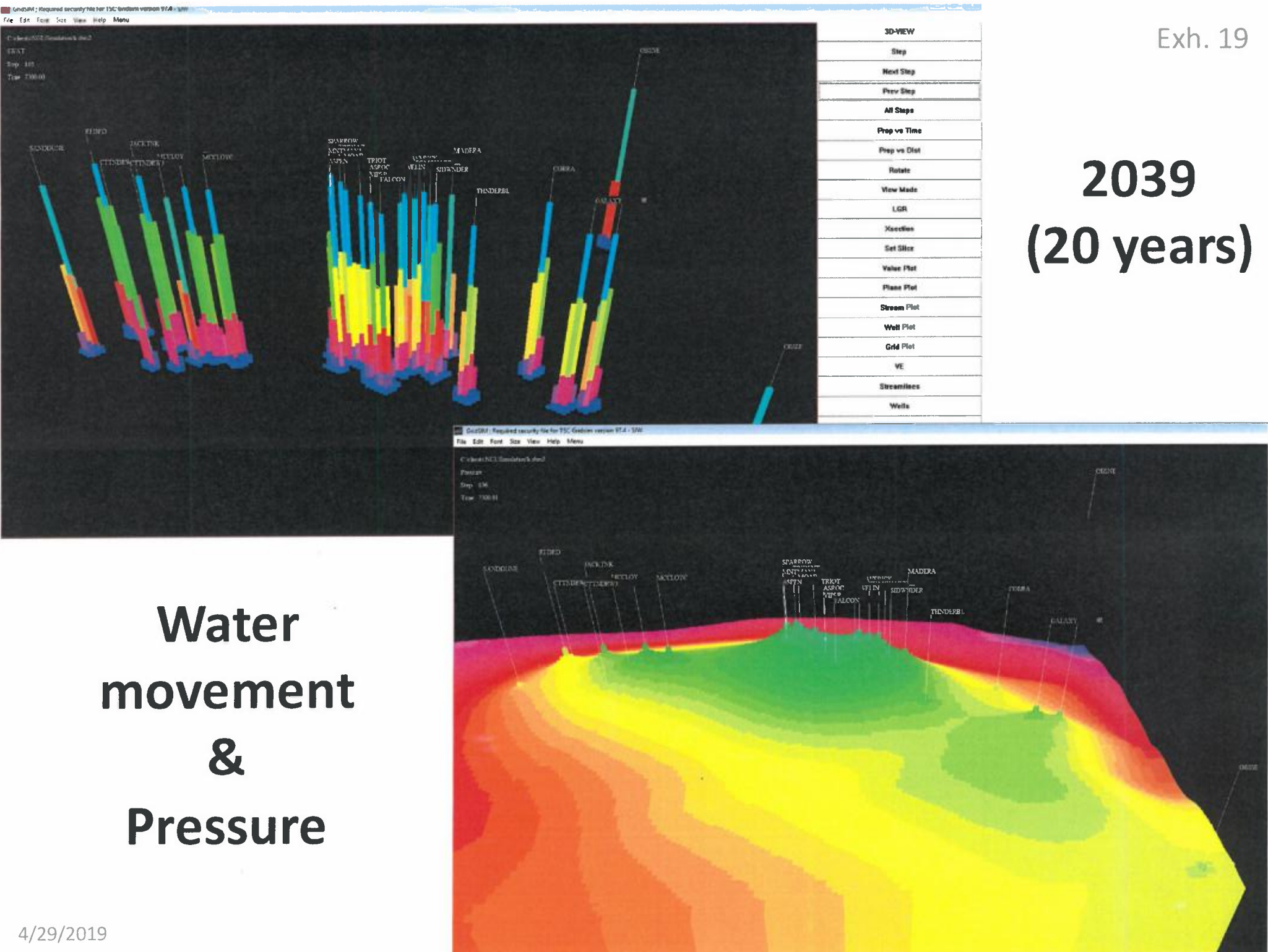


Exh. 19

**2039  
(20 years)**

# Water movement & Pressure

4/29/2019



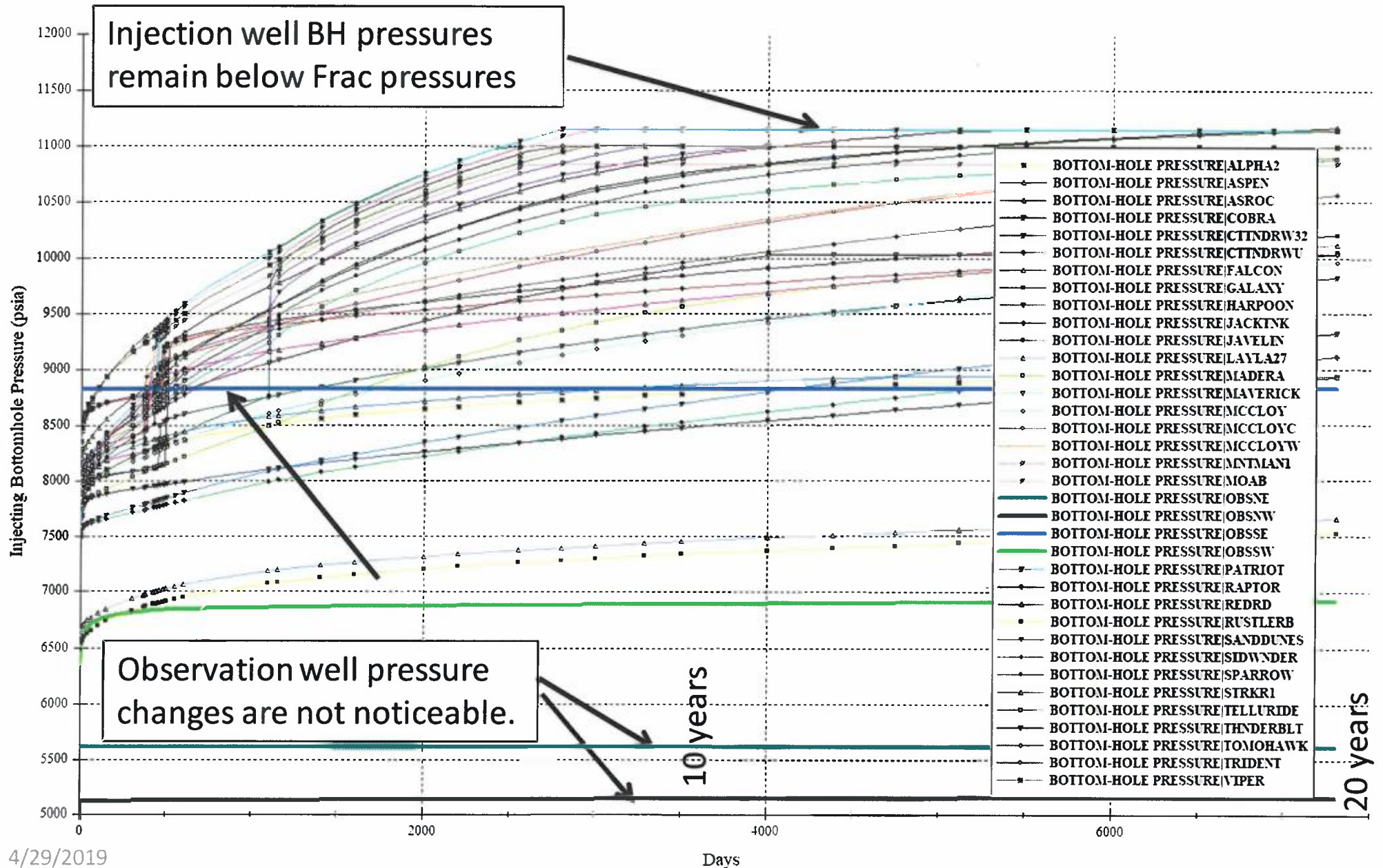




# NGL Water Solutions, LLC

Exh. 20

Simulation predictions for individual wells over time.





# **Exhibit 4**

**Exhibits of Kate Zeigler**  
**On Behalf of NGL Water Solutions Permian, LLC**



**STATE OF NEW MEXICO  
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**AMENDED APPLICATION OF NGL WATER  
SOLUTIONS PERMIAN, LLC  
FOR APPROVAL OF SALT WATER  
DISPOSAL WELL IN EDDY COUNTY,  
NEW MEXICO**

**CASE NO. 20404 (WHITT 31)**

**AFFIDAVIT OF DR. KATE ZEIGLER**

STATE OF NEW MEXICO            )  
  ) ss.  
COUNTY OF BERNALILLO        )

I, Dr. Kate Zeigler, make the following affidavit based upon my own personal knowledge.

1.     I am over eighteen (18) years of age and am otherwise competent to make the statements contained herein.

2.     I am the senior geologist at Zeigler Geologic Consulting, and I provide a wide range of geoscience related services to companies and other entities in Southeastern New Mexico.

3.     I have obtained a bachelor's degree in geology from Rice University, a master's degree in paleontology from the University of New Mexico, and a Ph.D. in stratigraphy and paleomagnetism from the University of New Mexico. Additionally, I have completed several surface geologic maps for the New Mexico Bureau of Geology and Mineral Resource's Geologic Mapping Program as well as for independent operators who are exploring prospects within the western Permian Basin. I have also conducted a prior geologic study concerning what is commonly referred to as the Devonian and Silurian formations in Southeastern New Mexico to

help determine whether the approval of 7" by 5 ½" tubing is appropriate in Devonian and Silurian salt water disposal wells approved by the New Mexico Oil Conservation Division.

4. I am familiar with the amended application that NGL Water Solutions Permian, LLC ("NGL") has filed in this matter, and I have conducted a geologic study of the lands which are the subject matter of the application. A copy of my geologic study, including cross sections, a structure map and isopach are included in Attachment A to this affidavit.

5. The applicant, NGL (OGRID No. 372338), seeks an order approving the Whitt 31 SWD #1 well (Case No. 20404), which is a salt water disposal well.

6. I have been informed that the injection intervals for the well will be isolated to the Devonian and Silurian formations (also referred to as the Wristen Group and Fusselman Formation) and the well will have four strings of casing protecting the fresh water aquifer, the salt-bearing interval, the Permian aged rocks through the Wolfcamp Formation. The deepest casing is 7 5/8", which is cemented and cement is circulated on the 7 5/8" casing.

7. The well will be spaced out and not located closer than approximately 1 mile from other disposal well that have been approved for injection into the Devonian and Silurian formations.

8. The injection zone for the well are located below the Woodford Shale. The Woodford Shale is an Upper Devonian unit which has low porosity and permeability and consists predominantly of shale and mudstone with some carbonate beds. The Woodford Shale acts as a permeability boundary to prevent fluids from moving upward out of the underlying formations. The Woodford Shale formation in the areas where the well is located is between 100 feet to 120 feet thick.

9. Below the injection zone for the well is the Ordovician formation, also referred to as the Simpson Group, which contains sequences of shale that make up approximately 55% of the total thickness of the formation in any given place and can likewise act as a permeability boundary which prevents fluids from migrating downwards into deeper formations and the basement rock. In the areas where the well is located, the Ordovician formation is between 350' and 400' feet thick and, as a result, there is a significant thickness in this lower shale. Below the Ordovician is the Ellenburger Formation, which is up to 800 feet thick.

10. Based on my geologic study of the area, it is my opinion that the approved injection zone for the well is located below the base of the Woodford Shale formation and above the Simpson Group formation, both of which consist of significant shale deposits. Evidence indicates that shale formations located above and below the approved injection zones will likely restrict fluids from migrating beyond the approved injection zones for the well.

11. The well will primarily be injecting fluids into the Wristen Group and Fusselman Formation, with some fluids potentially being injected into the Upper Montoya Group. Each of these rock units are located within what is commonly referred to by operators and the Division as the "Devonian-Silurian" formations. These zones consist of a very thick sequence of limestone and dolostone which has significant primary and secondary porosity and permeability that is collectively between 1,500 to 1,800 feet thick.

12. It is my opinion that there is no risk to freshwater resources for injection within the Wristen Group, Fusselman, and Upper Montoya Group because of the depth of these sub-formations and the upper shale permeability boundary created by the Woodford Shale.

13. I have also studied the location of known fault lines within the area where the well is proposed to be drilled and the closest projected fault line to the well is located approximately 1 mile away from where the well are proposed to be drilled.

14. There are no currently recognized production shales within the Wristen Group, Fusselman Formation, and Upper Montoya Group in this part of the western Permian Basin. While there may be some isolated traps located within these sub-formations, it takes significant ability with imaging to be able to locate these deposits in order to properly target them.

15. I attest that the information provided herein is correct and complete to the best of my knowledge and belief.

16. The granting of this application is in the interests of conservation and the prevention of waste.

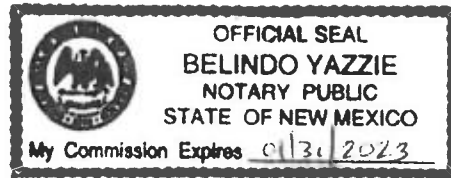
*[Signature page follows]*

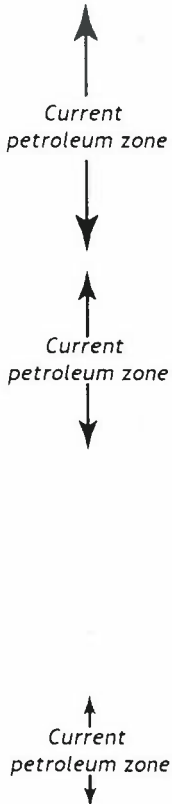
Kate Zeigler  
Dr. Kate Zeigler

SUBSCRIBED AND SWORN to before me this 30th day of April, 2019 by Dr. Kate Zeigler.

Belindo Yazzie  
Notary Public

My commission expires: 01/31/2023



Age		Stratigraphic Unit	Key Feature	Estimated Depth BLS for Eddy/Lea County Line*
<b>Triassic</b>		Chinle	<b>Freshwater resources</b>	
		Santa Rosa		
		Dewey Lake		
<b>Permian</b>	Ochoan	Rustler		
		Salado		
		Castile		
	Guadalupian	Bell Canyon		
		Cherry Canyon		
		Brushy Canyon		
	Leonardian	Bone Spring		
<b>Pennsylvanian</b>	Wolfcampian	Wolfcamp		
	Virgilian	Cisco		
	Missourian	Canyon		
	Des Moinesian	Strawn		
	Atokan	Atoka		
	Morrowan	Morrow		
<b>Mississ.</b>	Upper	Barnett		
	Lower	limestones		
<b>Devon.</b>	Upper	Woodford	<b>Shale: permeability barrier</b>	~16,600'
	Middle			~16,750'*
	Lower	Thirtyone		
<b>Silur.</b>	Upper	Wristen	<b>Target injection interval</b>	
	Middle			~17,600'
	Lower	Fusselman		
<b>Ordov.</b>	Upper	Montoya	<b>Shale: permeability barrier</b>	~18,400'
	Middle	Simpson		~18,900'
	Lower	Ellenburger		
<b>Cambrian</b>		Bliss		~19,600'
<b>Precambrian</b>		basement		

Stratigraphic chart for the Delaware Basin from Broadhead (2017).

\* Based on data from 30-015-44416 Striker 2 SWD #1 (23-24S-31E).

\*\*Note the Thirtyone Formation is not present in the project area.



Northwest

Southeast



30-015-43892  
Gravitas 2 SWD #002  
02-265-27E  
TD: 14,960'

30-015-41402  
Apple 5 SWD #001  
05-265-28E  
TD: 14,300'

Total Weight 3  
11,265-29E  
TD: 14,137'

30-015-41806  
Willow 17 SWD #001  
17-255-28E  
TD: 14,168'



30-015-41979  
Lobo 285 SWD #001  
22-255-28E  
TD: 15,720'

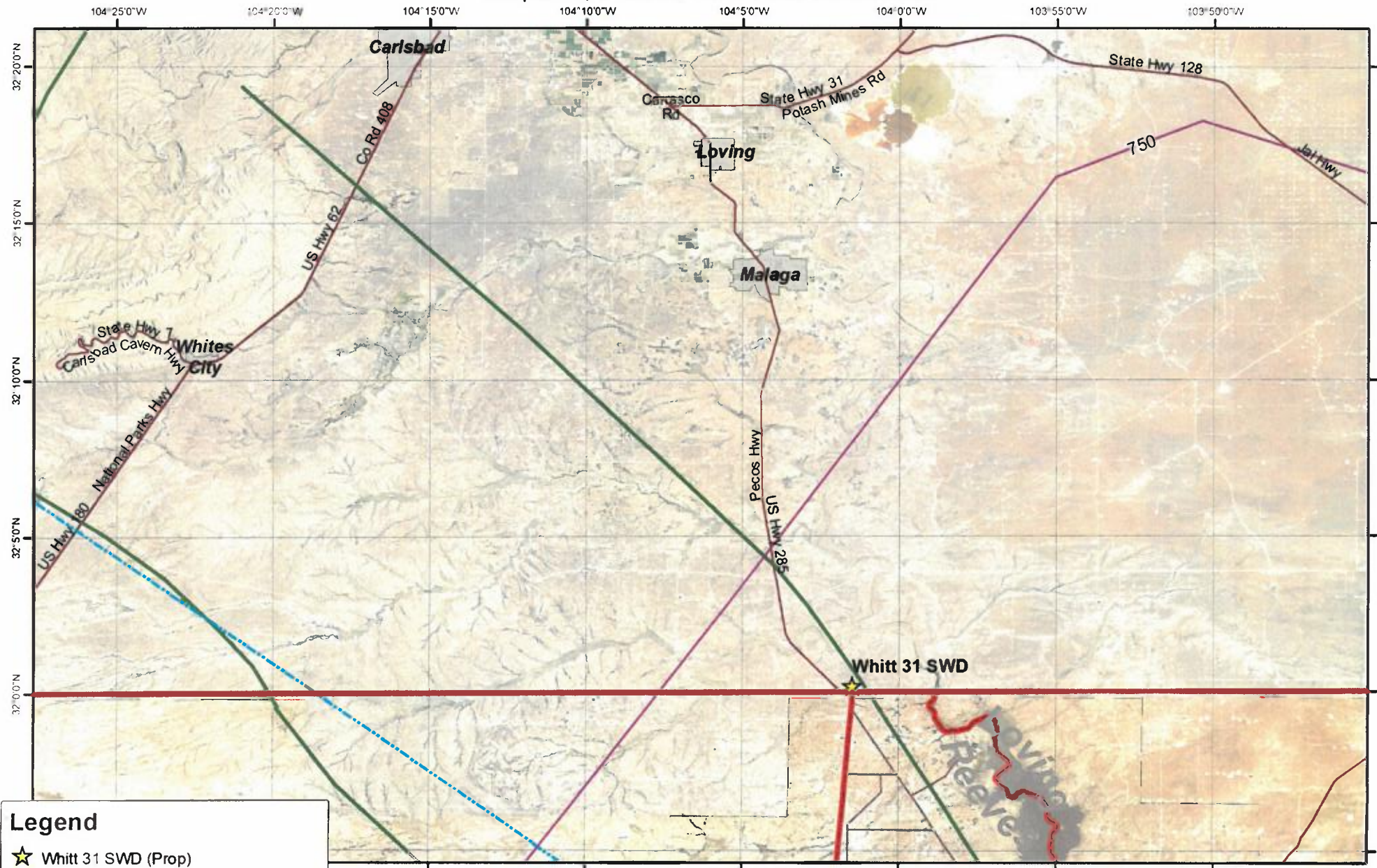
30-015-41846  
Goldenshield 6 SWD #001  
06-255-29E  
TD: 16,240'

30-015-39470  
Shocker SWD #001  
33-255-29E  
TD: 15,690'

50'



# Isopach, Faults, and Well Locations



**Legend**

- ★ Whitt 31 SWD (Prop)
- Lower Ordovician (Ellenburger) Isopach
- - - Precambrian Faults
- Basement Faults
- Roads
- ▭ Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM



Coordinate System: GCS North American 1983  
 Datum: North American 1983  
 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.





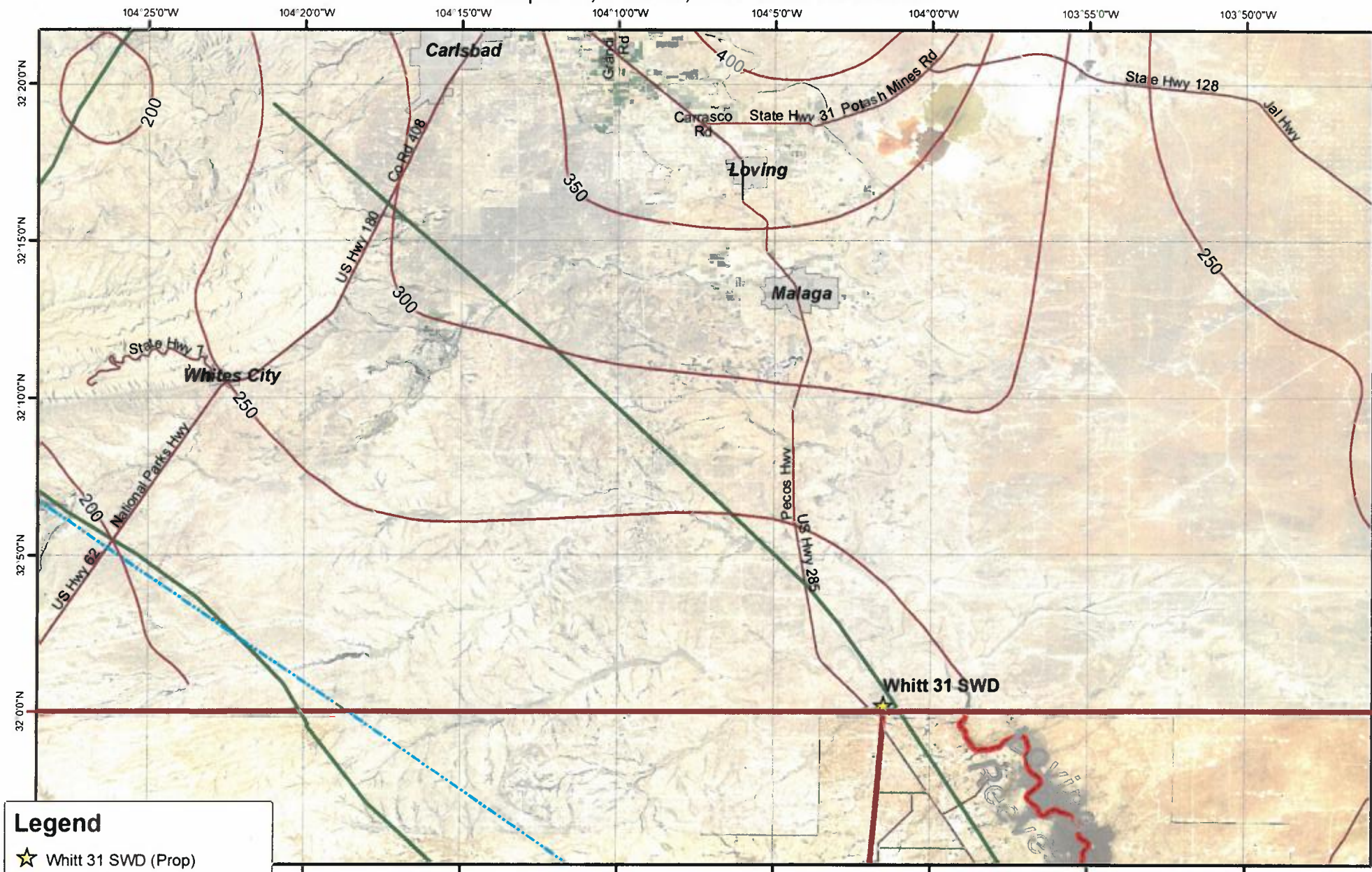
This geological map displays the Whitt 31 SWD area in southeastern New Mexico. The map includes a coordinate grid (32°0'0"N to 32°20'0"N, 104°25'0"W to 103°50'0"W) and a scale bar (0 to 20 miles). Key features include:

- Towns/Cities:** Carlsbad, Loving, Malaga, Whites City.
- Highways:** US Hwy 62, US Hwy 180, State Hwy 31, State Hwy 128, Polash Mines Rd, Carrasco Rd, Jar Hwy.
- Geological Features:**
  - Precambrian Faults:** Shown as blue dashed lines.
  - Basement Faults:** Shown as red solid lines.
  - Lower Ordovician (Ellenburger) Isopach:** Shown as a green solid line.
  - Pecos Hwy:** Shown as a purple solid line.
  - Whitt 31 SWD (Prop):** Marked with a yellow star.
  - Cross Section Wells:** Marked with purple dots and labeled with IDs: 30-015-41806, 30-015-43979, 30-015-39470, 30-015-41402, 30-015-43892, 30-015-44600, and 30-015-41846.
  - Cross Section Line:** Shown as an orange dashed line connecting several wells.
  - Tie Line:** Shown as a blue solid line.
- Legend:**
  - Whitt 31 SWD (Prop)
  - Cross Section Wells
  - Cross Section Line
  - Tie Line
  - Lower Ordovician (Ellenburger) Isopach
  - Precambrian Faults
  - Basement Faults
  - Roads
  - Towns/Cities
  - County Boundaries, TX
  - County Boundaries, NM
- Coordinate System:** GCS North American 1983
- Datum:** North American 1983
- Units:** Degree
- Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)**
- Precambrian faults were digitized from Frenzel et al (1998) Figure 6.**

Coordinate System: GCS North American 1983  
Datum: North American 1983  
Units: Degree  
Base~~ment~~ faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
Precambrian faults were digitized from Frenzel et al (1998) Figure 6.



# Isopach, Faults, and Well Locations



**Legend**

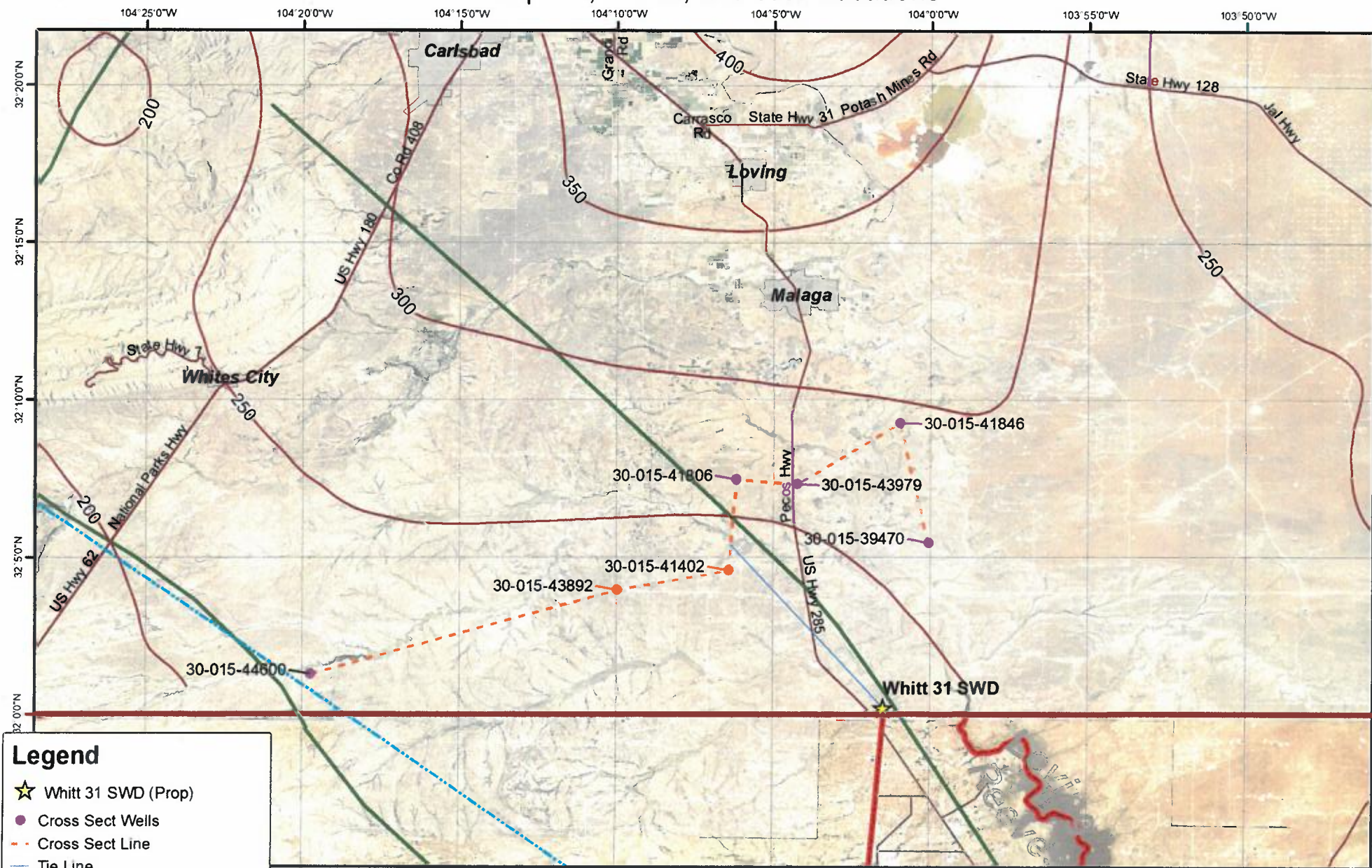
- ★ Whitt 31 SWD (Prop)
- Mississippian (Barnett) Isopach
- - - Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM



Coordinate System: GCS North American 1983  
 Datum: North American 1983  
 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.



# Isopach, Faults, and Well Locations



## Legend

- ★ Whitt 31 SWD (Prop)
- Cross Sect Wells
- - - Cross Sect Line
- - - Tie Line
- Mississippian (Barnett) Isopach
- Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM

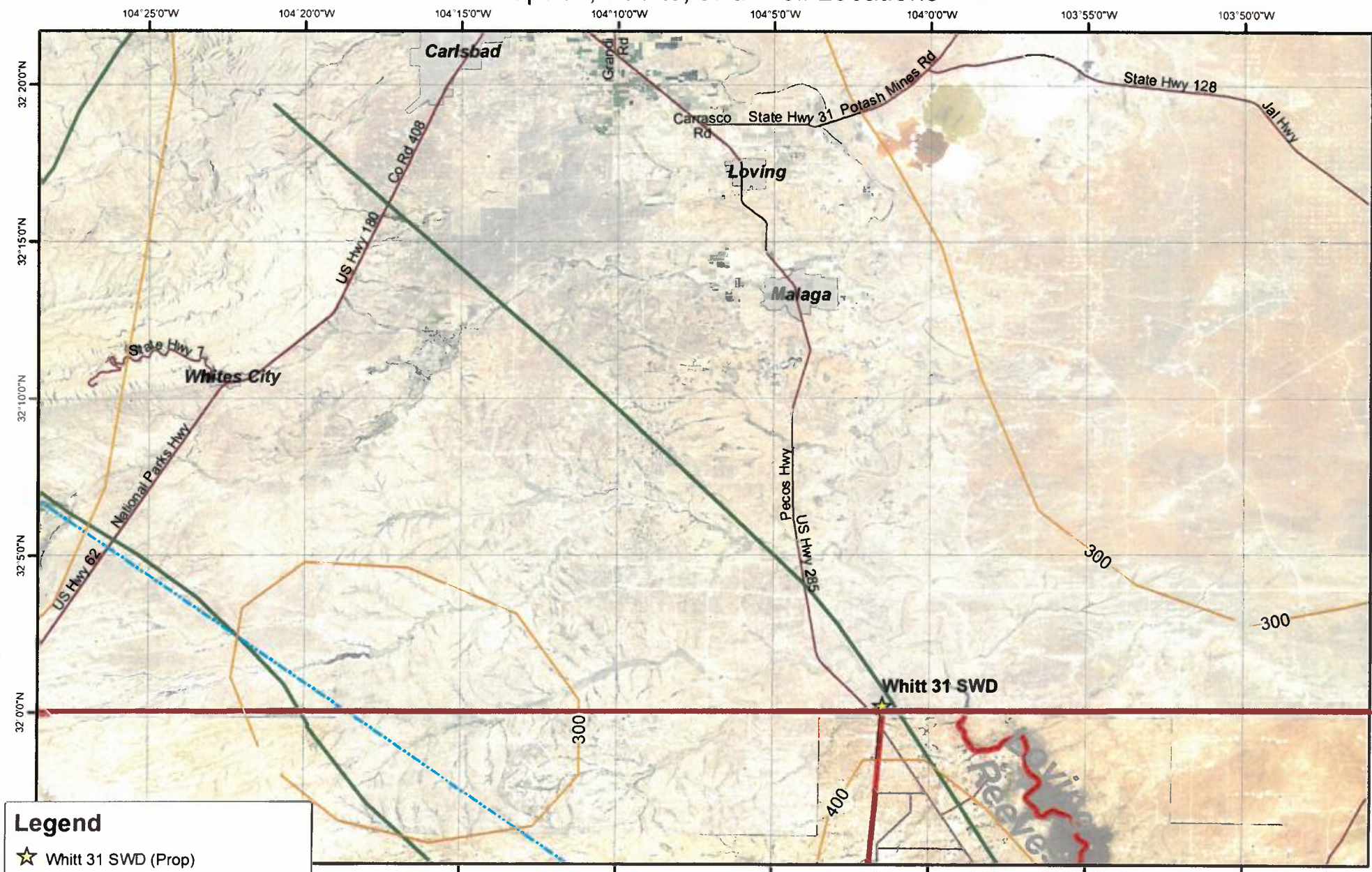


Coordinate System: GCS North American 1983  
 Datum: North American 1983  
 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.





# Isopach, Faults, and Well Locations



**Legend**

- ★ Whitt 31 SWD (Prop)
- Upper Ordovician (Montoya) Isopach
- - - Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM

5    2.5    0    5    10    15    20

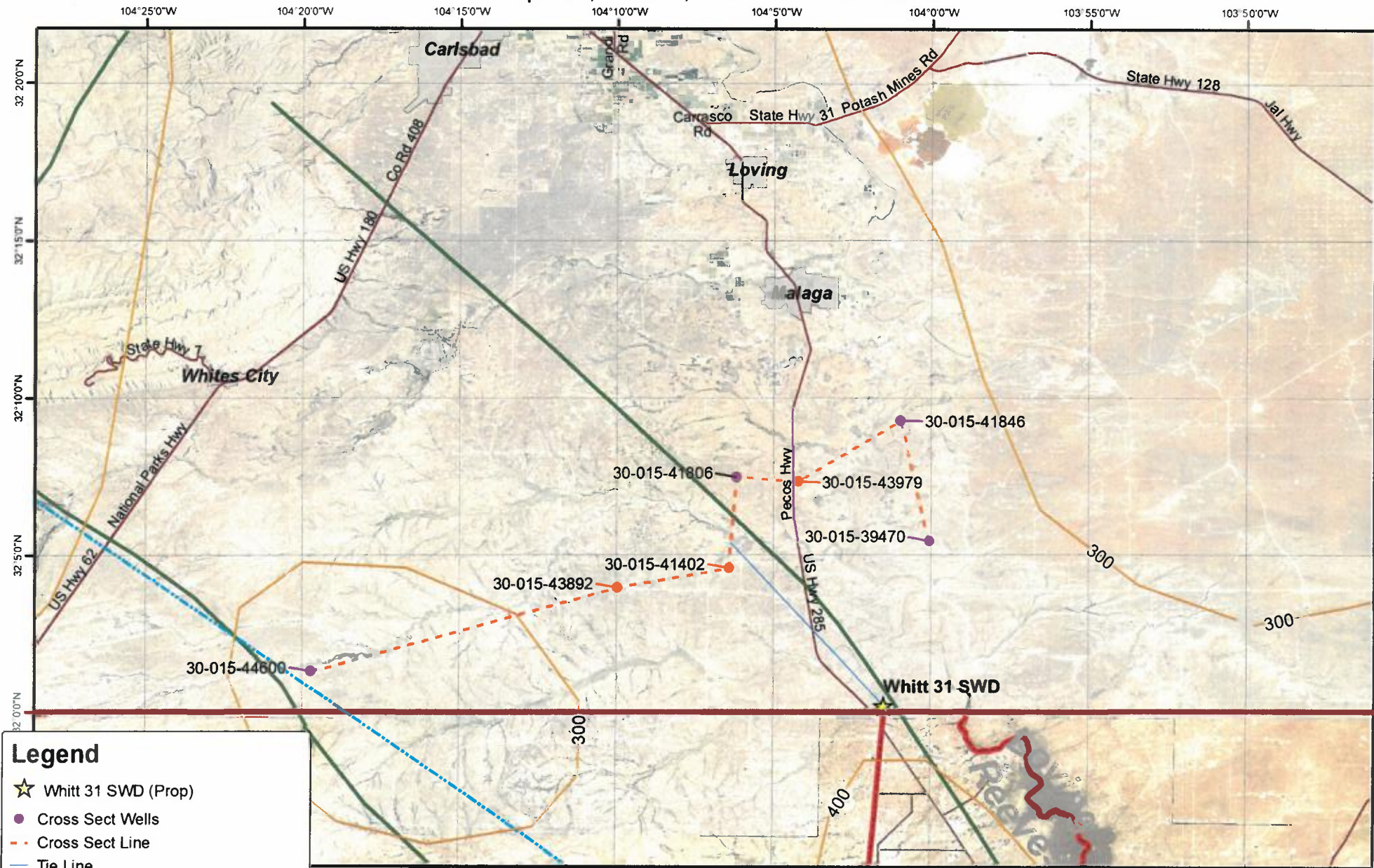
Miles

Coordinate System: GCS North American 1983  
Datum: North American 1983  
Units: Degree

Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
Precambrian faults were digitized from Frenzel et al (1998) Figure 6.



# Isopach, Faults, and Well Locations



## Legend

- ☆ Whitt 31 SWD (Prop)
- Cross Sect Wells
- - - Cross Sect Line
- - - Tie Line
- Upper Ordovician (Montoya) Isopach
- Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM

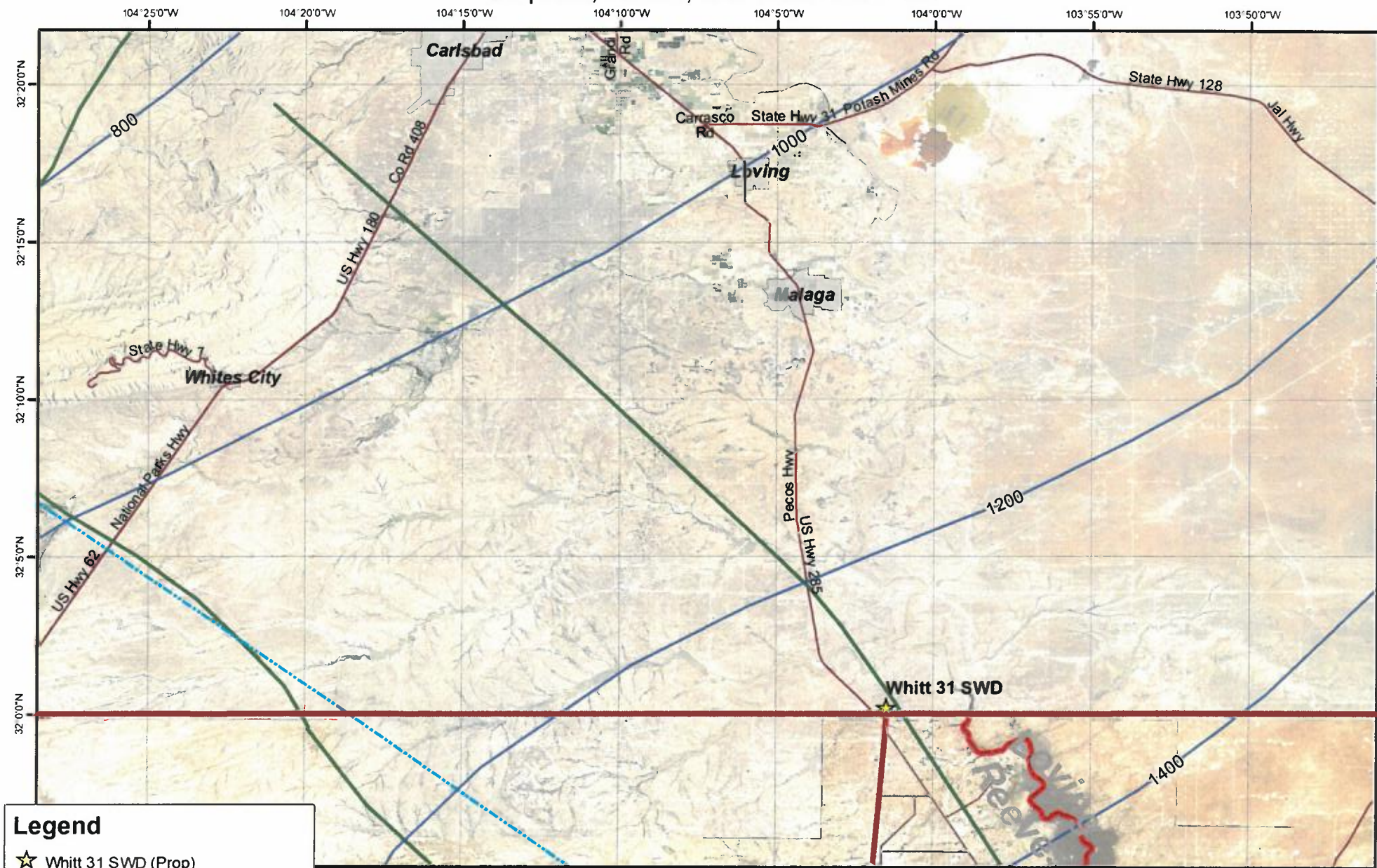


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 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.





# Isopach, Faults, and Well Locations



## Legend

- ★ Whitt 31 SWD (Prop)
- Sil/Dev (Wristen/Fusselman) Isopach
- - - Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM

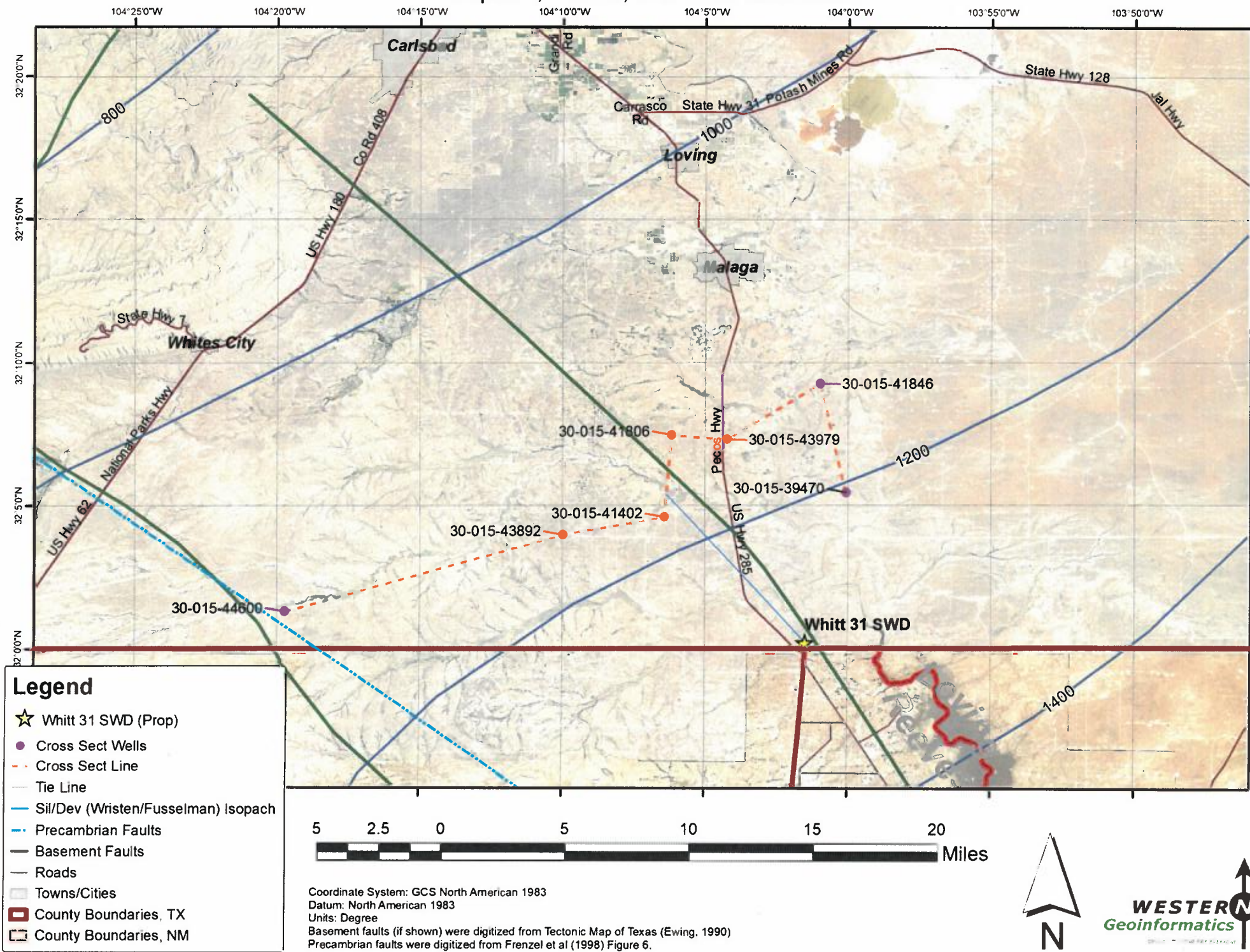


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 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.



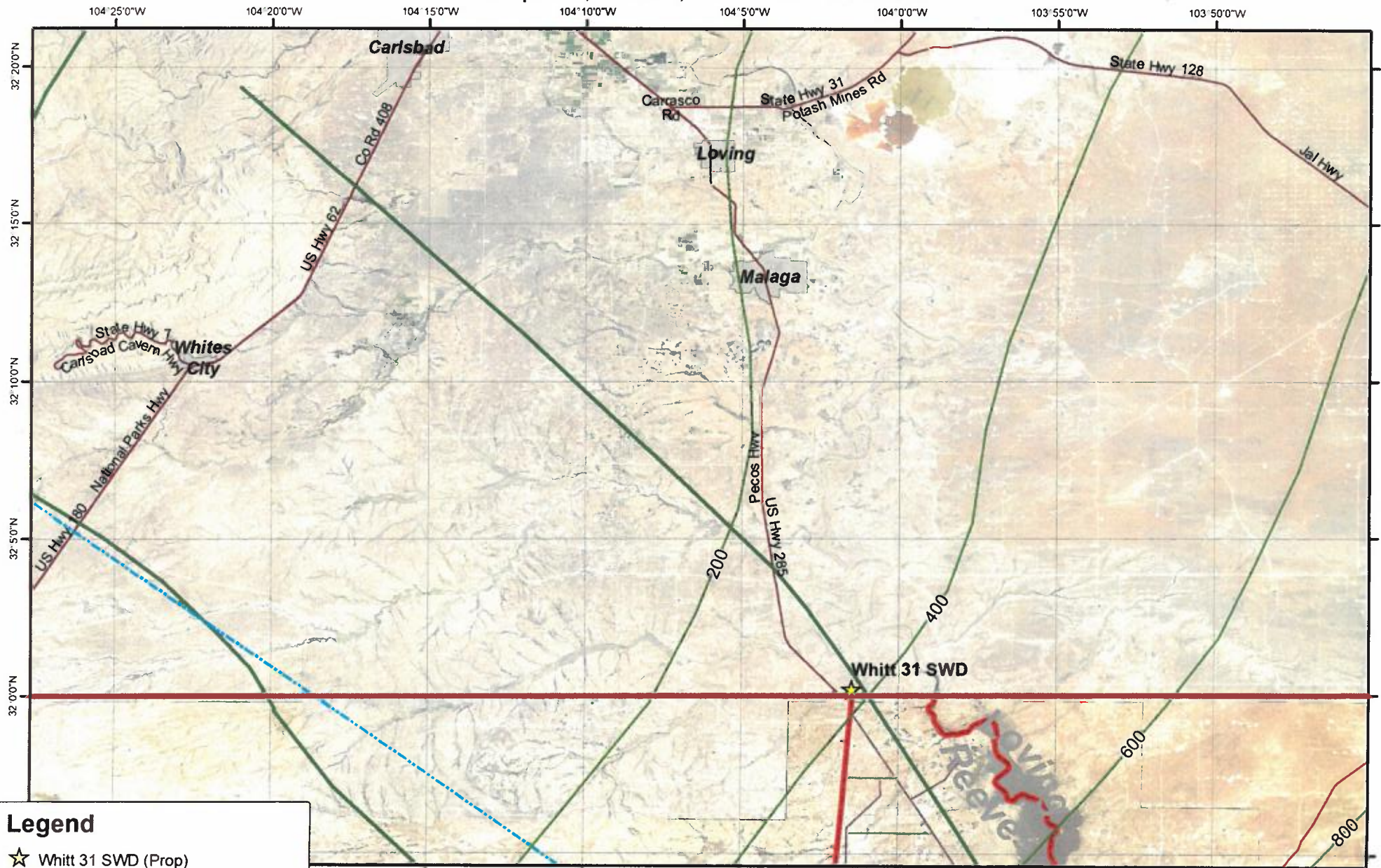


# Isopach, Faults, and Well Locations





# Isopach, Faults, and Well Locations



## Legend

- ★ Whitt 31 SWD (Prop)
- Middle Ordovician (Simpson) Isopach
- - - Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM

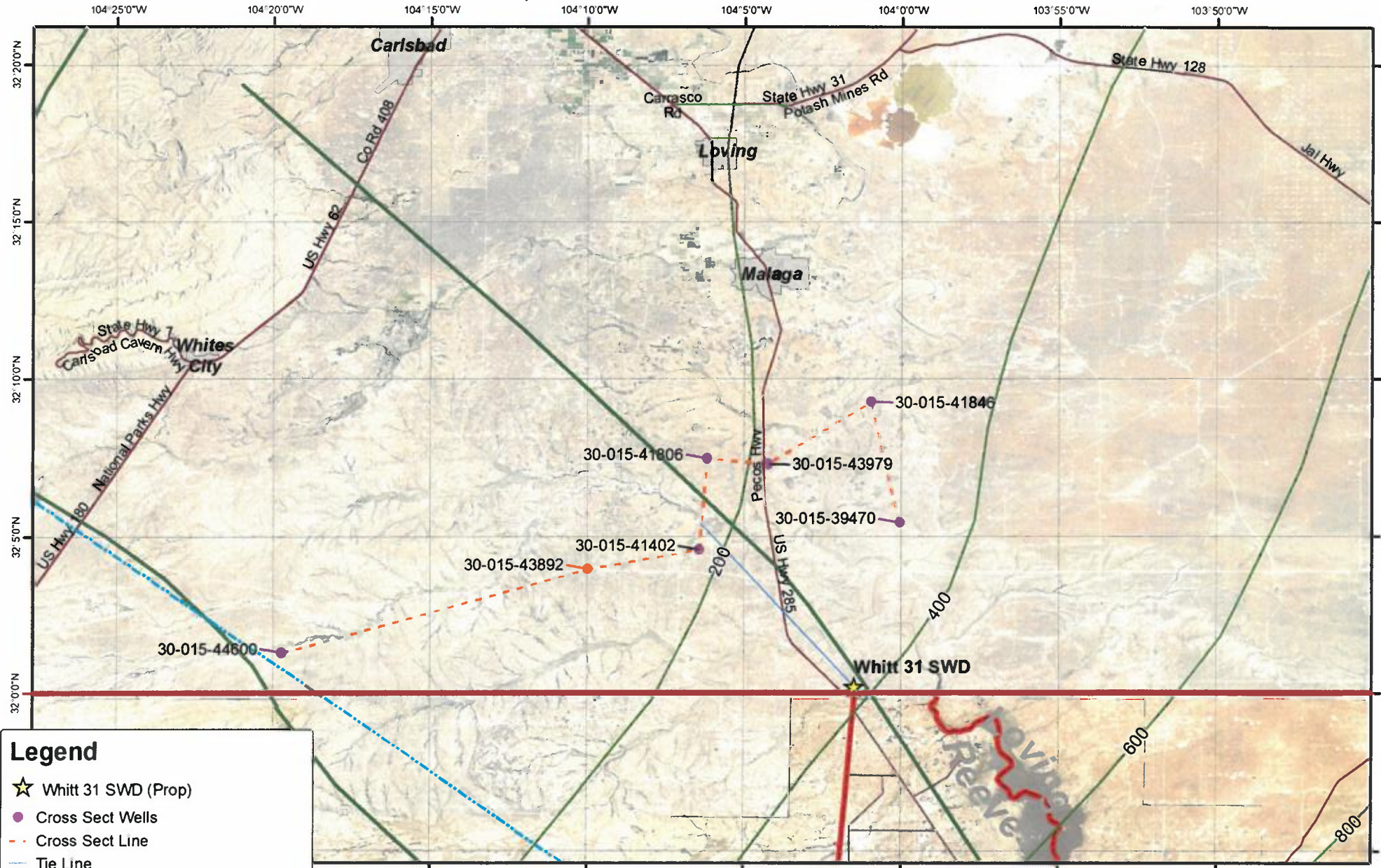


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 Datum: North American 1983  
 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.





# Isopach, Faults, and Well Locations



### Legend

- ☆ Whitt 31 SWD (Prop)
- Cross Sect Wells
- - - Cross Sect Line
- - - Tie Line
- Middle Ordovician (Simpson) Isopach
- Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM

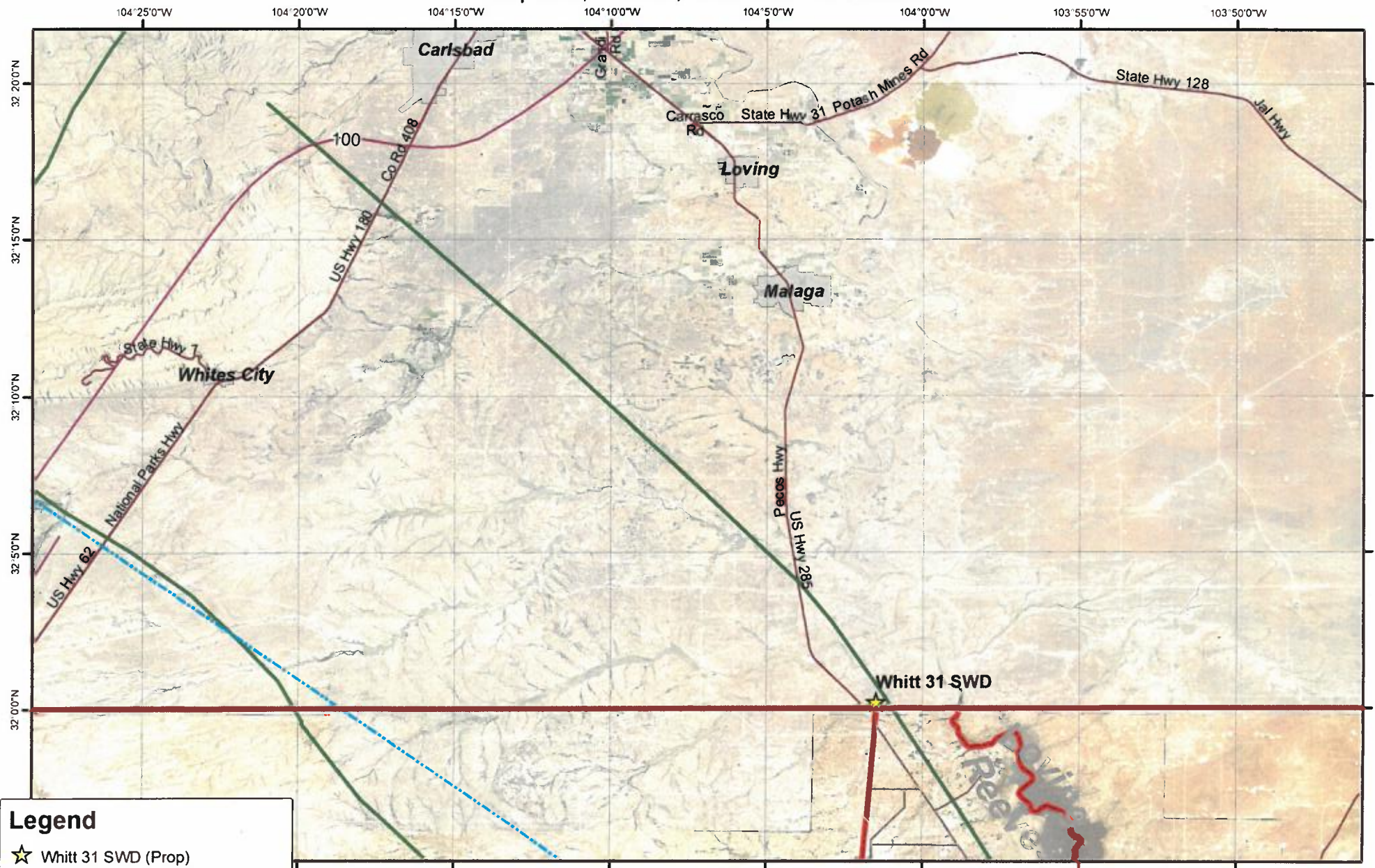


Coordinate System: GCS North American 1983  
 Datum: North American 1983  
 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.





# Isopach, Faults, and Well Locations



## Legend

- ☆ Whitt 31 SWD (Prop)
- Late Devonian (Woodford) Isopach
- - - Precambrian Faults
- Basement Faults
- Roads
- Towns/Cities
- ▬ County Boundaries, TX
- ▬ County Boundaries, NM

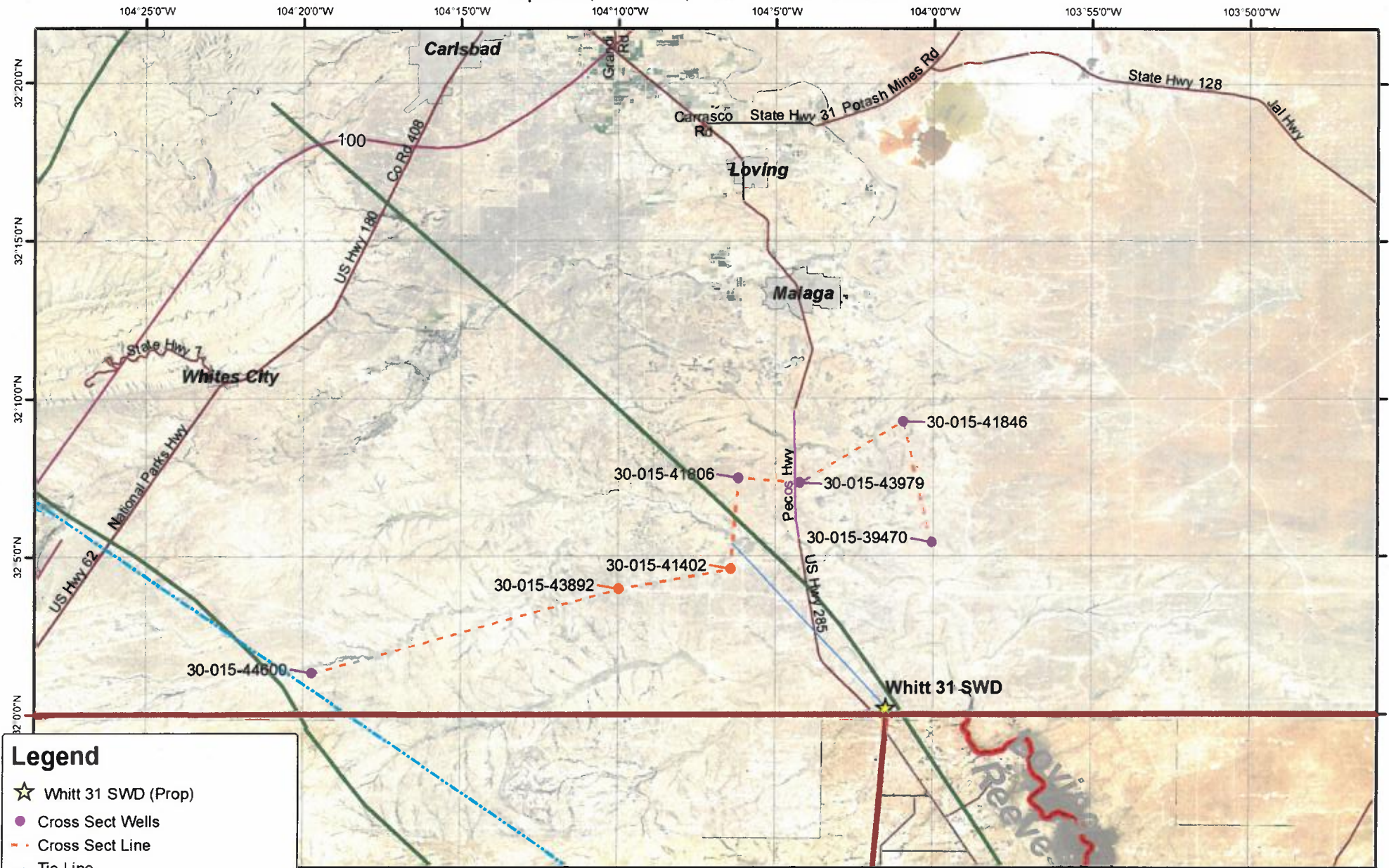


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 Datum: North American 1983  
 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.





# Isopach, Faults, and Well Locations



**Legend**

- ☆ Whitt 31 SWD (Prop)
- Cross Sect Wells
- - - Cross Sect Line
- - - Tie Line
- - - Late Devonian (Woodford) Isopach
- - - Precambrian Faults
- - - Basement Faults
- - - Roads
- Towns/Cities
- ▭ County Boundaries, TX
- ▭ County Boundaries, NM



Coordinate System: GCS North American 1983  
 Datum: North American 1983  
 Units: Degree  
 Basement faults (if shown) were digitized from Tectonic Map of Texas (Ewing, 1990)  
 Precambrian faults were digitized from Frenzel et al (1998) Figure 6.

# **Exhibit 5**



**Exhibits of Dr. Steven Taylor**  
**On Behalf of NGL Water Solutions Permian, LLC**

**STATE OF NEW MEXICO  
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**AMENDED APPLICATION OF NGL WATER  
SOLUTIONS PERMIAN, LLC  
FOR APPROVAL OF SALT WATER  
DISPOSAL WELL IN EDDY COUNTY,  
NEW MEXICO**

**CASE NO. 20404 (WHITT 31)**

**AFFIDAVIT OF DR. STEVEN TAYLOR**

STATE OF NEW MEXICO            )  
  ) ss.  
COUNTY OF \_\_\_\_\_        )

I, Dr. Steven Taylor, make the following affidavit based upon my own personal knowledge.

1. I am over eighteen (18) years of age and am otherwise competent to make the statements contained herein.

2. I have worked at the Los Alamos National Labs from 1991 to 2006. I currently am the secretary of GeoEnergy Monitoring Systems, Inc., a company that builds and conducts seismic monitoring.

3. I have obtained a Bachelor of Science degree in geology at Ohio University (1975) and a Ph.D. in Geophysics at the Massachusetts Institute of Technology (1980).

4. I am familiar with the amended application that NGL Water Solutions Permian, LLC ("NGL") filed in this matter and I have conducted a study related to the areas which is the subject matter of the application.

5. The applicant, NGL (OGRID No. 372338), seeks an order approving the Whitt 31 SWD #1 well (Case No. 20404), which is a salt water disposal well.

6. The injection zone for the well is located below the base of the Woodford Shale formation and above the Ordovician formation, which consists of significant shale deposits.

7. The closest known fault line is located approximately 2 to 20 miles away from where the well is proposed to be located.

8. I have studied seismic catalogs, unpublished catalogs and USGS catalogs for the time period of 2010 – 2017 selective events within 50 km of one the Striker SWD wells. Attached as Exhibit A is a copy of my study. My study concludes that there is very little seismic activity in the areas where the well is proposed to be located.

9. I have also reviewed information provided by FTI Platt Sparks involving several different fault slip probability analysis conducted, using a tool created by Stanford University. These fault slip potential models showed low probability of slip or earthquakes to known mapped faults located closest to the well. A copy of the studies are attached hereto as Exhibit B.

10. I attest that the information provided herein is correct and complete to the best of my knowledge and belief.

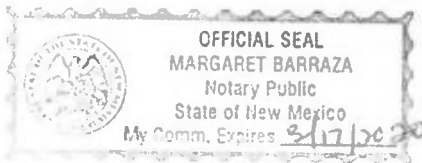
*[Signature page follows]*

Steven Taylor  
Dr. Steven Taylor

SUBSCRIBED AND SWORN to before me this 30<sup>th</sup> day of April, 2019 by Dr. Steven Taylor.

Margaret Barraza  
Notary Public

My commission expires: 3/17/2020



## Seismic Catalog Analysis Within 50 km of Whitt 31 SWD #1 Well

Prepared for NGL-Permian  
by  
GeoEnergy Monitoring Systems  
April 4, 2019

Analysis is based on NMT seismic catalogs, unpublished catalogs and USGS catalogs for the time period 2010-2017 selecting events within 50 km of the Striker 2 SWD well. Additionally, seismic monitoring through March 31, 2019 from the three NGL seismic stations installed at Striker 2, Striker 3 and Striker 6 SWD wells installed on September 6, 2018. NGL/GeoEMS installed a seismic monitor at the Salty Dog SWD well (SDOG) in Texas just across New Mexico border on March 28, 2019 that will help constrain locations in southeastern NM.

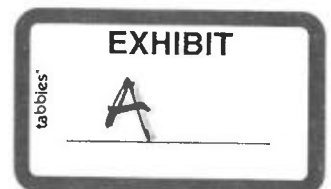
Striker Two (STR2), Sand Dunes well, Lat/Long: 32.2072820/-103.7557370  
Striker Three (STR3), Gossett well, Lat/Long: 32.2551110/-104.0868610  
Striker Six (STR6), Madera well, Lat/Long: 32.2091150/-103.5359570  
Salty Dog (SDOG), Salty Dog well, Lat/Long: 32.22531/-103.045212

**Figure 1** shows seismic station locations with estimated detection levels for M 1.0 (green circles) and M 1.5 (red circles) along with NGL-Permian stations (yellow pushpins). **Figure 2** shows seismicity listed in Table 1 shown as red circles and additional regional stations from TexNet and NMT (green pushpins). These regional stations are used along with the 3 Striker SWD seismic stations for regional monitoring.

The USGS reports only two events in the vicinity since 2010. New Mexico Tech runs a seismic network (SC) north of the wells for the DOE Waste Isolation Plant (only short-period vertical components). There are a total of seven seismic events in this time period ranging in magnitude from 1.0 to 3.1. Since the seismic deployment, there have been six event detections and having preliminary locations using available regional data (**Figure 3**). Due to the small magnitudes, the signal-to-noise levels are low so the locations have large uncertainty and there is little constraint on depth.

Table 1: Seismicity Within 50 km of Striker SWD Wells 2010-2017

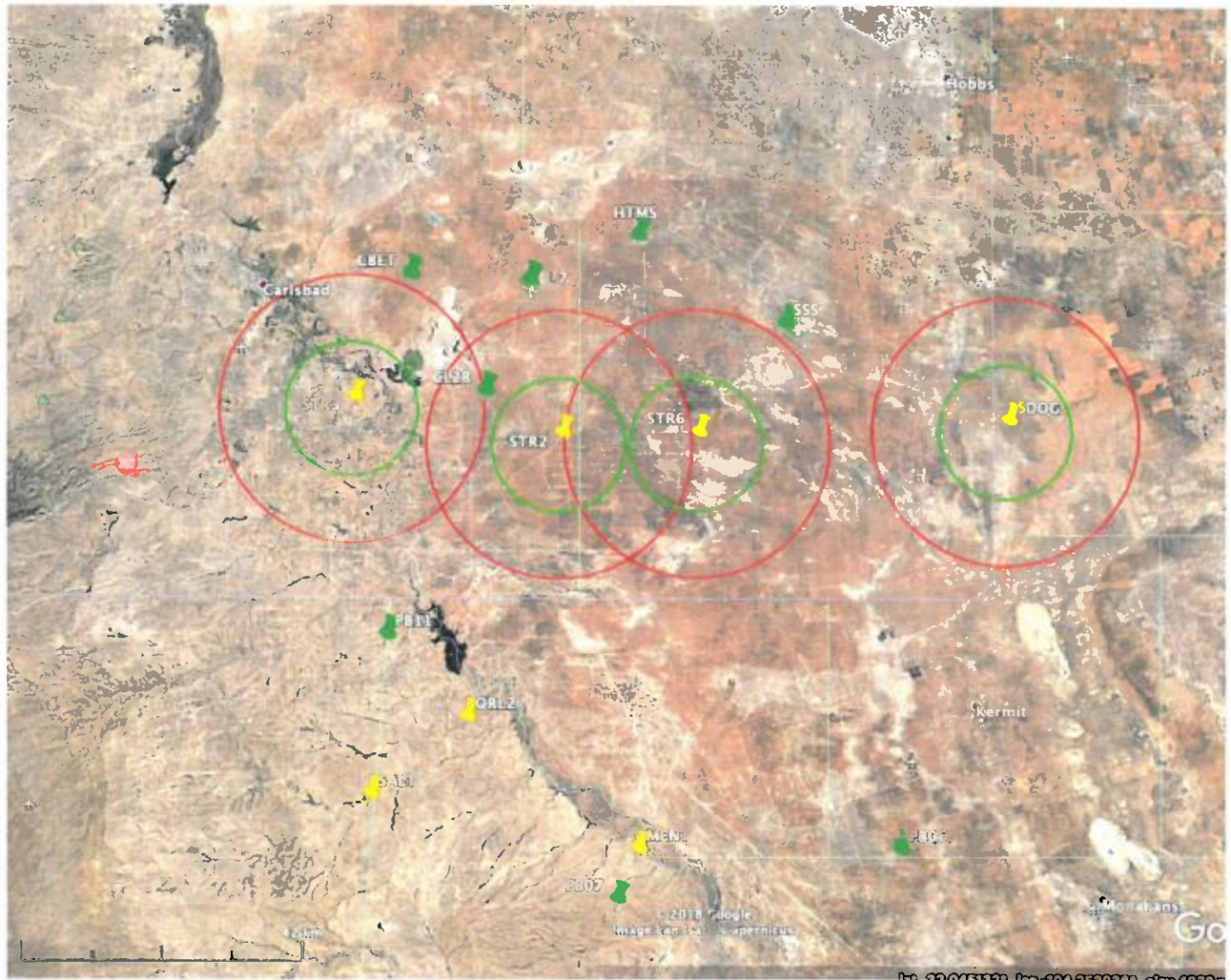
Date	Origin Time GMT	Latitude	Longitude	Depth (km)	Magnitude
20111227	23:10:37	32.37	-103.95	NaN	1.6
20120318	10:57:22	32.281	-103.892	5.0	3.1
20170211	14:34:27	32.29	-103.92	NaN	1.5
20170302	11:38:53	32.37	-103.88	NaN	1.7
20170325	22:46:01	32.13	-103.77	NaN	1
20170503	17:47:21	32.082	-103.023	5.0	2.6
20170814	01:09:56	32.39	-103.56	NaN	1.2



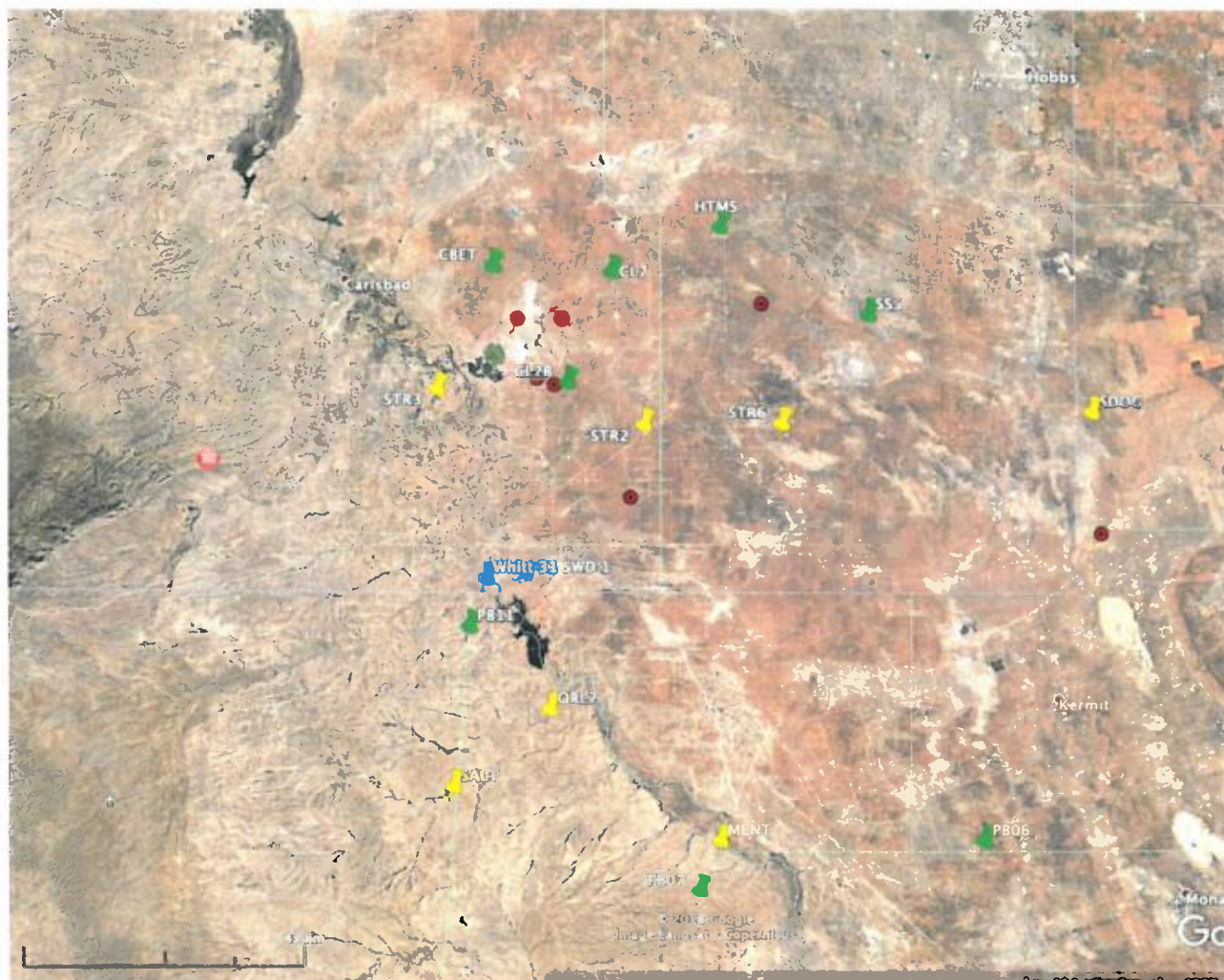
**Table 2.** New Mexico Area Reporting Period Seismicity (km units)

Date	Origin Time (GMT)	Lat	Long	Depth	Loc Error	M	(+/-)
09/10/18	23:35:43.942	32.1793	-103.5283	1	5.58	1.25	0.23
09/14/18	06:57:47.614	32.1540	-103.5030	1	5.58	1.11	0.41
09/15/18	16:48:21.041	32.1630	-103.5211	1	5.37	1.50	0.00
10/13/18	22:07:22.259	32.0998	-103.4560	6	5.64	1.60	0.12
11/18/18	09:04:52.707	32.2526	-103.7853	5	3.77	1.75	0.20
12/09/18	18:51:00.805	32.3634	-103.8510	1	2.09	1.44	0.08
01/03/19	09:15:48.809	32.2761	-103.6732	6	5.64	1.63	0.00
01/03/19	23:05:33.122	32.2599	-103.7654	4	5.51	1.60	0.25
01/04/19	09:45:38.943	32.2346	-103.7798	4	4.34	1.98	0.38
01/09/19	10:18:54.389	32.2255	-103.7166	5	2.80	1.47	0.41
01/27/19	07:33:47.127	32.2219	-103.7220	5	3.53	1.72	0.31
02/19/19	09:35:15.109	32.2443	-103.6898	1	4.17	1.20	0.00



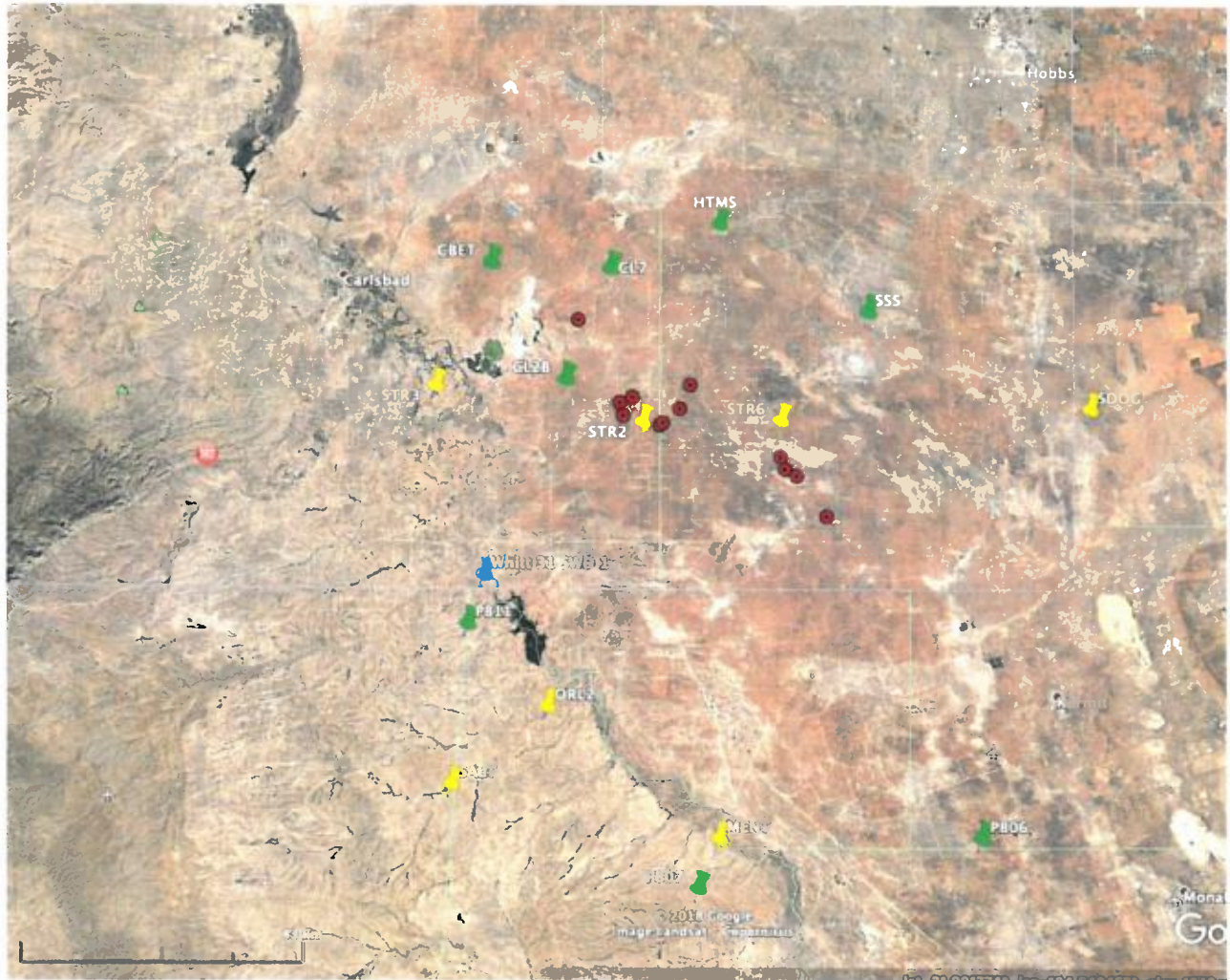


**Figure 1.** NGL-Permian seismic stations (yellow pushpins). Green and red circles around stations show approximate detection levels for ML 1.0 and 1.5, respectively.



**Figure 2.** Striker SWD wells seismic station locations (yellow push pins) and existing NGL-Permian seismic stations (yellow pushpins). Other regional seismic stations run by TexNet and New Mexico Tech are shown as green pushpins. Historic seismicity listed in Table 1 shown as red circles. Whitt 31 SWD #1 well is shown as blue pushpin.





**Figure 3.** Seismic events in between September 6 and March 31, 2019 as red circles (Table 2). Whitt 31 SWD #1 well shown as blue pushpin. Seismic stations as yellow (NGL) or green (NMT and TexNet) pushpins.

May 1, 2019

RE: FSP Analysis

NGL Water Solutions Permian, LLC (**Whitt 31 SWD #1**)

Eddy County, New Mexico

**FSP Analysis**

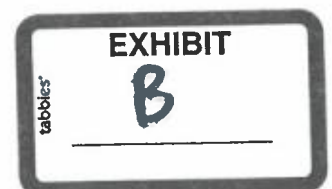
The FSP software used for this analysis was jointly developed by Stanford University, Exxon Mobil and XTO Energy as a tool for estimating fault slip potential resulting from fluid injection.

I have reviewed the geology, seismic activity, injection history and future proposed injection in the Subject Area and I would conclude that the Proposed **Whitt 31 SWD #1** well does not pose a risk of increasing seismicity in the area. The primary risk reduction factor is that the faults are not optimally oriented to slip, and significant pressure increases would be necessary to initiate slip on the faults analyzed.

Fault slip potential (FSP) was analyzed in the area of review shown on **Exhibit No. 1**. The analysis integrates the proposed well location as well as any existing injection wells in order to fully assess the pressure implications of injection in the area and the potential for slip along existing faults. There are no historical USGS earthquake locations within the review area. (see **Exhibit No. 1**)

**Exhibit No. 2** shows the FSP input parameters for the local stress, average reservoir depth, pressure gradients and reservoir characteristics. Depths and reservoir characteristics were derived from nearby well logs and stress values were derived from the Lund Snee and Zoback (2018) paper related to Stress in the Permian Basin.

**Exhibit No. 3** shows the location of existing wells and locations of the Proposed SWD well relative to the faults documented in this area. The faults are sourced from the Texas Bureau of Economic Geology



and these are also the fault traces shown in the referenced Snee/Zoback paper (Figure 3 in the paper) and shown as **Exhibit No. 4** in my report. The Snee/Zoback paper only considers fault orientation relative to the stress orientation in determination of fault slip potential. Based on their limited analysis of the area they concluded the faults have low slip potential based on orientation/azimuth.

In my own independent subsurface mapping of the area I did not find evidence for the BEG fault in this area. Also, Geomap structure maps on the top of the Siluro-Devonian do not show any faults in this area. In my opinion this area is unfaulted, however I did honor the BEG faults in the FSP model.

My analysis further incorporates the injection history and future injection projections and the injection reservoir characteristics to fully assess the potential for slip along these faults. Existing wells were incorporated into the analysis using their injection volume histories and holding them constant into the future at their last reported monthly injection volume. The Subject well was modelled at 50,000 bbls/day and held constant for the life of the analysis (+25 years). The proposed Whitt 32 SWD is also included in the model at 50,000 bbls/day and held constant for the life of the analysis (+25 years).

(Only wells within the 10 km radius are used in the model)

The wells in the model: (Exhibit No. 3 and Exhibit No. 1)

- 8 – Whitt 31 SWD
- 9 – Whitt 32 SWD (proposed)
- 1 – 3001523615
- 2 – 3001525530
- 3 – 3001539470
- 4 – 3001543630
- 5 – 3001544001
- 6 – 4210932853
- 7 – 4210933166



**Exhibit No. 5** illustrates the geomechanical properties of the fault segments in the area of review. It should be noted that the FSP software only calculates a single pressure change along a fault (at the fault mid-point) so it is critical that faults are broken into multiple segments to get a true evaluation of the pressure increases associated with injection. **Exhibit No. 5** also shows the direction of max hor. stress as denoted by the grey arrows outside the circle on the stereonet in the lower right portion of this exhibit. Faults that align parallel or closer to this orientation will have the highest potential for slip or lowest  $\Delta P$  to slip. Faults 1-9 have very low potential for slip.

**Exhibit No. 6** shows that the input stress and fault values were varied by +/-10% to allow for uncertainty in the input parameters. Even considering the variability of the inputs the model results show low probability for slip on the faults in the area of review. An increase of 2,800 psi still only results in a 10% probability of fault slip.

**Exhibit No. 7** takes a closer look at fault 1. The sensitivity analysis is highlighted in the lower right portion of this exhibit and shows that without any variability of inputs the  $\Delta P$  needed to slip is 5,383 psi along this fault. A 10% change in the azimuth of the fault could lower  $\Delta P$  needed to slip to 3,250psi. The analysis is essentially the same for segments F1-F9, with the fault segments F2-F9 requiring slightly higher  $\Delta P$  needed to slip. (See table 1)

**Exhibit No. 8** illustrates the  $\Delta P$  pressure in a “heat map” and shows  $\Delta P$  pressure increases at the faults as of 1/1/2020. This map indicates  $\Delta P$  pressure increase of 192 psi at F6.

**Exhibit No. 9** illustrates the  $\Delta P$  pressure in a “heat map” and shows  $\Delta P$  pressure increases at the faults as of 1/1/2025. This map indicates  $\Delta P$  pressure increase of 1,165 psi at F6.

**Exhibit No. 10** illustrates the  $\Delta P$  pressure in a “heat map” and shows  $\Delta P$  pressure increases at the faults as of 1/1/2030. This map indicates  $\Delta P$  pressure increase of 1,448 psi at F6.

**Exhibit No. 11** illustrates the  $\Delta P$  pressure in a “heat map” and shows  $\Delta P$  pressure increases at the faults as of 1/1/2035. This map indicates  $\Delta P$  pressure increase of 1,638 psi at F6.. Note that this pressure is still well below the pressure that could initiate fault slip, which takes +3,650 psi.

**Exhibit No. 12** illustrates the  $\Delta P$  pressure in a “heat map” and shows  $\Delta P$  pressure increases at the faults as of 1/1/2040. This map indicates  $\Delta P$  pressure increase of 1,786 psi at F6. Note that this pressure is still well below the pressure that could initiate fault slip, which takes +3,650 psi.

**Exhibit No. 13** illustrates the  $\Delta P$  pressure in a “heat map” and shows  $\Delta P$  pressure increases at the faults as of 1/1/2045. This map indicates  $\Delta P$  pressure increase of 1,910 psi at F6. Note that this pressure is still well below the pressure that could initiate fault slip, which takes +3,650 psi.

The pressure analysis over time shows that pressure is expected to increase along the faults however pressures remain below critical levels. The table below shows the  $\Delta P$  pressure increases needed to imitate fault slip along each fault segment and the corresponding  $\Delta P$  pressure increases as of 2045:

<b>Fault Segment</b>	<b><math>\Delta P</math> to slip (fixed inputs)</b>	<b><math>\Delta P</math> to slip (10% varied inputs)</b>	<b><math>\Delta P</math> at 2045</b>
<b>F1</b>	5,383	3,250	189
<b>F2</b>	5,901	3,850	415
<b>F3</b>	5,901	3,850	465
<b>F4</b>	6,246	3,800	614
<b>F5</b>	6,246	3,800	1,056
<b>F6</b>	6,232	3,650	1,910
<b>F7</b>	6,190	3,450	1,586
<b>F8</b>	6,244	3,700	672
<b>F9</b>	6,242	3,700	176

**TABLE 1**

This analysis demonstrates that there is a low likelihood of injection induced seismicity in the Subject Area.

### **Conclusion**

The faults and fault trends in the area of review are not optimally oriented to slip. The orientation of the faults requires significant pressure changes ( $\Delta P$  +5,383 psi) based on the fixed input parameters and the  $\Delta P$  increase at the faults only reaches 1,910 psi by 2045. This model assumes constant injection rates over the next +25 years which is not a typical scenario as SWD wells tend to decrease injection

volumes over time as the well ages and disposal demand decreases in the area. If injection volumes are lower over time than the model represents, then the risk for fault slip is lowered also.

In the event seismicity should occur in the future, the wells closest to the faults (proposed and existing) should be the wells considered for modification or reduction of injection rates. At this time there is no evidence to support rate reduction for any of the existing or proposed wells.

Should you have any questions, please do not hesitate to call me at (512) 327-6930 or email me at [todd.reynolds@ftiplattsparks.com](mailto:todd.reynolds@ftiplattsparks.com).

Regards,

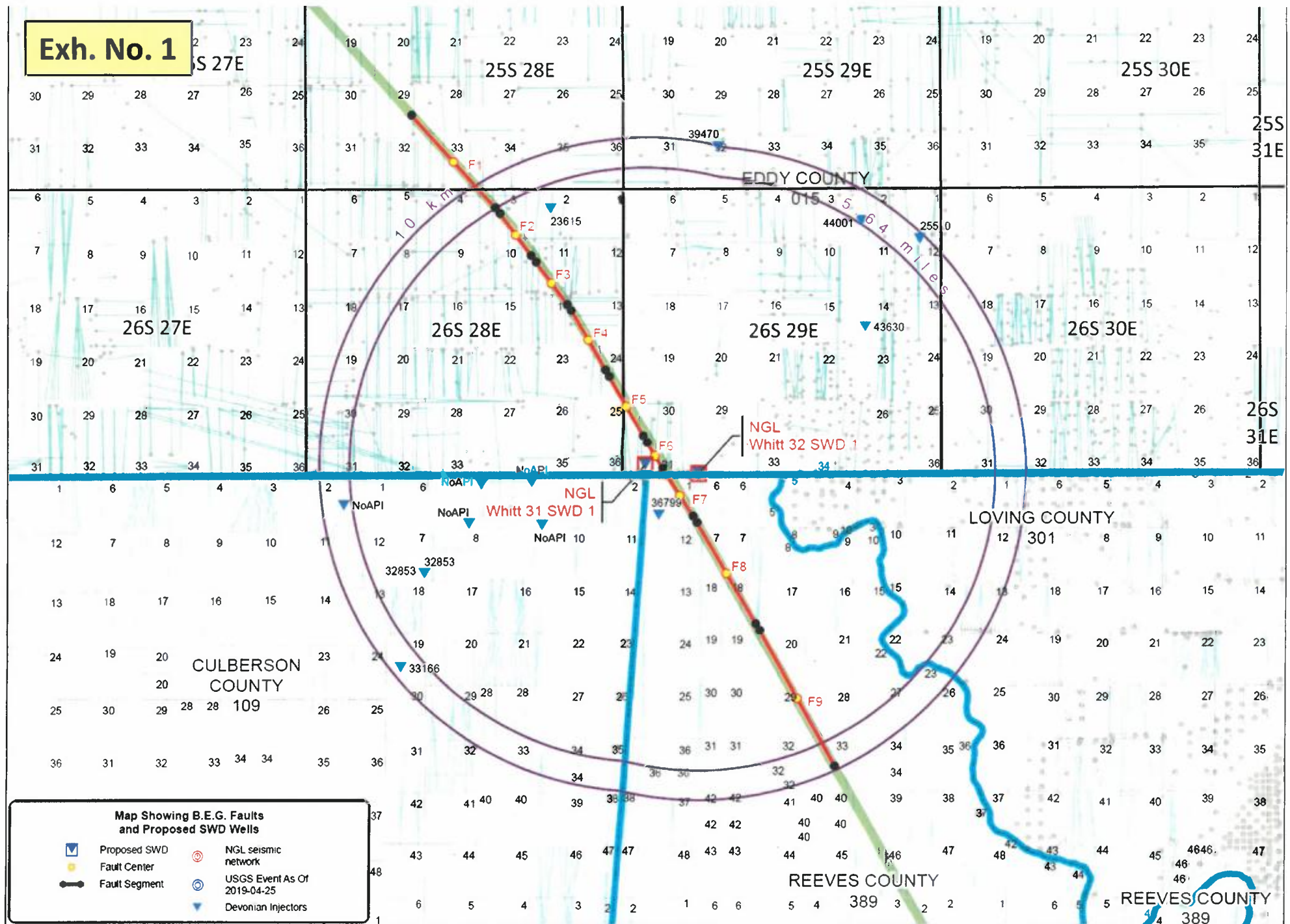
**Todd W. Reynolds – Geologist/Geophysicist**  
Managing Director, Economics/FTI Platt Sparks



Todd W. Reynolds

**FTI Platt Sparks**  
512.327.6930 office

**Exh. No. 1**





## Exh. No. 2

## FSP INPUT PARAMETERS

Stress Data

Vertical Stress Gradient [psi/ft]	1.1
Max Hor Stress Direction [deg N CW]	60
Reference Depth for Calculations [ft]	15741
Initial Res. Pressure Gradient [psi/ft]	0.465
Min Horiz. Stress Gradient [psi/ft]	0.66856
Max Horiz. Stress Gradient [psi/ft]	0.91017
A Phi Parameter	0.56
Reference Friction Coefficient mu	0.6

OK

Hydrology Data

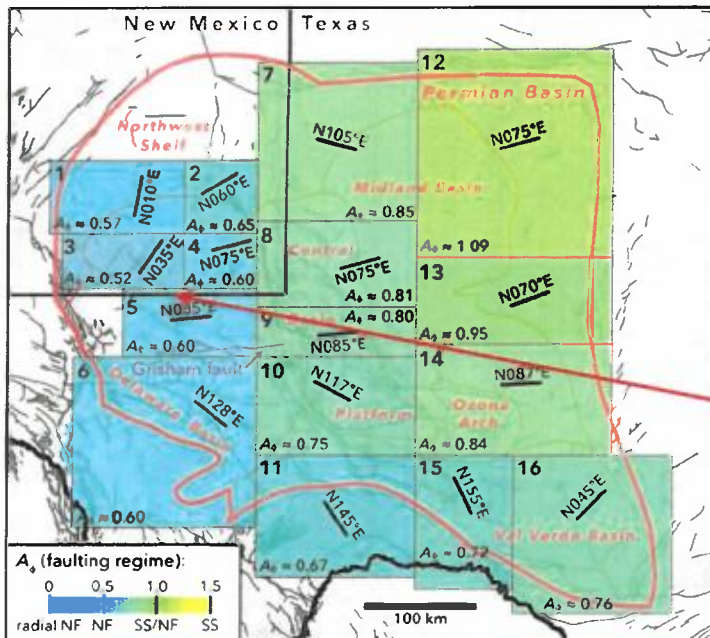
Enter Hydrologic Parameters

Load External Hydrologic Model

Aquifer Thickness [ft]	570
Porosity [%]	4.5
Permeability [mD]	25

Fault dips assumed – 80 deg

OK



### Input Parameter Comments

Hydrologic Parameters – Derived from nearby logs

Stress Gradients – Derived from A Phi parameter from Snee/Zoback paper (.56)

Max Hor. Stress Direction - Derived from Snee/Zoback paper (N60E)

# Exh. No. 3

Zoom

## Fault Slip Potential

Fault Selector:

All Faults

- Fault #1
- Fault #2
- Fault #3
- Fault #4
- Fault #5
- Fault #6
- Fault #7
- Fault #8
- Fault #9

Calculate

MODEL INPUT...

GEOMECHANICS

PROB. GEOMECH

HYDROLOGY

PROB. HYDRO

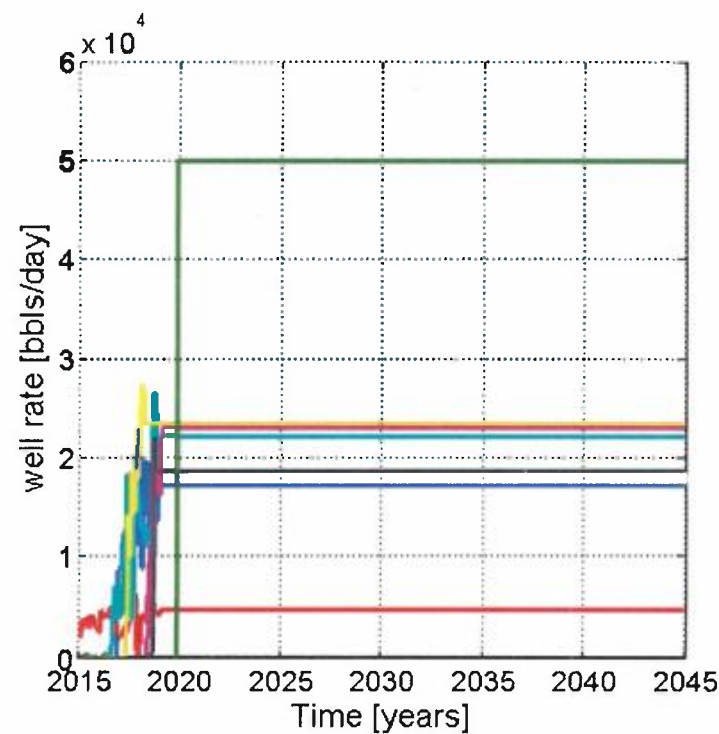
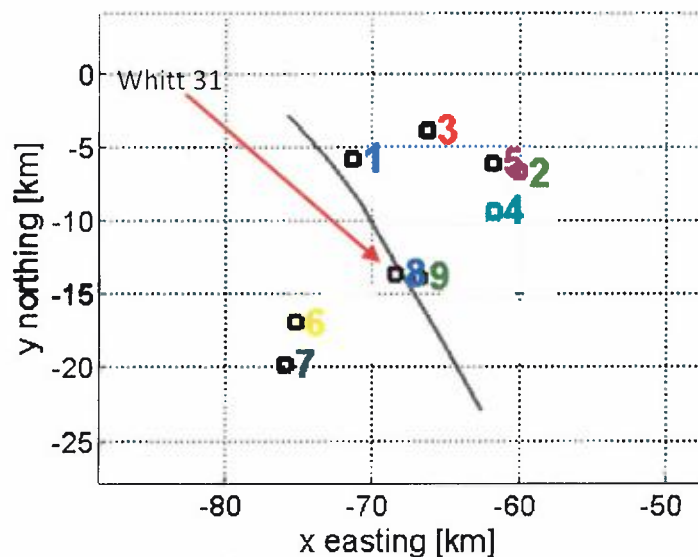
INTEGRATED

Stress Regime: Normal Faulting

Select Well:

All

FSP INPUT Fault and well locations



FSP INPUT Injection history and projected future injection

# Exh. No. 4

Area of Review

Low slip potential based on fault orientation (green faults)

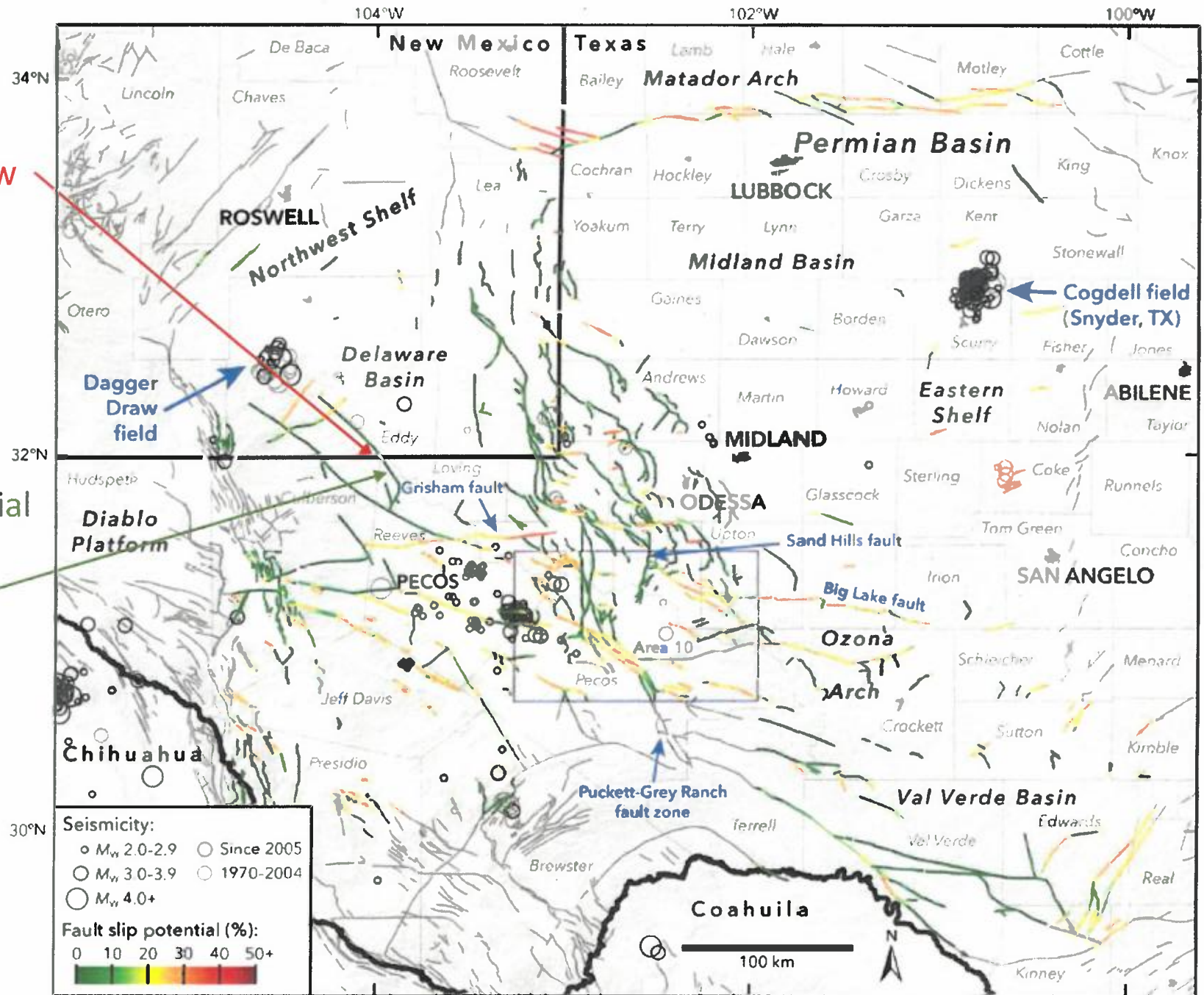


Figure 3. Results of our probabilistic FSP analysis across the Permian Basin. Data sources are as in Figures 1 and 2.

From Lund Snee and Zoback (2018)



# Exh. No. 5

Zoom

## Fault Slip Potential

Fault Selector:

All Faults

Fault #1  
Fault #2  
Fault #3  
Fault #4  
Fault #5  
Fault #6  
Fault #7  
Fault #8  
Fault #9

Calculate

MODEL INPUTS

GEOMECHA...

PROB. GEOMECH

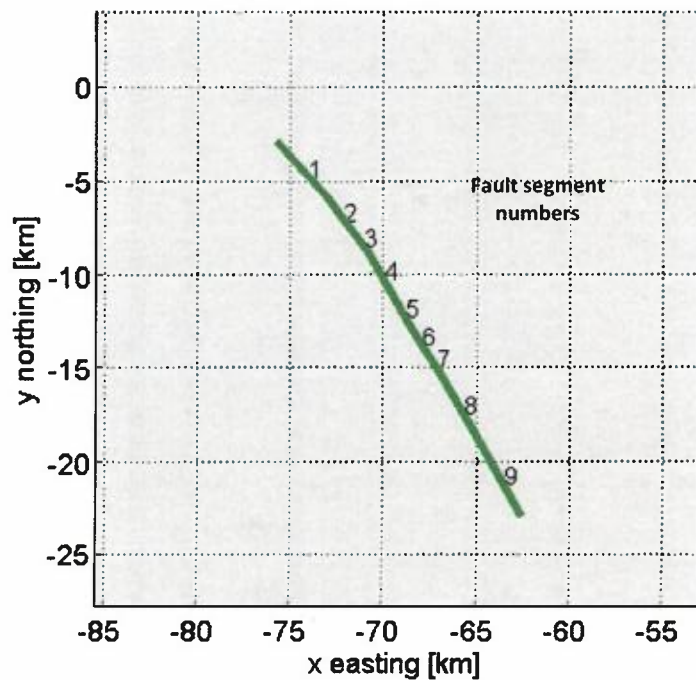
HYDROLOGY

PROB. HYDRO

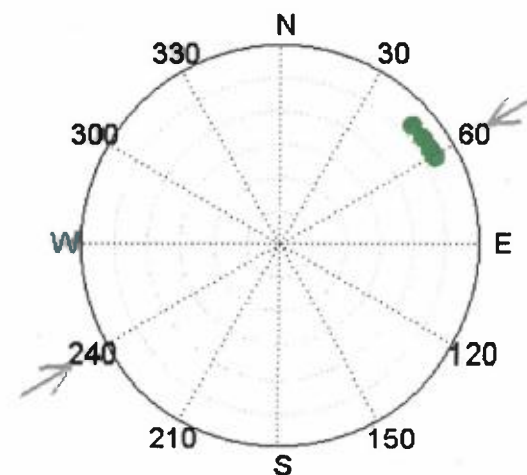
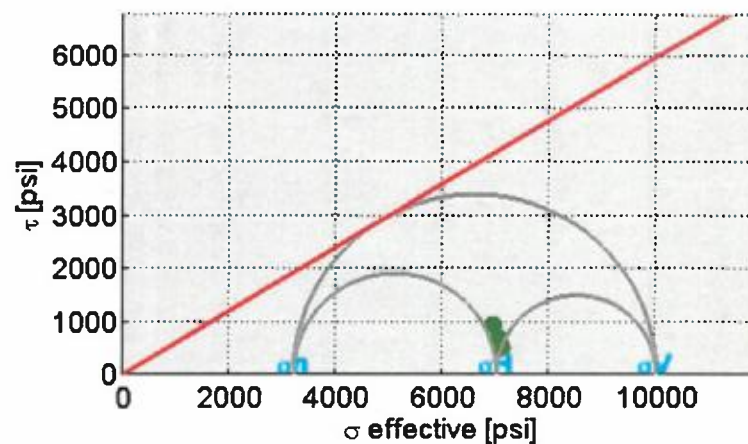
INTEGRATED

a) Fault Number

Help



Stress Regime: Normal Faulting



Stereonet Show: Fault Normals



## Exh. No. 6

Zoom

### Fault Slip Potential

MODEL INPUTS

GEOMECHANICS

PROB. GEOM...

HYDROLOGY

PROB. HYDRO

INTEGRATED

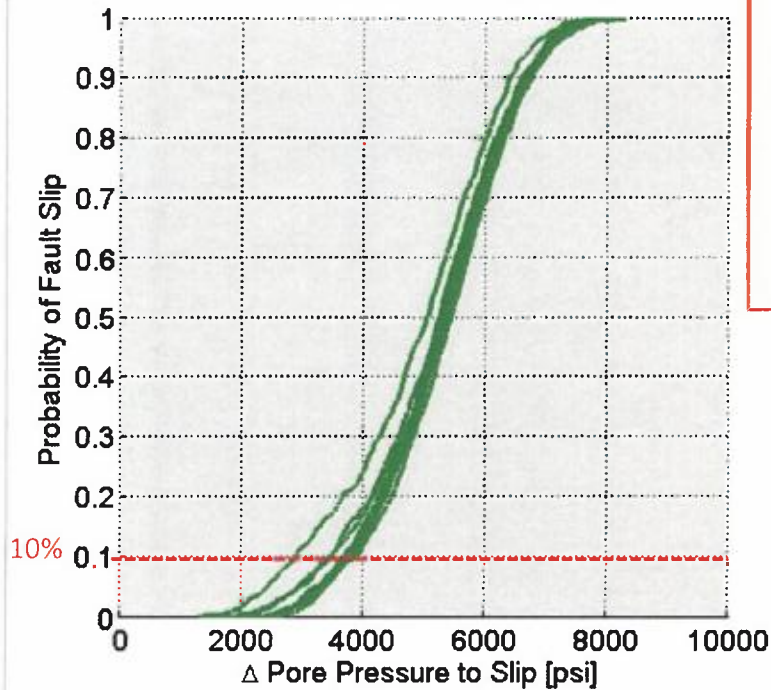
Fault Selector:

All Faults

Fault #1  
Fault #2  
Fault #3  
Fault #4  
Fault #5  
Fault #6  
Fault #7  
Fault #8  
Fault #9

Load Distributions

Run Analysis



Max Delta PP [psi].

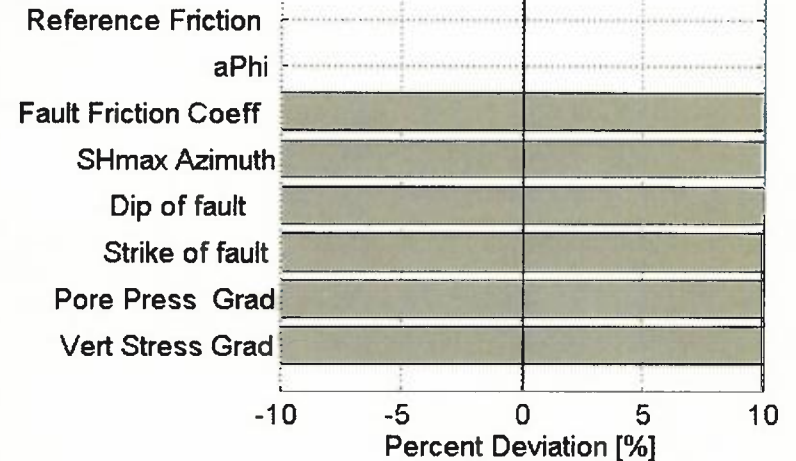
10000

Calculate

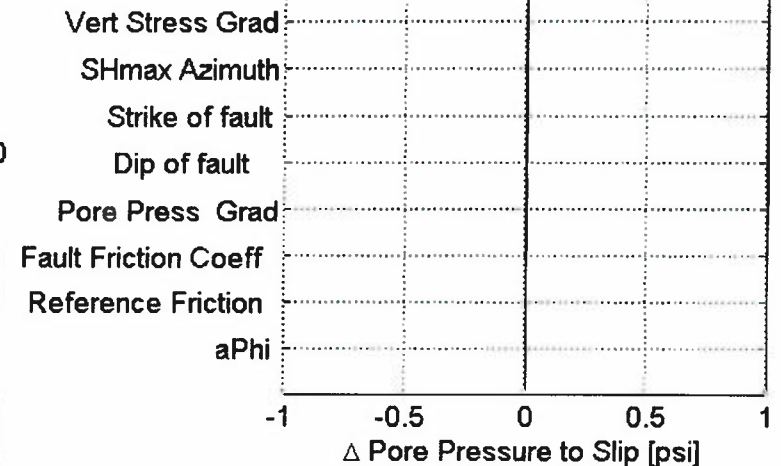
Export CDF data

Show Input Distributions

#### Variability in Inputs



#### Choose a fault to see sensitivity analysis



# Exh. No. 7

## Fault Slip Potential

Fault Selector:

- All Faults
- Fault #1
- Fault #2
- Fault #3
- Fault #4
- Fault #5
- Fault #6
- Fault #7
- Fault #8
- Fault #9

Calculate

MODEL INPUTS

GEOMECHANICS

PROB. GEOM...

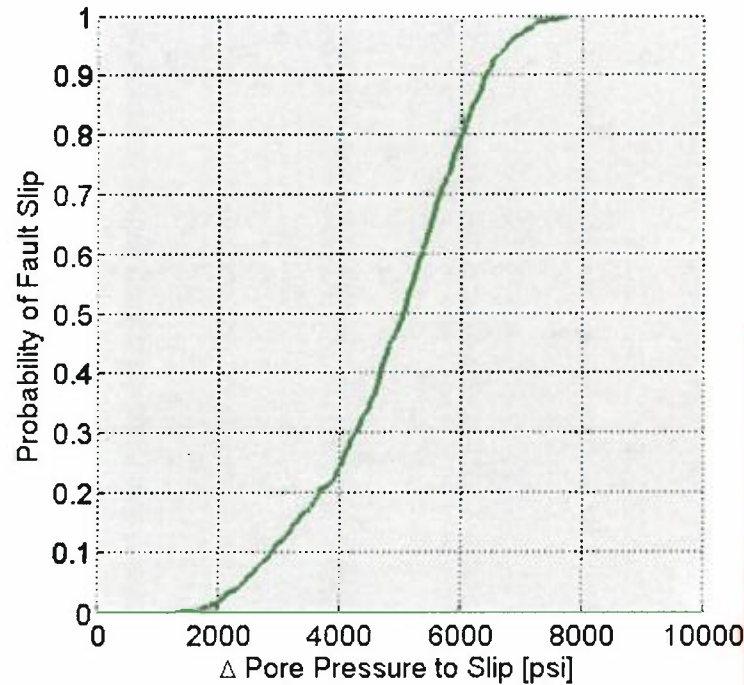
HYDROLOGY

PROB. HYDRO

INTEGRATED

Load Distributions

Run Analysis



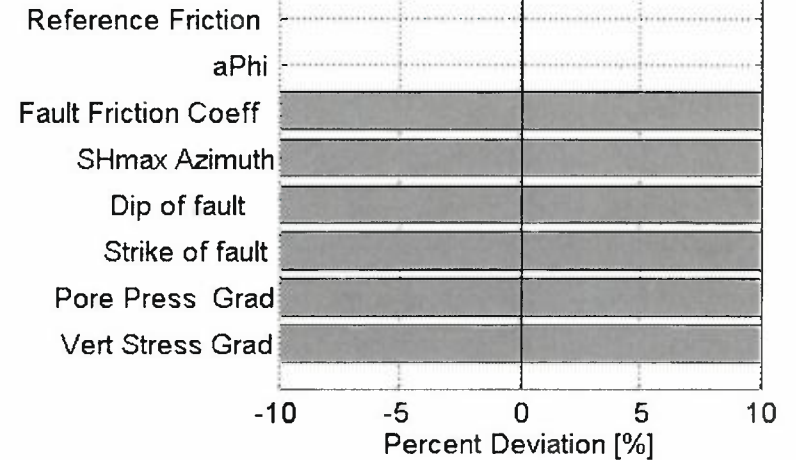
Max Delta PP [psi]:

10000

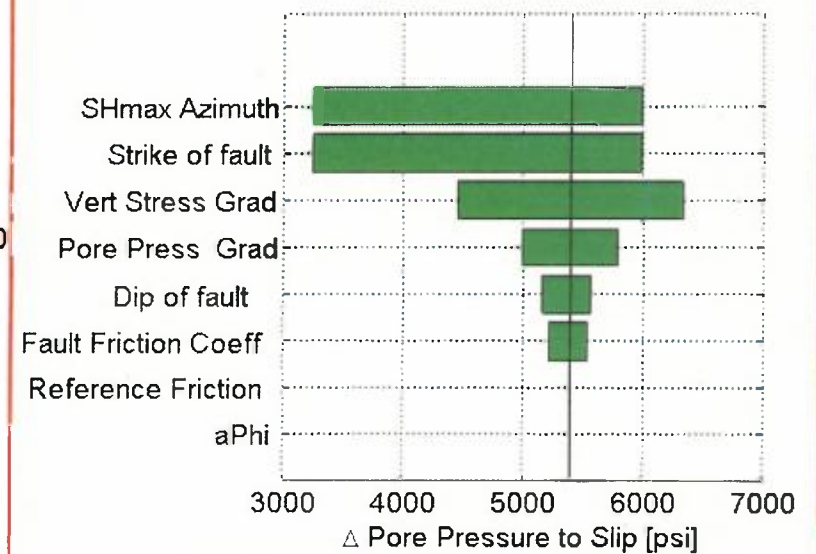
Export CDF data

Show Input Distributions

### Variability in Inputs



### Sensitivity Analysis for Fault #1



# Exh. No. 8

Zoom

## Fault Slip Potential

Fault Selector:

All Faults

Fault #1: 0.00 FSP  
Fault #2: 0.00 FSP  
Fault #3: 0.00 FSP  
Fault #4: 0.00 FSP  
Fault #5: 0.00 FSP  
Fault #6: 0.00 FSP  
Fault #7: 0.00 FSP  
Fault #8: 0.00 FSP  
Fault #9: 0.00 FSP

Calculate

MODEL INPUTS

GEOMECHANICS

PROB. GEOMECH

HYDROLOGY

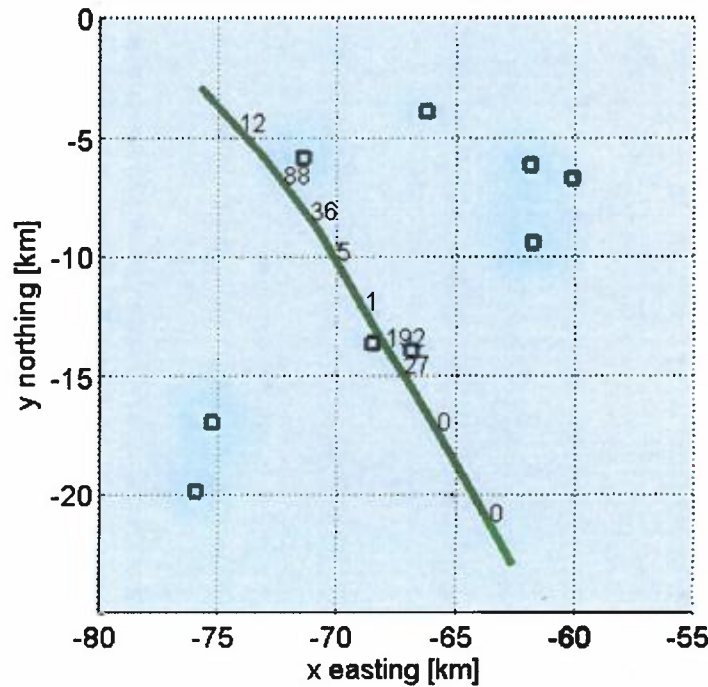
PROB. HYDRO

INTEGRATED

Export

b) PP Change at fault [psi]

Summary Plots



0.00

0.2

0.4

0.6

0.8

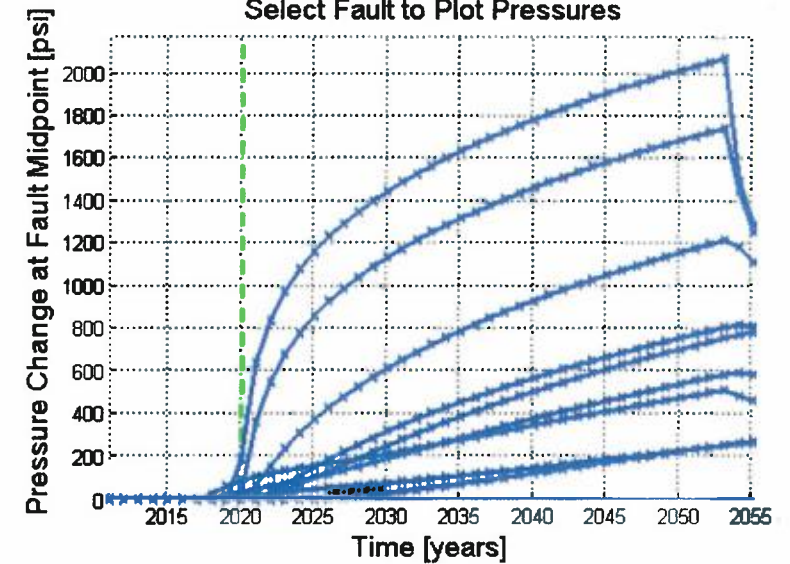
1

Fault Slip Potential

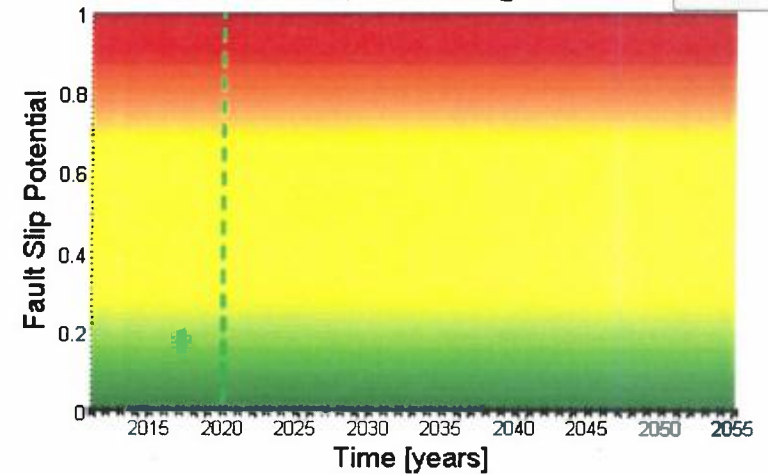
Year:

2020

Select Fault to Plot Pressures



All Faults, FSP Through Time



Export



Exh. No. 9

## Fault Slip Potential

Fault Selector:

All Faults

Fault #1, 0.00 FSP  
Fault #2, 0.00 FSP  
Fault #3, 0.00 FSP  
Fault #4, 0.00 FSP  
Fault #5, 0.00 FSP  
Fault #6, 0.00 FSP  
Fault #7, 0.00 FSP  
Fault #8, 0.00 FSP  
Fault #9, 0.00 FSP

Calculate

MODEL INPUTS

GEOMECHANICS

PROB. GEOMECH

HYDROLOGY

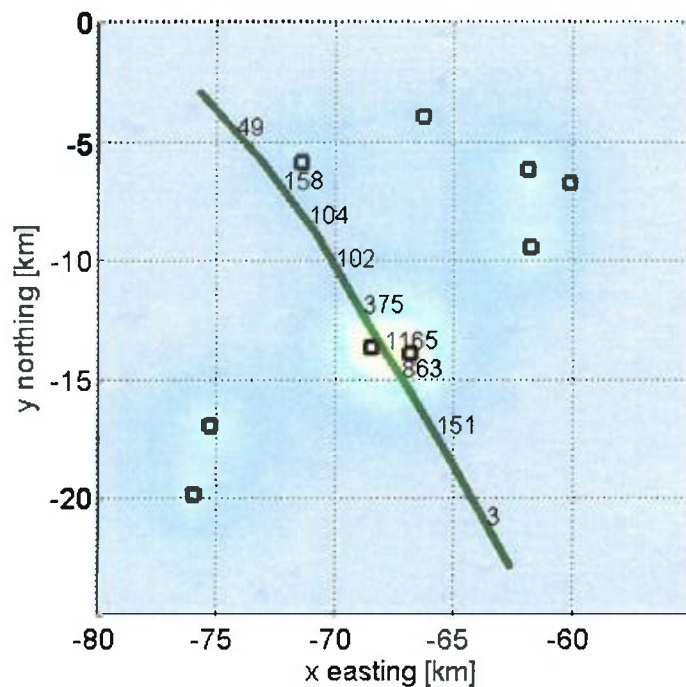
PROB. HYDRO

INTEGRATED

Export

b) PP Change at fault [psi]

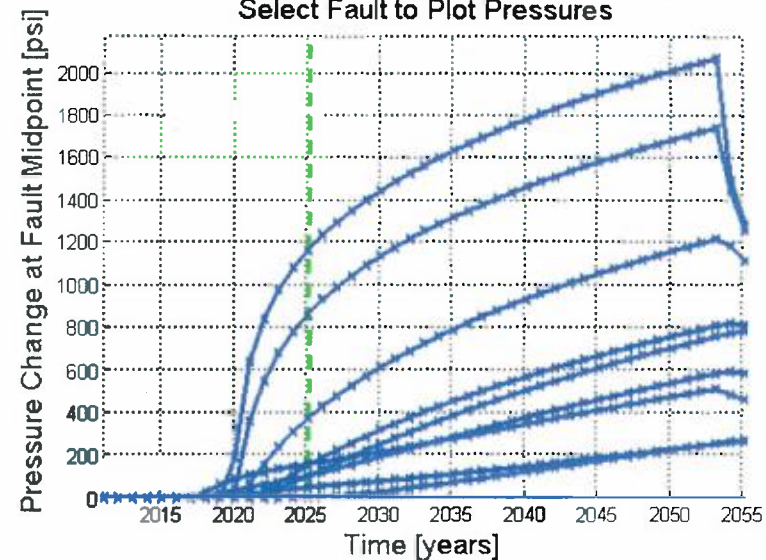
Summary Plots



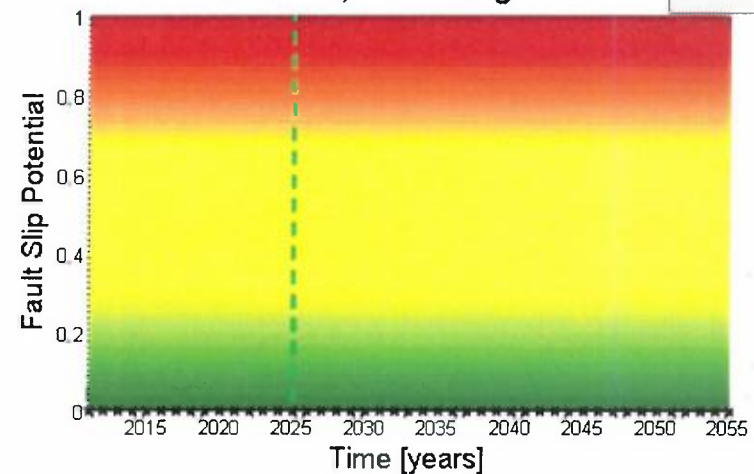
Year:

2025

Select Fault to Plot Pressures



All Faults, FSP Through Time





# Exh. No. 10

## Fault Slip Potential

Fault Selector:

All Faults

Fault #1: 0.00 FSP  
Fault #2: 0.00 FSP  
Fault #3: 0.00 FSP  
Fault #4: 0.00 FSP  
Fault #5: 0.00 FSP  
Fault #6: 0.00 FSP  
Fault #7: 0.00 FSP  
Fault #8: 0.00 FSP  
Fault #9: 0.00 FSP

Calculate

MODEL INPUTS

GEOMECHANICS

PROB. GEOMECH

HYDROLOGY

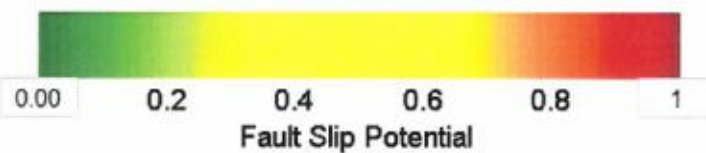
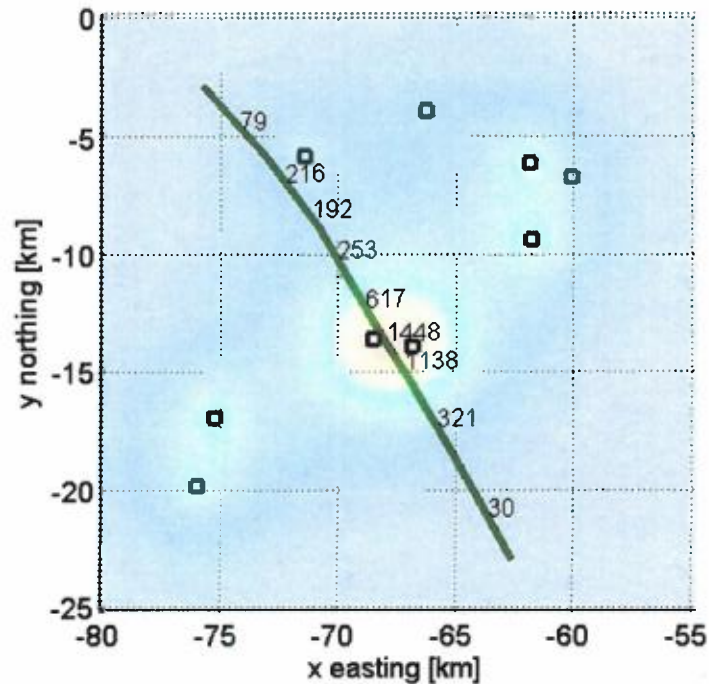
PROB. HYDRO

INTEGRATED

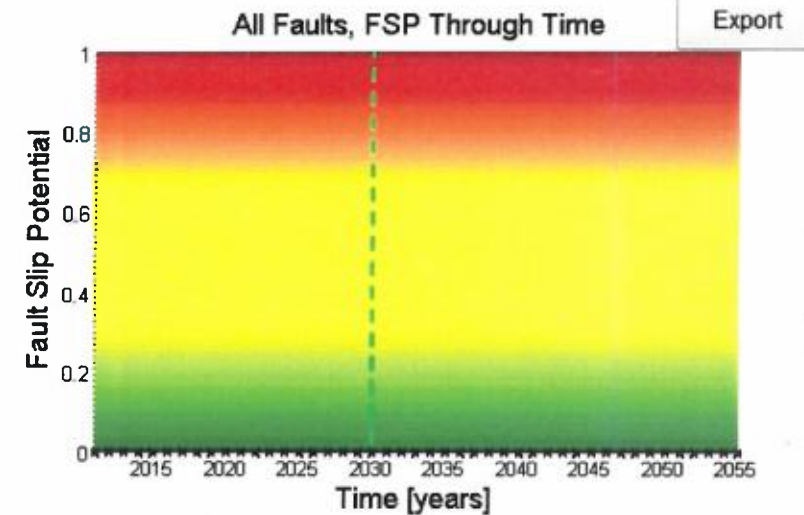
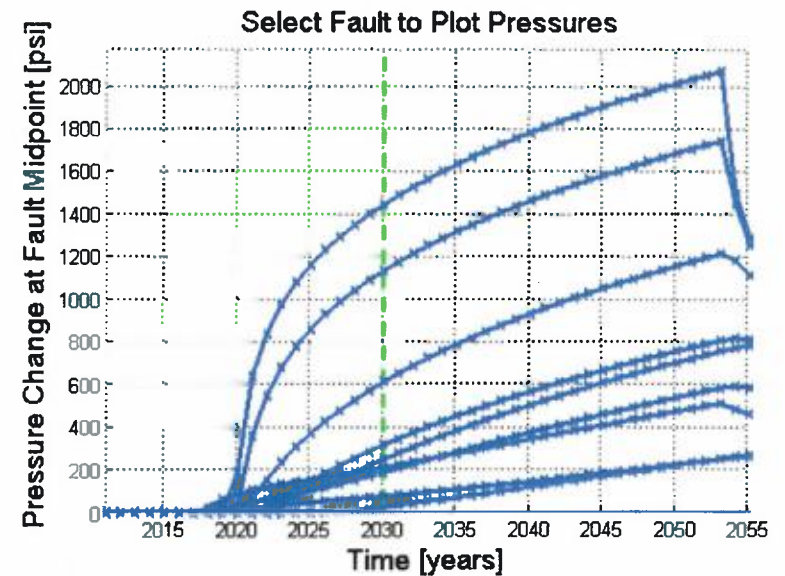
Export

b) PP Change at fault [psi]

Summary Plots



Year: 2030



Exh. No. 11

## Fault Slip Potential

Fault Selector:

All Faults

Fault #1, 0.00 FSP  
Fault #2, 0.00 FSP  
Fault #3, 0.00 FSP  
Fault #4, 0.00 FSP  
Fault #5, 0.00 FSP  
Fault #6, 0.00 FSP  
Fault #7, 0.00 FSP  
Fault #8, 0.00 FSP  
Fault #9, 0.00 FSP

Calculate

MODEL INPUTS

GEOMECHANICS

PROB. GEOMECH

HYDROLOGY

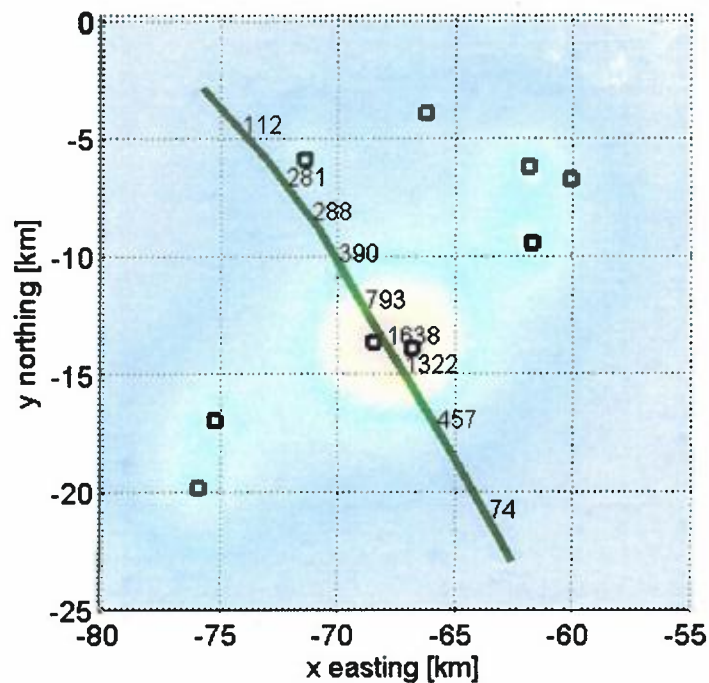
PROB. HYDRO

INTEGRATED

Export

b) PP Change at fault [psi]

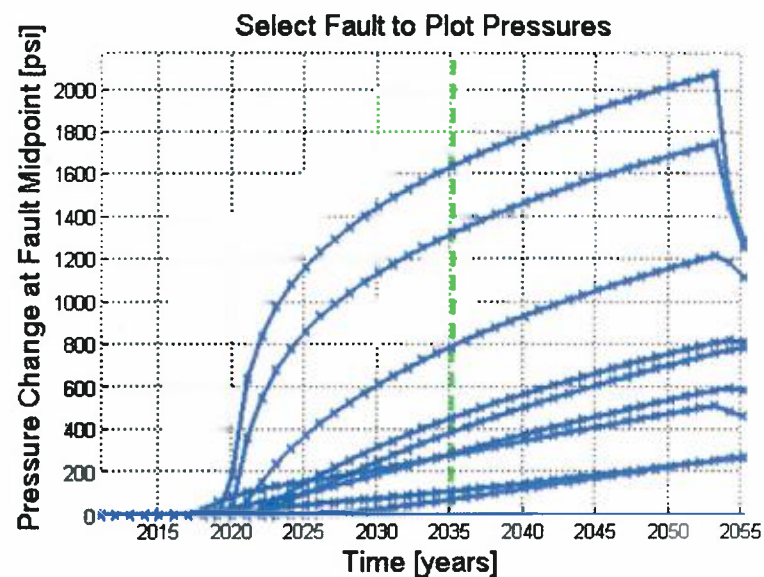
Summary Plots



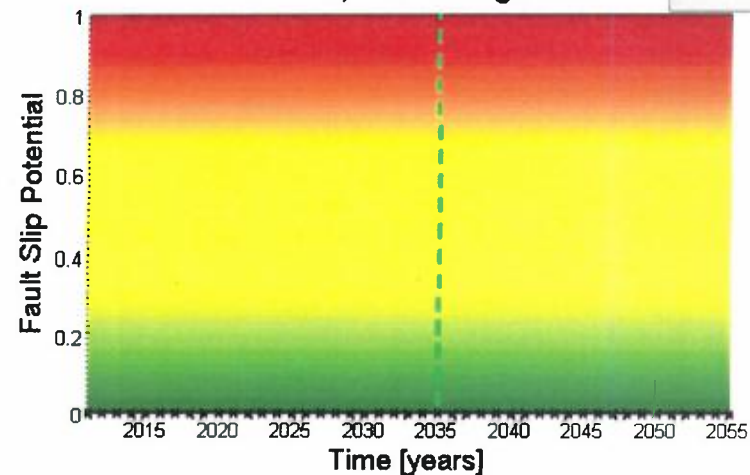
0.00 0.2 0.4 0.6 0.8 1

Fault Slip Potential

Year: 2035



All Faults, FSP Through Time





Exh. No. 12

## Fault Slip Potential

Fault Selector:

All Faults

Fault #1, 0.00 FSP  
Fault #2, 0.00 FSP  
Fault #3, 0.00 FSP  
Fault #4, 0.00 FSP  
Fault #5, 0.00 FSP  
Fault #6, 0.00 FSP  
Fault #7, 0.00 FSP  
Fault #8, 0.00 FSP  
Fault #9, 0.00 FSP

Calculate

MODEL INPUTS

GEOMECHANICS

PROB. GEOMECH

HYDROLOGY

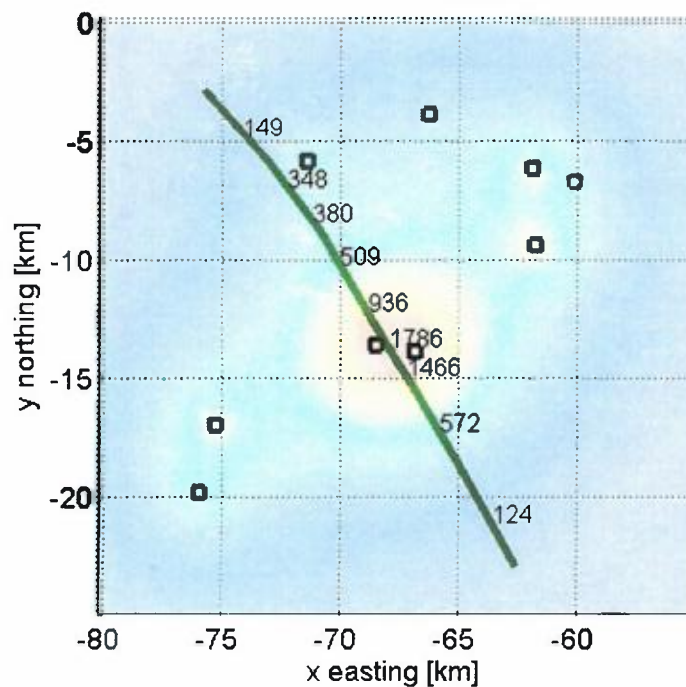
PROB. HYDRO

INTEGRATED

Export

b) PP Change at fault [psi]

Summary Plots



0.00

0.2

0.4

0.6

0.8

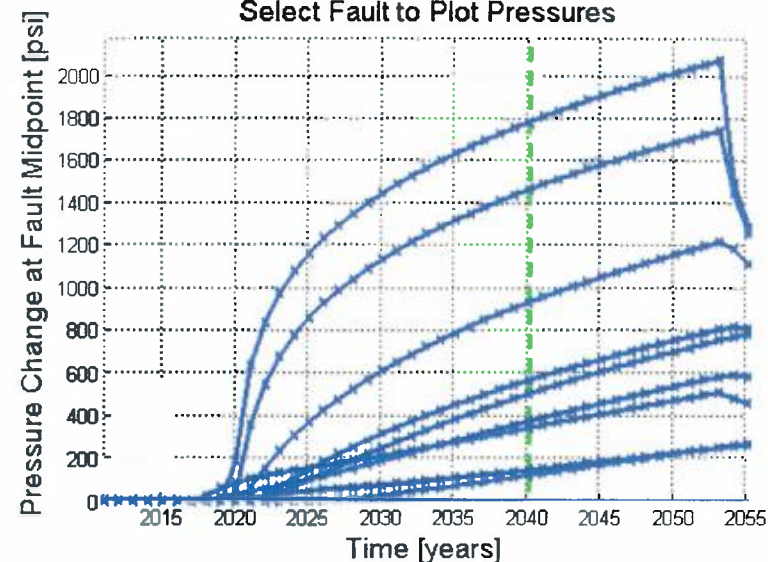
1

Fault Slip Potential

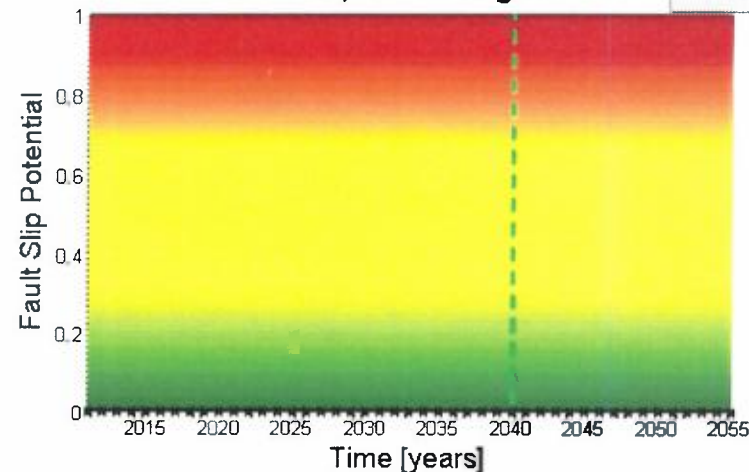
Year:

2040

Select Fault to Plot Pressures



All Faults, FSP Through Time





# Exh. No. 13

## Fault Slip Potential

Fault Selector:

All Faults

Fault #1, 0.00 FSP  
Fault #2, 0.00 FSP  
Fault #3, 0.00 FSP  
Fault #4, 0.00 FSP  
Fault #5, 0.00 FSP  
Fault #6, 0.00 FSP  
Fault #7, 0.00 FSP  
Fault #8, 0.00 FSP  
Fault #9, 0.00 FSP

Calculate

MODEL INPUTS

GEOMECHANICS

PROB. GEOMECH

HYDROLOGY

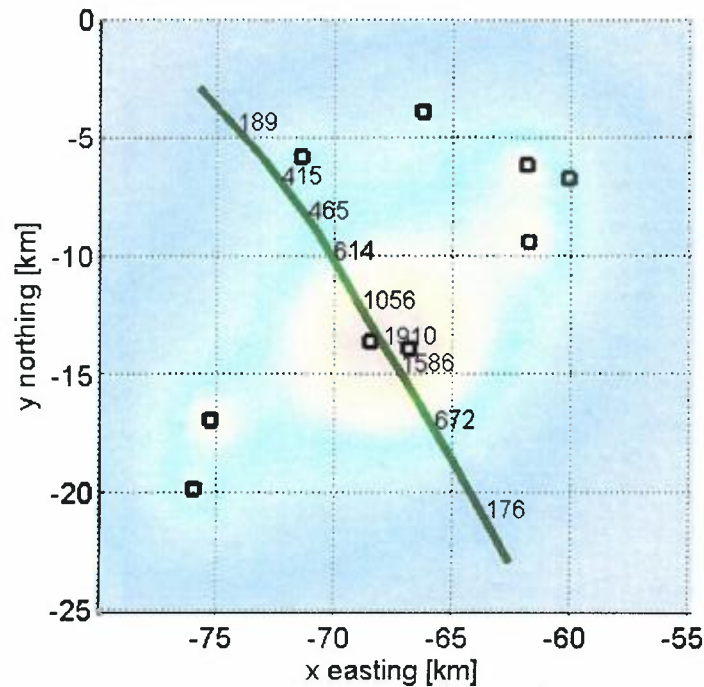
PROB. HYDRO

INTEGRATED

Export

b) PP Change at fault [psi]

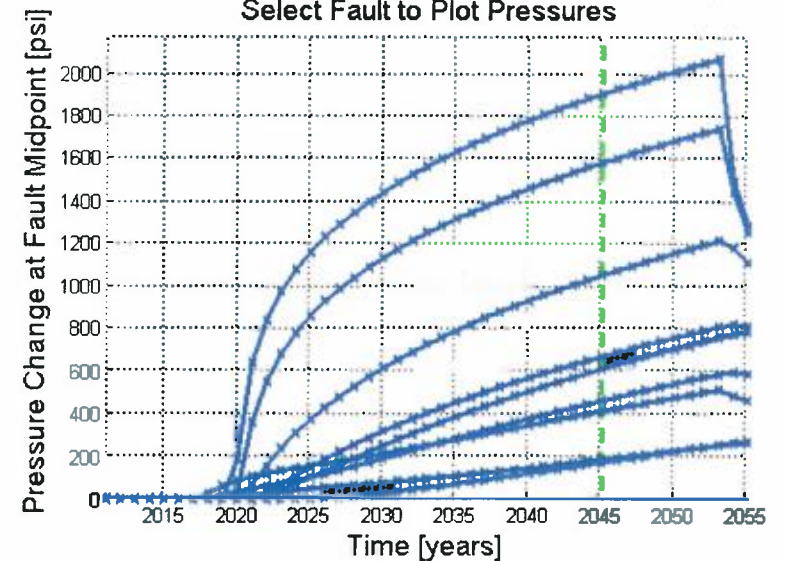
Summary Plots



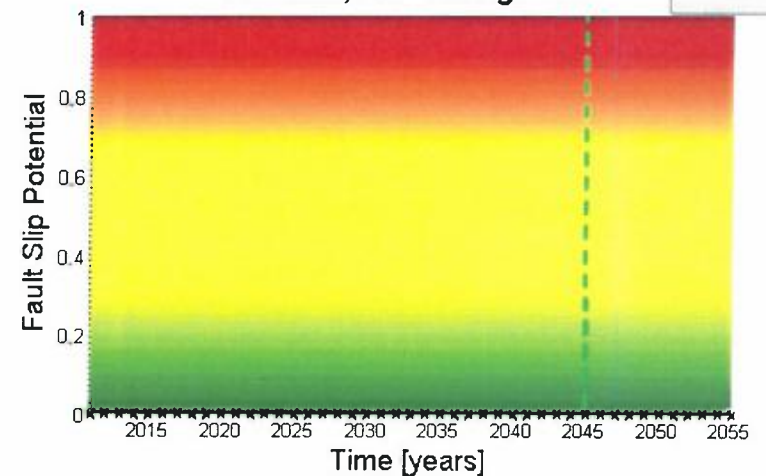
Year:

2045

Select Fault to Plot Pressures



All Faults, FSP Through Time



# **Exhibit 6**

**Declaration of Stephan Nave**  
**On Behalf of NGL Water Solutions Permian, LLC**



### DECLARATION OF STEVEN NAVE

I, Steven Nave, declare under penalty of perjury under the law of New Mexico that the following is true and correct to the best of my knowledge and belief.

1. I am over eighteen (18) years of age and am otherwise competent to make this declaration.

2. I am the president of Nave Oil and Gas, which is a fishing tool company that performs fishing operations in several areas, including the area of Southeastern, New Mexico.

3. I worked as a fisherman for Star Tool Company, a fishing tool company, from 1980 until 2001. I later became a partner in Star Tool Company until that company was sold. I then later started my own company, Nave Oil and Gas, which also performs fishing operations. Over the years, I have developed expertise in fishing operations and I have performed fishing operations on Devonian salt water disposal wells located within Southeastern, New Mexico.

4. I am familiar with tubing and casing design requested by NGL Water Solutions Permian, LLC which consists of using tapered string tubing that is 7" x 5 1/2".

5. I have been informed that NGL's wells will be isolated to the Devonian and Silurian formations and will have four strings of casing protecting the fresh water, the salt interval, the Permian aged rocks through the Wolfcamp formation, and the depths to the top of the Devonian. There is a liner, and the deepest casing is 7 5/8", which will be cemented and cement will be circulated.

6. Based on my experience as a fisherman, it is my opinion that there is sufficient clearance between the 7 5/8" 39 pounds per foot or less casing and the proposed 5 1/2" tubing to

perform fishing operations. My company regularly performs fishing operations in situations involving similar dimensions and clearances.

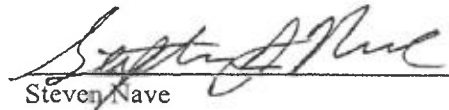
7. Fishing can be performed through different methods when 7 5/8" 39 pounds per foot or less casing and the proposed 5 1/2" tubing is utilized; such as through the use of overshot tools, spear fishing tools, and (if needed) cutting tools.

8. The use of 7 5/8" 39 pounds per foot or less casing and the proposed 5 1/2" tubing will actually allow for the use of a wider variety of fishing tools that cannot typically be used within salt water disposal wells equipped with smaller tubing and casing sizes. This is because there is more room to run tools through the inside of the tubing. Additionally, it is my opinion that it is easier to perform fishing operations when 5 1/2" tubing is used.

9. Recently, I supervised a fishing job which involved a horizontal Wolfcamp well which was equipped with casing with a diameter of 7 5/8" 39 pounds per foot or less and casing with a diameter of 5 1/2". In that situation, my company was able to mill off the collar and use overshot tools to latch on to the piping that needed to be fished out of the well.

10. In my opinion, fishing operations could be successfully performed even at deeper depths for Devonian disposal wells provided that a sufficient rig is obtained for the operation.

*[Signature Page Follows.]*

  
\_\_\_\_\_  
Steven Nave  
STEPHAN NAVE



# **Exhibit 7**

## **Notice Affidavit**

**STATE OF NEW MEXICO  
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**AMENDED APPLICATION OF NGL WATER  
SOLUTIONS PERMIAN, LLC  
FOR APPROVAL OF SALT WATER  
DISPOSAL WELL IN EDDY COUNTY,  
NEW MEXICO**

**CASE NO. 20404**

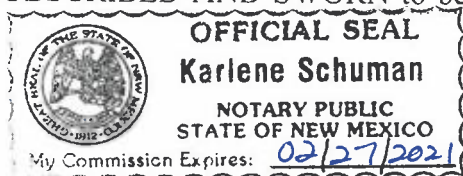
**AFFIDAVIT**

STATE OF NEW MEXICO            )  
  ) ss.  
COUNTY OF BERNALILLO        )

Deana M. Bennett, attorney in fact and authorized representative of NGL Water Solutions Permian LLC, the Applicant herein, being first duly sworn, upon oath, states that the above-referenced Application was provided under a notice letter and that proof of receipt is attached hereto.

  
\_\_\_\_\_  
Deana M. Bennett

SUBSCRIBED AND SWORN to before me this 30th day of April, 2019 by Deana M. Bennett.



*Karlene Schuman*

Notary Public

My commission expires: \_\_\_\_\_



Karlene Schuman  
Modrall Sperling Roehl Harris & Sisk P.A.  
500 Fourth Street, Suite 1000  
Albuquerque NM 87102

PS Form 3877  
Type of Mailing: CERTIFIED  
03/22/2019



Firm Mailing Book ID: 163464

Line	Article Number	Name, Street & P.O. Address	Postage	Fee	R.R.Fee	Reference	Rest.Del.Fee Contents
1	9314 8699 0430 0057 2502 16	Oil Conservation Division District IV 1220 South Saint Francis Drive Santa Fe NM 87505	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
2	9314 8699 0430 0057 2502 23	Oil Conservation Division District II - Artesia 811 S. First St. Artesia NM 88210	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
3	9314 8699 0430 0057 2502 30	NGL WATER SOLUTIONS PERMIAN, LLC Attn: Joe Vargo 1509 W. Wall St., Ste 306 Midland TX 79701	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
4	9314 8699 0430 0057 2502 47	NEW MEXICO STATE LAND OFFICE P.O. Box 1148 Santa Fe NM 87504	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
5	9314 8699 0430 0057 2502 54	BUREAU OF LAND MGMT 301 Dinosaur Trail Santa Fe NM 87508	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
6	9314 8699 0430 0057 2502 61	COG OPERATING LLC 600 W. Illinois Ave. Midland TX 79701	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
7	9314 8699 0430 0057 2502 78	OCCIDENTAL PERMIAN LP 5 Greenway Plaza, Suite 110 Houston TX 77046	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
8	9314 8699 0430 0057 2502 85	COG PRODUCTION LLC P.O. Box 2064 Midland TX 79702	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
9	9314 8699 0430 0057 2502 92	CONOCOPHILLIPS COMPANY Attn: Charlene Winston P.O. Box 2197 Houston TX 77252	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
10	9314 8699 0430 0057 2503 08	CHEVRON USA INC 6301 Deauville Blvd Midland TX 79706	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
11	9314 8699 0430 0057 2503 15	FEATHERSTONE DEVELOPMENT CORPORATION P.O. Box 429 Roswell NM 88202	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
12	9314 8699 0430 0057 2503 22	EOG Y RESOURCES INC 104 S. 4th St. Artesia NM 88210	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
13	9314 8699 0430 0057 2503 39	Rustler Hills LTD P.O. Box 72 Orla TX 79770	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
14	9314 8699 0430 0057 2503 46	James Hale 349 Indian Lake Rd Hendersonville TN 37075	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice



Karlene Schuman  
Modrall Sperling Roehl Harris & Sisk P.A.  
500 Fourth Street, Suite 1000  
Albuquerque NM 87102

PS Form 3877

Type of Mailing: CERTIFIED  
03/22/2019



Firm Mailing Book ID: 163464

Line	Article Number	Name, Street & P.O. Address	Postage	Fee	R.R.Fee	Reference	Rest.Del.Fee Contents
15	9314 8699 0430 0057 2503 53	EOG Resources Inc. P.O. Box 2267 Midland TX 79702	\$1.45	\$3.50	\$1.60	87806-0006 Whitt	\$0.00 Notice
Totals:			\$21.75	\$52.50	\$24.00		\$0.00
Grand Total:							\$98.25

List Number of Pieces  
Listed by Sender

Total Number of Pieces  
Received at Post Office

Postmaster:  
Name of receiving employee

Dated:

15



Transaction Report Details - CertifiedPro.net  
Firm Mail Book ID: 163464  
Generated: 4/30/2019 7:32:20 AM

USPS Article Number	Date Created	Name 1	Name 2	Address	City	State	Zip	Mailing Status	Service Options	Mail Delivery Date
9314869904300057250353	2019-03-22 1:16 PM	EOG Resources Inc.		P.O. Box 2267	Midland	TX	79702	Delivered	Return Receipt - Electronic	03-27-2019
9314869904300057250346	2019-03-22 1:16 PM	James Hale		349 Indian Lake Rd	Hendersonville	TN	37075	Delivered	Return Receipt - Electronic	03-27-2019
9314869904300057250339	2019-03-22 1:16 PM	Rustler Hills LTD		P.O. Box 72	Orla	TX	79770	Delivered	Return Receipt - Electronic	04-15-2019
9314869904300057250322	2019-03-22 1:16 PM	EOG Y RESOURCES INC		104 S. 4th St.	Artesia	NM	88210	Delivered	Return Receipt - Electronic	03-25-2019
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9314869904300057250308	2019-03-22 1:16 PM	CHEVRON USA INC		6301 Deauville Blvd	Midland	TX	79706	Delivered	Return Receipt - Electronic	03-25-2019
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9314869904300057250278	2019-03-22 1:16 PM	OCCIDENTAL PERMIAN LP		5 Greenway Plaza, Suite 110	Houston	TX	77046	Delivered	Return Receipt - Electronic	03-25-2019
9314869904300057250261	2019-03-22 1:16 PM	COG OPERATING LLC		600 W. Illinois Ave.	Midland	TX	79701	Delivered	Return Receipt - Electronic	03-26-2019
9314869904300057250254	2019-03-22 1:16 PM	BUREAU OF LAND MGMT		301 Dinosaur Trail	Santa Fe	NM	87508	Lost	Return Receipt - Electronic	
9314869904300057250247	2019-03-22 1:16 PM	NEW MEXICO STATE LAND OFFICE		P.O. Box 1148	Santa Fe	NM	87504	Delivered	Return Receipt - Electronic	03-25-2019
9314869904300057250230	2019-03-22 1:16 PM	NGL WATER SOLUTIONS PERMIAN, LLC	Attn: Joe Vargo	1509 W. Wall St., Ste 306	Midland	TX	79701	Delivered	Return Receipt - Electronic	03-25-2019
9314869904300057250223	2019-03-22 1:16 PM	Oil Conservation Division District II - Artesia		811 S. First St.	Artesia	NM	88210	Delivered	Return Receipt - Electronic	03-25-2019
9314869904300057250216	2019-03-22 1:16 PM	Oil Conservation Division District IV		1220 South Saint Francis Drive	Santa Fe	NM	87505	Delivered	Return Receipt - Electronic	03-26-2019

# Transaction Details

**Recipient:**

BUREAU OF LAND MGMT  
301 Dinosaur Trail  
Santa Fe, NM 87508

**USPS Article Number:**

9314869904300057250254

**Return Receipt Article Number:**

Not Applicable

**Service Options:**

Return Receipt - Electronic

**Mail Service:**

Certified

**Reference #:**

87806-0006 Whitt

**Postage:**

\$1.45

**Fees:**

\$5.10

**Status:**

Lost

**Custom Field 1:**

Whitt

**Sender:**

Karlene Schuman  
Modrall Sperling Roehl Harris & Sisk P.A.  
500 Fourth Street, Suite 1000  
Albuquerque, NM 87102

**Transaction created by:** Karlenes

User ID: 20660

Firm Mailing Book ID: 163464

Batch ID: 159629

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# Transaction History

**Event Description**

**Event Date**

**Details**

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USPS® Certified Mail	03-22-2019 11:01 PM	[USPS] - PROCESSED THROUGH USPS FACILITY at ALBUQUERQUE,NM
USPS® Certified Mail	03-23-2019 01:59 AM	[USPS] - DEPART USPS FACILITY at ALBUQUERQUE,NM
USPS® Certified Mail	03-23-2019 05:43 PM	[USPS] - PROCESSED THROUGH USPS FACILITY at ALBUQUERQUE,NM



March 22, 2019



**VIA CERTIFIED MAIL**

**Re: APPLICATION OF NGL WATER SOLUTIONS PERMIAN, LLC  
FOR APPROVAL OF SALT WATER DISPOSAL WELL IN  
EDDY COUNTY, NEW MEXICO**

Deana M. Bennett  
[Deana.bennett@modrall.com](mailto:Deana.bennett@modrall.com)  
505-848-1834

**CASE NO. 20404**

**TO: AFFECTED PERSONS**

This letter is to advise you that NGL Water Solutions Permian, LLC ("NGL") has filed an amended application with the Oil Conservation Division ("Division"). NGL has amended the application only to correct two typographical errors in the designated range and footages. In its amended application, NGL seeks an order for the Division approving disposal through the Whitt 31 SWD #1 well at a surface location 1,191 feet from the North line and 2,335 feet from the **West line** of Section 31, Township 26 South, Range **29 East**, NMPM, Eddy County, New Mexico for the purpose of operating a salt water disposal well. NGL seeks authority to inject salt water into the Silurian-Devonian formation at a depth of 14,990' to 16,137'. NGL further seeks approval of the use of 7 inch tubing inside the surface and intermediate casings and 5 ½ inch tubing inside the liner and an injection rate for the well of 50,000 bbls per day. The Division has not yet assigned a case number to this case. Because none of the attachments to the application contain any errors, NGL has not provided those attachments with this letter.

This case is currently set for a hearing before a Division Examiner on April 4, 2019, starting at 8:15 a.m. The hearing will be held in Porter Hall in the Oil Conservation Division's Santa Fe Office located at 1220 South Saint Francis Drive, Santa Fe, New Mexico 87505. As a party who may be affected by this application, we are notifying you of your right to appear at the hearing and participate in the case, including the right to present evidence either in support of or in opposition to the application. Failure to appear at the hearing may preclude you from any involvement in the case at a later date.

You are notified that if you desire to appear in this case, then you are requested to file a Pre-Hearing Statement with the Division at least four business days in advance of a scheduled hearing before the Division or the Commission, but in no event later than 5:00 p.m. mountain time, on the Thursday preceding the scheduled hearing date, with a copy delivered to the undersigned.

Modrall Sperling  
Roehl Harris & Sisk P.A.

500 Fourth Street NW  
Suite 1000  
Albuquerque,  
New Mexico 87102

PO Box 2168  
Albuquerque,  
New Mexico 87103-2168

Tel: 505.848.1800  
[www.modrall.com](http://www.modrall.com)

Sincerely,

Deana M. Bennett

Deana M. Bennett

*Attorneys for Applicant*

Karlene Schuman  
 Modrall Sperling Roehl Harris & Sisk P.A.  
 500 Fourth Street, Suite 1000  
 Albuquerque NM 87102

PS Form 3877  
 Type of Mailing: CERTIFIED  
 03/15/2019



*Karlene*

Firm Mailing Book ID: 162862

Line	Article Number	Name, Street & P.O. Address	Postage	Fee	R.R.Fee	Reference	Rest.Del.Fee Contents
1	9314 8699 0430 0057 0000 64	Oil Conservation Division District IV 1220 South Saint Francis Drive Santa Fe NM 87505	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
2	9314 8699 0430 0057 0000 71	Oil Conservation Division District II - Artesia 811 S. First St. Artesia NM 88210	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
3	9314 8699 0430 0057 0000 88	NGL WATER SOLUTIONS PERMIAN, LLC Attn: Joe Vargo 1509 W. Wall St., Ste 306 Midland TX 79701	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
4	9314 8699 0430 0057 0000 95	NEW MEXICO STATE LAND OFFICE P.O. Box 1148 Santa Fe NM 87504	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
5	9314 8699 0430 0057 0001 01	BUREAU OF LAND MGMT 301 Dinosaur Trail Santa Fe NM 87508	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
6	9314 8699 0430 0057 0001 18	COG OPERATING LLC 600 W. Illinois Ave. Midland TX 79701	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
7	9314 8699 0430 0057 0001 25	OCCIDENTAL PERMIAN LP 5 Greenway Plaza, Suite 110 Houston TX 77046	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
8	9314 8699 0430 0057 0001 32	COG PRODUCTION LLC P.O. Box 2064 Midland TX 79702	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
9	9314 8699 0430 0057 0001 49	CONOCOPHILLIPS COMPANY Attn: Charlene Winston P.O. Box 2197 Houston TX 77252	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
10	9314 8699 0430 0057 0001 56	CHEVRON USA INC 6301 Deauville Blvd Midland TX 79706	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
11	9314 8699 0430 0057 0001 63	FEATHERSTONE DEVELOPMENT CORPORATION P.O. Box 429 Roswell NM 88202	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
12	9314 8699 0430 0057 0001 70	EOG Y RESOURCES INC 104 S. 4th St. Artesia NM 88210	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
Totals:			\$17.40	\$42.00	\$19.20		\$0.00
Grand Total:							\$78.60

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Listed by Sender

Total Number of Pieces  
Received at Post Office

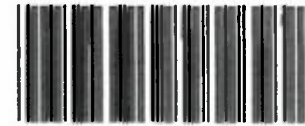
Postmaster:  
Name of receiving employee

Dated:

Karlene Schuman  
Modrall Sperling Roehl Harris & Sisk P.A.  
500 Fourth Street, Suite 1000  
Albuquerque NM 87102

PS Form 3877

Type of Mailing: CERTIFIED  
03/19/2019



Add'l  
names

Firm Mailing Book ID: 163144

Line	Article Number	Name, Street & P.O. Address	Postage	Fee	R.R.Fee	Reference	Rest.Del.Fee Contents
1	9314 8699 0430 0057 1082 96	Rustler Hills LTD P.O. Box 72 Orla TX 79770	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
2	9314 8699 0430 0057 1083 02	James Hale 349 Indian Lake Rd Hendersonville TN 37075	\$1.45	\$3.50	\$1.60	87806-0003 Whitt	\$0.00 Notice
Totals:			\$2.90	\$7.00	\$3.20		\$0.00
Grand Total:							\$13.10

List Number of Pieces  
Listed by Sender

Total Number of Pieces  
Received at Post Office

Postmaster:  
Name of receiving employee

Dated:

2





Transaction Report Details - CertifiedPro.net  
Firm Mail Book ID= 162862  
Generated: 4/30/2019 8:47:21 AM

USPS Article Number	Date Created	Name 1	Name 2	Address	City	State	Zip	Mailing Status	Service Options	Mail Delivery Date
9314869904300057000170	2019-03-15 10:21 AM	EOG Y RESOURCES INC		104 S. 4th St	Artesia	NM	88210	Delivered	Return Receipt - Electronic	03-18-2019
9314869904300057000163	2019-03-15 10:21 AM	FEATHERSTONE DEVELOPMENT CORPORATION		P.O. Box 429	Roswell	NM	88202	Delivered	Return Receipt - Electronic	03-18-2019
9314869904300057000156	2019-03-15 10:21 AM	CHEVRON USA INC		6301 Deauville Blvd	Midland	TX	79706	Delivered	Return Receipt - Electronic	03-20-2019
9314869904300057000149	2019-03-15 10:21 AM	CONOCOPHILLIPS COMPANY	Attn: Charlene Winston	P.O. Box 2197	Houston	TX	77252	Delivered	Return Receipt - Electronic	03-20-2019
9314869904300057000132	2019-03-15 10:21 AM	COG PRODUCTION LLC		P.O. Box 2064	Midland	TX	79702	Delivered	Return Receipt - Electronic	03-27-2019
9314869904300057000125	2019-03-15 10:21 AM	OCCIDENTAL PERMIAN LP		5 Greenway Plaza, Suite 110	Houston	TX	77046	Delivered	Return Receipt - Electronic	03-19-2019
9314869904300057000118	2019-03-15 10:21 AM	COG OPERATING LLC		600 W. Illinois Ave	Midland	TX	79701	Lost	Return Receipt - Electronic	
9314869904300057000101	2019-03-15 10:21 AM	BUREAU OF LAND MGMT		301 Dinosaur Trail	Santa Fe	NM	87508	To be Returned	Return Receipt - Electronic	
9314869904300057000095	2019-03-15 10:21 AM	NEW MEXICO STATE LAND OFFICE		P.O. Box 1148	Santa Fe	NM	87504	Delivered	Return Receipt - Electronic	03-18-2019
9314869904300057000088	2019-03-15 10:21 AM	NGL WATER SOLUTIONS PERMIAN, LLC	Attn: Joe Vargo	1509 W. Wall St., Ste 306	Midland	TX	79701	Delivered	Return Receipt - Electronic	03-18-2019
9314869904300057000071	2019-03-15 10:21 AM	Oil Conservation Division District II - Artesia		811 S. First St.	Artesia	NM	88210	Delivered	Return Receipt - Electronic	03-18-2019
9314869904300057000064	2019-03-15 10:21 AM	Oil Conservation Division District IV		1220 South Saint Francis Drive	Santa Fe	NM	87505	Delivered	Return Receipt - Electronic	03-18-2019