



**Amended Subpart RR Monitoring, Reporting,  
and Verification Plan  
Pozo Acido Viejo No. 1  
Estacado No. 1**

**Yoakum County, Texas**

Prepared for *Stakeholder Gas Services, LLC*  
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By

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October 2024  
(Original Approval Date August 8, 2022)



## **INTRODUCTION**

Stakeholder Gas Services, LLC (Stakeholder) is amending the existing Monitoring, Reporting, and Verification (MRV) plan for the Campo Viejo Gas Processing Plant to include a newly drilled second acid gas injection (AGI) well, Estacado No. 1, to the facility. Stakeholder currently has a Class II AGI permit, issued by the Texas Railroad Commission (TRRC) in August 2018 and amended in August 2022, for the Pozo Acido Viejo (PAV) No. 1 (API No. 42-501-36935). This permit currently authorizes Stakeholder to inject up to 20 million standard cubic feet per day (MMscf/d) of treated acid gas (TAG) into the Bronco (Siluro-Devonian) Field at a depth of 12,020 feet (ft) to 12,349 ft with a maximum allowable surface pressure of 4,319 pounds per square inch (psi). Since being permitted, the injection has proceeded without incident. Stakeholder received their second Class II permit with the TRRC for the Estacado No. 1 (API No. 42-501-37472) on August 13, 2024. This permit authorizes Stakeholder to inject 19.7 MMscf/d at a depth of 12,052 ft to 12,750 ft with a maximum allowable surface pressure of 4,300 psi. These two AGI wells are associated with Stakeholder's Campo Viejo gas treating and processing plant (Campo Viejo Facility) located in a rural, sparsely populated area of Yoakum County, Texas, approximately 10 miles west of the town of Plains. Stakeholder is submitting this revision to its MRV plan to the Environmental Protection Agency (EPA) for approval under 40 CFR **§98.440(a)**, Subpart RR, of the Greenhouse Gas Reporting Program (GHGRP).

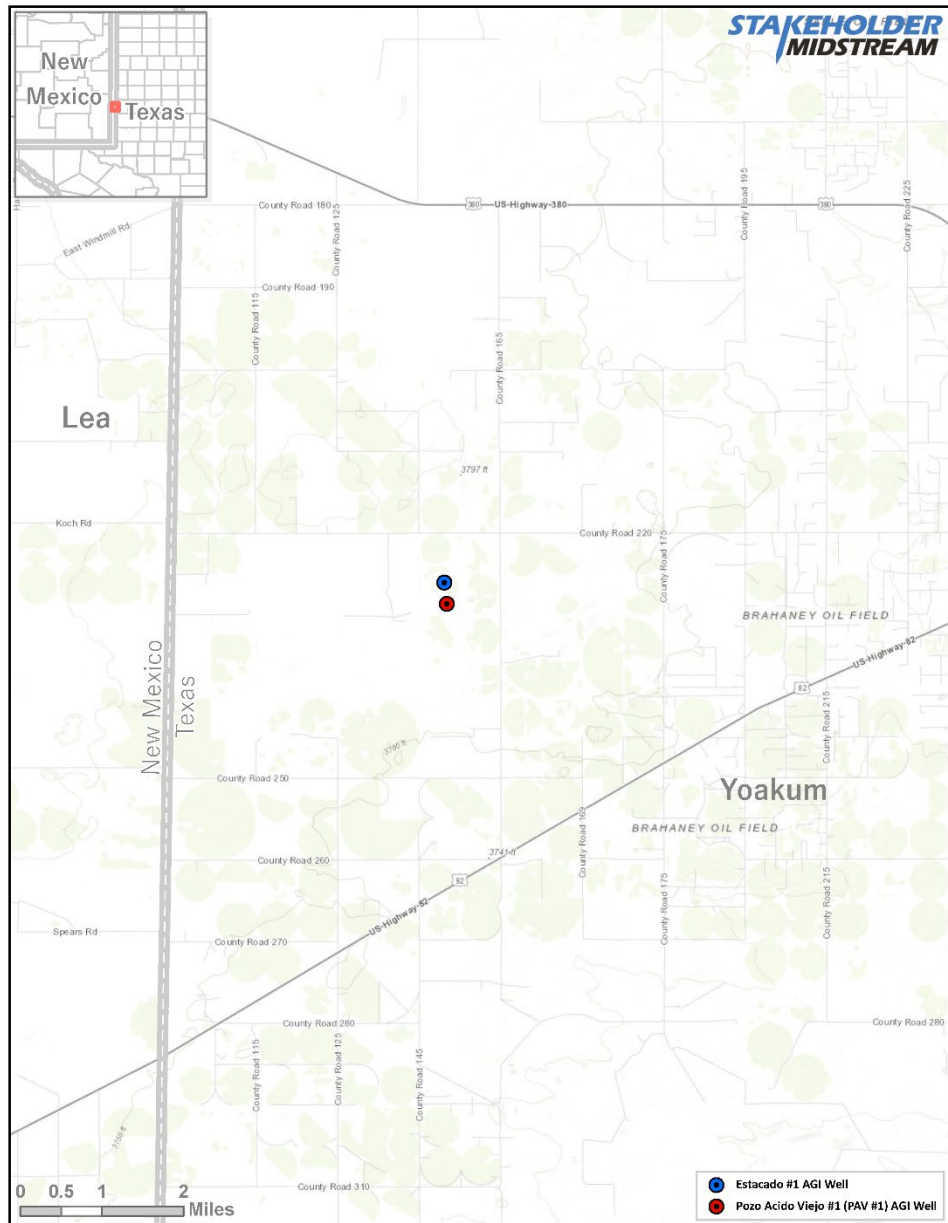


Figure 1 – Location of Pozo Acido Viejo No. 1 and Estacado No. 1.

## **ACRONYMS AND ABBREVIATIONS**

%	Percent(age)
°C	Degrees Celsius
°F	Degrees Fahrenheit
AGI	Acid Gas Injection
AMA	Active Monitoring Area
API	American Petroleum Institute
BCF	Billion Cubic Feet
BHP	Bottomhole Pressure
C <sub>2</sub>	Ethane
C <sub>3</sub>	Propane
C <sub>6</sub> +	Hexane Plus
CFR	Code of Federal Regulations
CH <sub>4</sub>	Methane
CMG	Computer Modelling Group
CO <sub>2</sub>	Carbon Dioxide (may also refer to other Carbon Oxides)
E	East
EOS	Equation of State
EPA	U.S. Environmental Protection Agency
ESD	Emergency Shutdown
FG	Fracture Gradient
Ft	Foot (Feet)
GAU	Groundwater Advisory Unit
GEM	Computer Modelling Group's GEM 2020.11
GHGs	Greenhouse Gases
GHGRP	Greenhouse Gas Reporting Program
H <sub>2</sub> S	Hydrogen Sulfide
Md	Millidarcy(ies)



Mg/L	Milligrams per Liter
Mi	Mile(s)
MIT	Mechanical Integrity Test
MM	Million
MMA	Maximum Monitoring Area
MMcf	Million Cubic Feet
MMscf	Million Standard Cubic Feet
MMscf/d	Million Standard Cubic Feet per Day
MRV	Monitoring, Reporting and Verification
MT/yr	Million Tons per Year
v	Poisson's Ratio
N	North
NW	Northwest
OBG	Overburden Gradient
PAV	Pozo Acido Viejo
PG	Pore Gradient
pH	Scale of Acidity
Ppm	Parts per Million
Psi	Pounds per Square Inch
Psi/ft	Pound per Square Inch per Foot
Psig	Pounds per Square Inch Gauge
S	South
SCADA	Supervisory Control and Data Acquisition
SDRDB	Submitted Drillers Report Database
SE	Southeast
SF	Safety Factor
SWD	Saltwater Disposal
TAC	Texas Administrative Code
TAG	Treated Acid Gas
TDS	Total Dissolved Solids

TOC	Total Organic Carbon
TRRC	Texas Railroad Commission
TVD	True Vertical Depth
TWDB	Texas Water Development Board
UIC	Underground Injection Control
USDW	Underground Source of Drinking Water
USGS	U.S. Geological Survey
W	West

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## **SECTION 1 – FACILITY INFORMATION**

This section contains key information regarding the acid gas and carbon dioxide (CO<sub>2</sub>) injection facility.

### **1.1 Reporter Number:**

- Gas Plant Facility Name: Campo Viejo Gas Processing Plant
- Greenhouse Gas Reporting Program ID: 573525
  - Reporting under Subpart RR
- Operator: Stakeholder Gas Services, LLC

### **1.2 Underground Injection Control Permit Class: Class II**

The TRRC regulates oil and gas activities in Texas and has primacy to implement the Underground Injection Control (UIC) Class II program. The TRRC classifies the Pozo Acido Viejo No. 1 and Estacado No. 1 as UIC Class II wells. These Class II permits were issued to Stakeholder under TRRC Rule 46 (entitled “Fluid Injection Into Productive Reservoirs”) and Rule 36 (entitled “Oil, Gas, or Geothermal Resource Operation in Hydrogen Sulfide Areas”).

### **1.3 UIC Well Identification Numbers:**

- Pozo Acido Viejo No. 1, API No. 42-501-36935, UIC No. 000117488.
- Estacado No. 1, API No. 42-501-37472, UIC No. 000126762.

### **1.4 Facility Address**

Campo Viejo Gas Processing Plant  
1548 County Road 165  
Plains, Texas 79355

Coordinates in NAD83 for this facility:

Latitude: 33.161087,  
Longitude: -102.992248

## **SECTION 2 – PROJECT DESCRIPTION**

This project description discusses the geologic setting, planned injection volumes and process, and the reservoir modeling performed for the Pozo Acido Viejo No. 1 and Estacado No. 1 wells. Stakeholder, with the assistance of Lonquist and Co., LLC, originally provided a geological overview as part of Stakeholder's original Class II application with the TRRC in 2018. Lonquist has updated the geology and plume modeling within the reservoir for this MRV Plan.

The two AGI wells are located and designed to protect against migration of CO<sub>2</sub> into productive oil and gas formations, freshwater aquifers, and surface releases. The injection interval for the AGI wells is located more than 3,300 ft below the active producing formations in the area and 9,800 ft below the base of the lowest usable quality water table, as shown in Figure 2. These wells inject both hydrogen sulfide (H<sub>2</sub>S) and CO<sub>2</sub>; therefore, both the well and facility are designed to minimize any leakage to the surface.

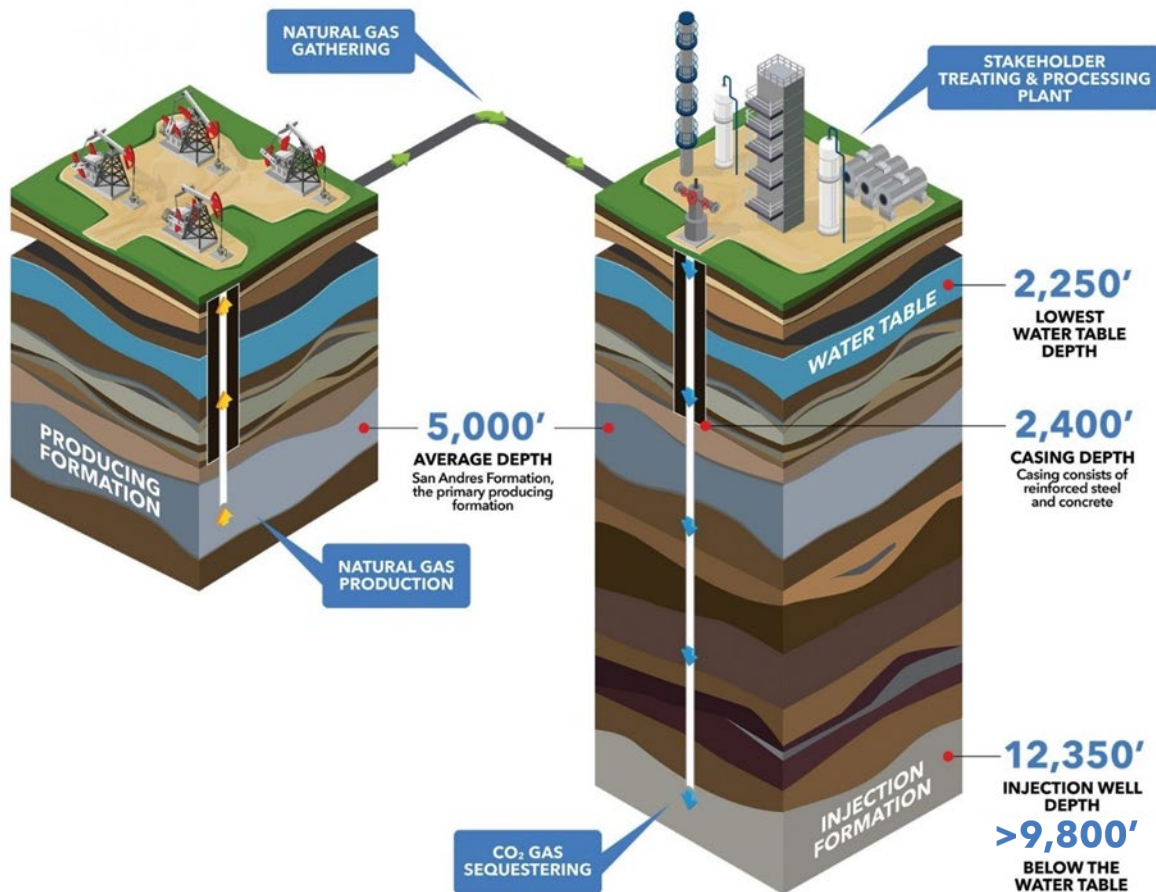


Figure 2 – Illustrative overview of the Campo Viejo Facility.

## 2.1 Regional Geology

The AGI wells at Campo Viejo are located on the southern portion of the Northwestern Shelf within the larger Permian Basin, as seen in Figure 3. The Northwestern Shelf is a broad marine shelf located in the northern portion of the Permian Basin.

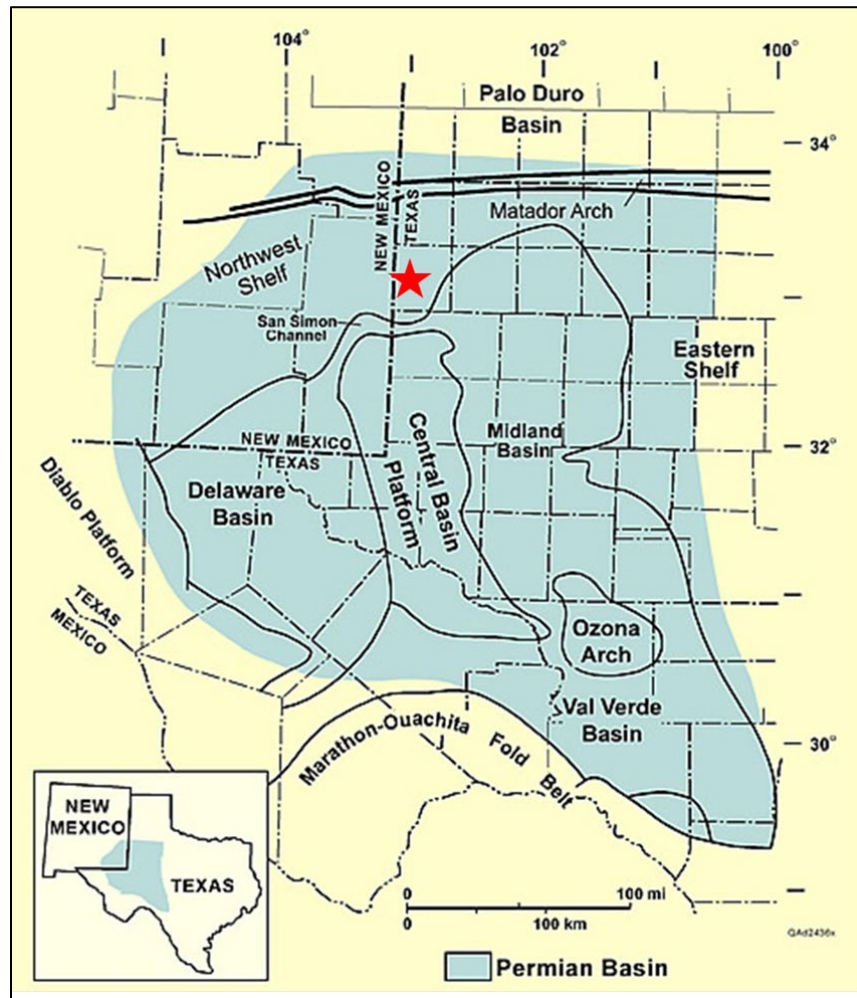


Figure 3 – Regional Map of the Permian Basin. The red star is the approximate location of the Campo Viejo AGI wells.

Figure 4 depicts the stratigraphic column found at the Campo Viejo facility with a red star referencing the injection formation and green stars indicating the productive intervals in the area. The primary injection interval is found within the Wristen group, of Silurian-age, as seen in Figure 5. The TRRC refers to this sequence under the general terms “Devonian,” “Silurian-Devonian,” or “Siluro-Devonian.”



Period	Epoch	Formation	General Lithology
Permian	Ochoan	Dewey Lake	Redbeds/Anhydrite
		Rustler	Halite
		Salado	Halite/Anhydrite
	Guadalupian	Tansil	Anhydrite/Dolomite
		Yates	Anhydrite/Dolomite
		Seven Rivers	Dolomite/Anhydrite
		Queen	Sandy Dolomite/Anhydrite/Sandstone
		Grayburg	Dolomite/Anhydrite/Shale/Sandstone
	Leonardian	★ San Andres	Dolomite/Anhydrite
		Glorieta	Sandy Dolomite
		Yeso	Dolomite/Anhydrite/Sandstone
		Abo	Dolomite/Anhydrite/Shale
	Wolfcampian	★ Wolfcamp	Limestone/Dolomite
Pennsylvanian	Virgilian	Cisco	Limestone/Dolomite
	Missourian	Canyon	Limestone/Shale
	Des Moinesian	Strawn	Limestone/Sandstone
	Atokan	Bend	Limestone/Sandstone/Shale
	Morrowan	Morrow	
Mississippian		Mississippian Lime	Limestone
Devonian		Woodford	Shale
Silurian		★ Wristen Group	Dolomite/Limestone
		Fusselman	Dolomite/Chert
Ordovician	Upper	Montoya	Dolomite/Chert
		Simpson Gp	Limestone/Sandstone/Shale
	Middle		
	Lower	Ellenburger	Dolomite

Figure 4 – Stratigraphic column of the Northwest Shelf. The red star indicates injection interval. The green stars indicate productive intervals.

<b>Mississippian</b>	<b>Chesterian</b>	<b>undivided</b>		
	<b>Meramecian</b>			
	<b>Osagian</b>			
	<b>Kinderhookian</b>			
<b>Devonian</b>	<b>Upper</b>	<b>Woodford Shale</b>		
	<b>Middle</b>			
	<b>Lower</b>	<b>Thirtyone Fm.</b>		
<b>Silurian</b>	<b>Pridolian</b>	<b>Wristen Gp.</b>	★ <b>Fasken Fm.</b>	<b>Frame Fm.</b>
	<b>Ludlovian</b>			
	<b>Wenlockian</b>			<b>Wink Fm.</b>
	<b>Llandoveryan</b>			
<b>Ordovician</b>	<b>Upper</b>	<b>Fusselman Fm.</b>		
	<b>Middle</b>	<b>Montoya Fm.</b>		
	<b>Lower</b>	<b>Simpson Gp.</b>		
		<b>Ellenburger Fm.</b>		

Figure 5 – Stratigraphic column depicting the composition of the Silurian group. The red star indicates injection interval (Broadhead, 2005).

The Wristen Group was deposited in a basin platform setting across the northern half of the Permian Basin. The depositional environment over Yoakum County during the Silurian period was a shallow inner platform, the margin of which exists to the south, in southern Andrews County, Texas. The Silurian-age lithology on the inner platform is dominated by grain-rich skeletal carbonates.

Carbonate buildups are common within the shallow inner platform, mainly skeletal wackestone, indicating a lower-energy deposition on the inner platform. The carbonate shelf margin to the south acted as a barrier from basin-ward wave energy (Ruppel and Holtz, 1994).

Depositional cycles within the inner platform indicate it was controlled by episodic sea level rise and fall, resulting in subareal exposure and diagenesis. The diagenesis of the Silurian-age carbonate rocks initiated secondary porosity development and increased permeability. Dolomite and solution-related features are the most prominent diagenetic characteristics found within the Silurian. The Wristen Group is composed of three formations: Fasken, Frame, and Wink. The Frame and Wink formations are found near the ramp boundary to the south, while the Fasken formation is found predominantly in the inner platform where the AGI wells are located. The Fasken formation is predominately dolomite grading to limestone, occurring as cycles, down section. This dolomitization is caused in part to subareal exposure, during which karsts and secondary porosity developed. Additional dolomitization was possible during successive sea level fluctuations by way of movement of magnesium-rich solution through karsts and vugs, which acted as channels for fluid flow (Ruppel and Holtz, 1994).

Figure 6 shows a regional isopach map of the Siluro-Devonian (combined Fasken and Fusselman formations) with a red star depicting the Campo Viejo project location. The thickness of the Silurian-age rock is approximately 1,000 ft at the AGI well locations.

North of Andrews County there is little differentiation between the Fasken and Fusselman formations, which are both carbonate deposits with the potential for subareal exposure and porosity development. The injection interval defined herein is based on petrophysical characteristics rather than stratigraphic nomenclature. For purposes of this MRV Plan, the Fasken is defined as the porous and permeable carbonate rock at the top of the Siluro-Devonian section, and the Fusselman is the low-permeability rock that comprises the carbonate section between the Fasken and Montoya formations.

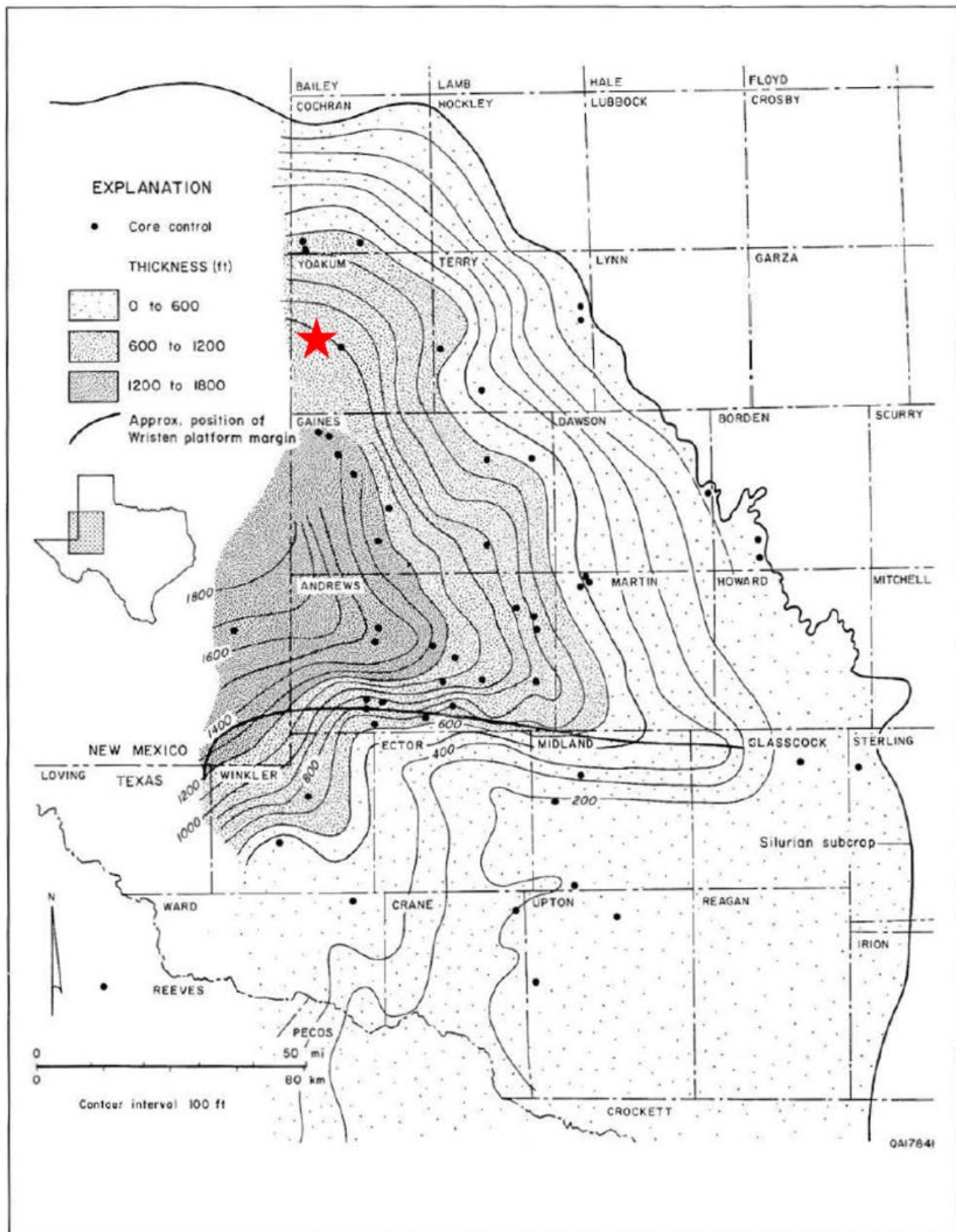


Figure 6 – Thickness map of the Silurian system that composes the Fusselman and Wristen Group.

### **2.1.1 Regional Faulting**

A major uplift that began in the Pennsylvanian strata to the south, the Central Basin Platform, ceased in Wolfcampian time, which caused a regional unconformity of the underlying formations (Hoak, Sundberg, and Ortoleva). Faulting on the Northwest Shelf can be seen through high-angle basement faults that tend to die within the Pennsylvanian strata. These faults predominately represent contractional (i.e., thrust) faults that were initiated during the Pennsylvanian because of regional tectonics. Hydrocarbon traps within the Wristen Group are primarily anticlinal structures dependent on reservoir development (Broadhead, 2005).

## **2.2 Site Characterization**

The Pozo Acido Viejo No. 1 and Estacado No. 1 wells are located in Section 452, Block D, John H. Gibson Survey, in Yoakum County, Texas. Stakeholder owns the 200-acre surface tract where the plant and the two AGI wells are located. The following discusses the geological character of this site.

### **2.2.1 Stratigraphy and Lithologic Characteristics**

Figure 7 depicts an openhole log from an offset well (API No. 42-501-33943) to the AGI wells indicating the injection and primary upper confining zones.



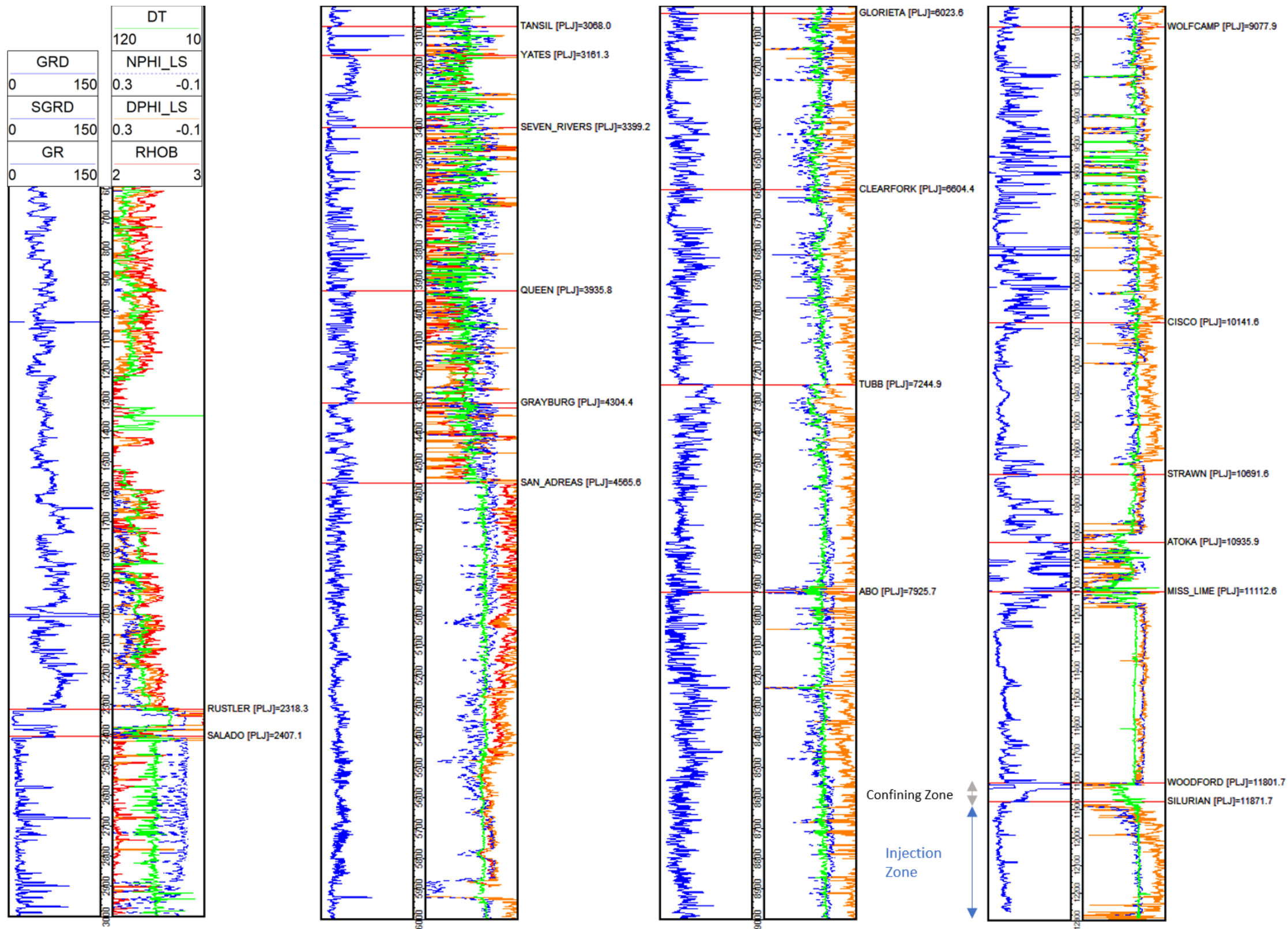


Figure 7 – Type Log (API No. 42-501-33943) with tops, confining and injection zones depicted.

## 2.2.2 Upper-Confining Interval – Woodford Shale

The Woodford Shale is a late Devonian-aged organic-rich shale deposited because of a widespread marine transgression. The flooding event occurred over much of the Permian basin, which produced a low-relief blanket-like shale deposit of the Woodford. Two major lithofacies found within the Woodford are black shale and siltstone. Nutrient-rich surface waters promoted the decay of abundant organic matter within the Woodford, thereby resulting in a high total organic carbon (TOC) percentage. The Woodford acts as the primary source and sealant rock for the Wristen Group (Comer, 1991).

Figure 8 is a description of a core sample taken in Lea County, New Mexico immediately southwest of the Campo Viejo AGI well location. This sample is referenced as C9 in the reference map with the blue star representing the Campo Viejo location. In the core description, black shale with abundant illitic clays is observed in the upper section, and medium gray dolomitic siltstone found in the basal section. The mineralogic and lithologic properties recorded in this description serve as excellent sealant characteristics to prohibit any injected fluids from migrating higher than the injection interval.

The Woodford at the Pozo Acido Viejo No. 1 is encountered at 11,965 ft true vertical depth (TVD) and is approximately 87 ft thick. At the Estacado No. 1, the Woodford is encountered at 11,952 ft TVD and is 65 ft thick.

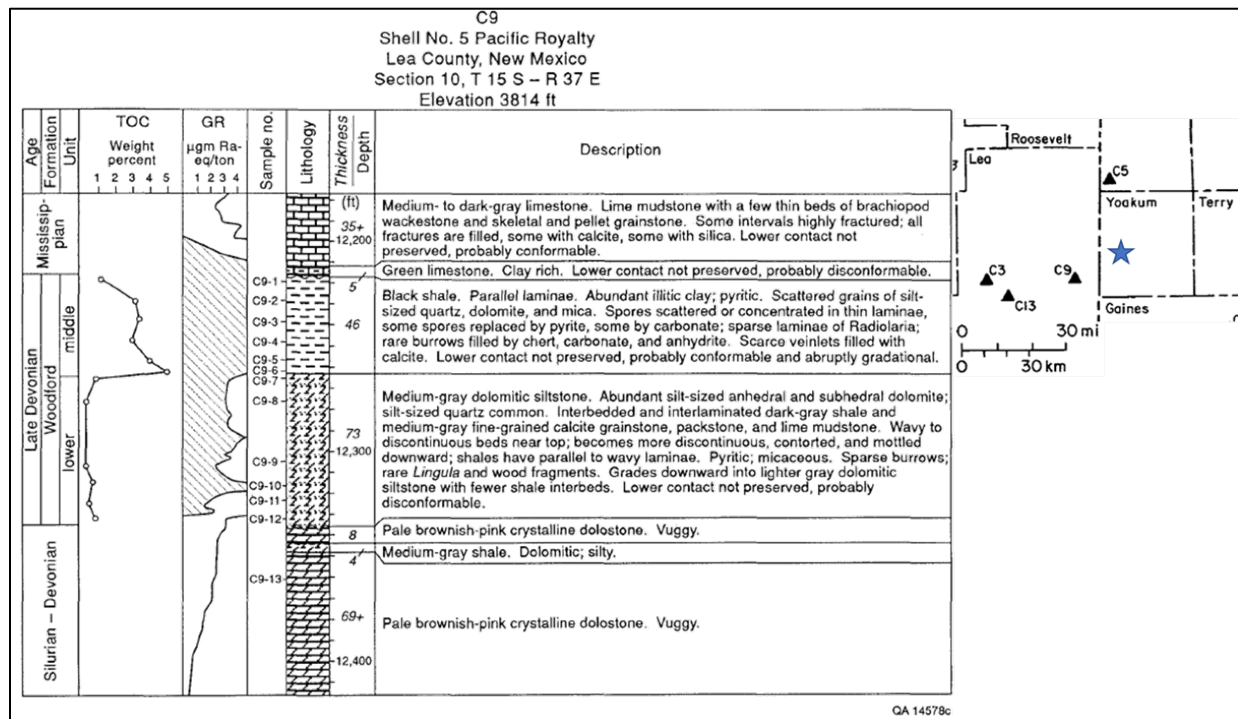


Figure 8 – Core description of the Woodford Shale and Upper Silurian (Ruppel and Holtz, 1994).

### 2.2.3 Injection Interval – Fasken Formation

The AGI wells at Campo Viejo reach total depth in the Fasken formation (Silurian in age), directly beneath the Woodford formation. Dolomites at the top of the Fasken formation underwent multiple leaching and diagenetic episodes that developed secondary porosity. This higher porosity is evidenced in offset wells by the practice of only drilling through the top 30 ft of the Fasken in anticipation of encountering the best reservoir quality. In Figure 8, the uppermost Siluro-Devonian section is described as “vuggy dolostone” in the core description. Beds beneath the top of the Fasken section may also have similar petrophysical attributes if exposed to multiple diagenetic events. Solution-collapse and karst breccia horizons can be found within inner platform deposits, some occurring as much as 100 ft beneath the Fasken top (Ruppel and Holtz, 1994).

#### 2.2.3.1 Porosity/Permeability Development

Porosity in the Fasken formation at Campo Viejo is typically moldic and intercrystalline associated with leaching of allochem-rich intervals. Porosity is directly related to these leaching events that occurred during and post-deposition, resulting in vugs and karst-like features. Figure 9 provides reservoir information from core data within fields in the Wristen buildup and platform carbonate play. The average porosity of these cores is 7.1% with an average permeability of 45.28 millidarcies (mD) (Ruppel and Holtz, 1994). The porosity and permeability described in the offset core data indicate the Fasken formation provides sufficient accessible pore space for the volume of fluid injection proposed.

Using the previously described values as reference points, porosity logs run in the Estacado No. 1 wellbore were evaluated. Figure 10 is the product of the petrophysical analysis performed on the openhole logs within the Estacado well, as shown in Figure 7. A permeability curve was generated from the effective porosity curve using the table in Figure 9 to establish the porosity-permeability relationship within the Estacado wellbore. In Figure 10, most of the porosity and permeability in the injection interval is found at the top of the Fasken formation, which correlates with the diagenetic processes previously described. These curves are extrapolated to the injection site and used to establish reservoir characteristics in the plume model.



	Fusselman Shallow Platform Carbonate play	Wristen Buildups and Platform Carbonate play	Thirtyone Ramp Carbonate play	Thirtyone Deep-Water Chert play
Porosity (%)				
Number of data points	33	30	16	35
Mean	7.93	7.10	6.41	14.85
Minimum	1.00	2.70	3.50	2.00
Maximum	17.70	14.00	9.50	30.00
Standard deviation	4.01	2.67	1.75	6.76
Permeability (md)				
Number of data points	21	24	12	33
Mean	11.61	45.28	1.51	8.56
Minimum	0.60	2.90	0.40	1.00
Maximum	84.80	400.00	30.00	100.00
Standard deviation	22.48	99.17	8.36	22.23
Initial water saturation (%)				
Number of data points	24	28	10	31
Mean	26.96	31.55	24.70	31.46
Minimum	10.00	20.00	16.00	10.00
Maximum	50.00	55.00	40.00	45.00
Standard deviation	9.31	10.45	7.39	8.33
Residual oil saturation (%)				
Number of data points	8	13	5	22
Mean	34.06	30.54	21.30	29.17
Minimum	30.00	20.00	9.00	14.00
Maximum	50.00	35.00	35.00	48.20
Standard deviation	6.99	4.61	11.66	9.76
Oil viscosity (cp)				
Number of data points	11	12	5	21
Mean	0.69	1.16	0.33	0.68
Minimum	0.13	0.32	0.04	0.07
Maximum	1.08	2.00	1.00	1.03
Standard deviation	0.81	0.75	0.40	0.42
Oil formation volume factor				
Number of data points	21	22	6	32
Mean	1.57	1.22	1.65	1.50
Minimum	1.05	1.05	1.31	1.30
Maximum	1.91	1.55	1.66	1.73
Standard deviation	0.28	0.14	0.48	0.16
Bubble-point pressure (psi)				
Number of data points	9	9	5	19
Mean	2,272	1,055	3,750	2,752
Minimum	798	450	2,660	1,755
Maximum	4,050	2,600	4,440	4,656
Standard deviation	1,300	689	756	667

Figure 9 – Table of reservoir properties found within the Wristen buildups and platform plays (Ruppel and Holtz, 1994).

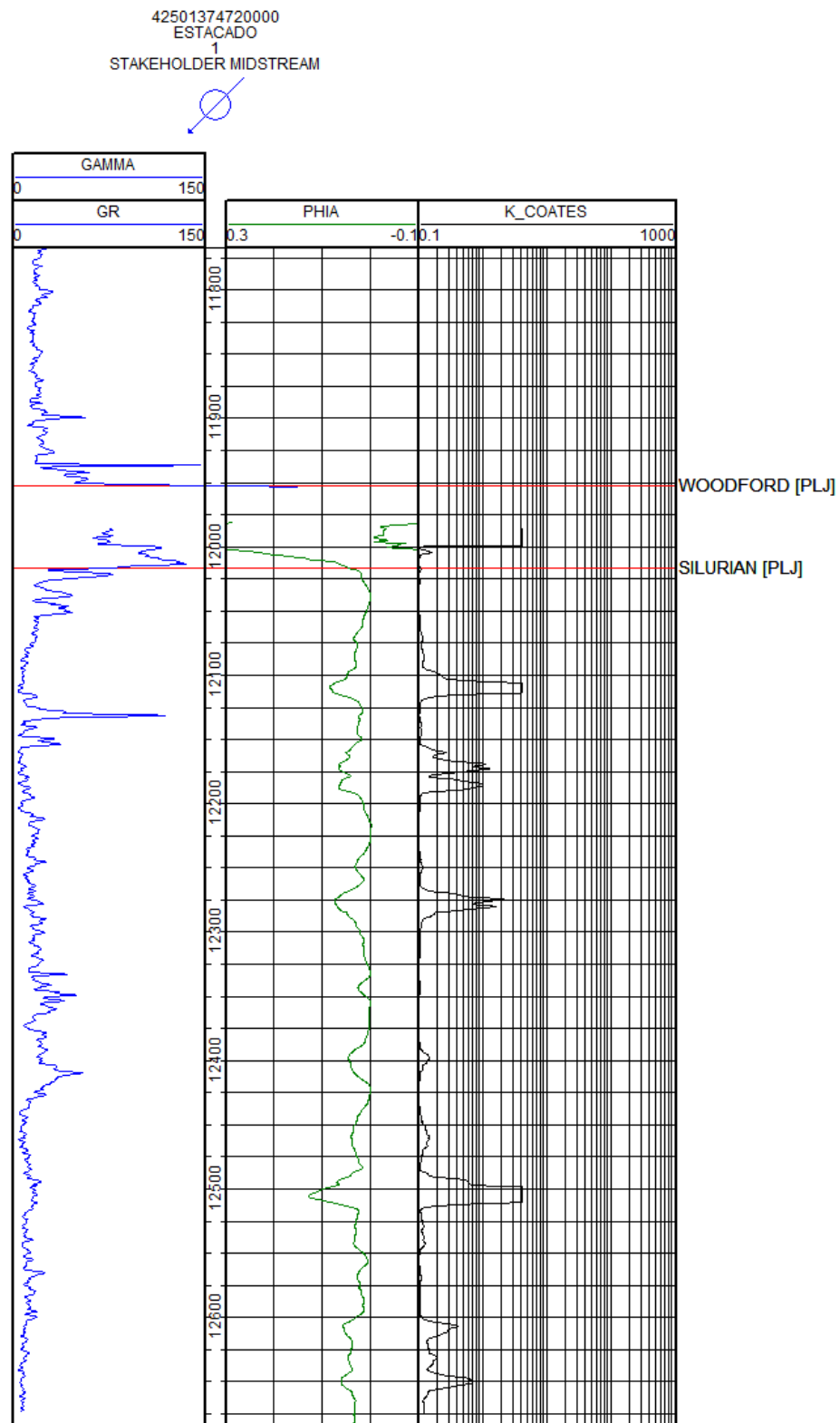


Figure 10 – Openhole log of Estacado well (API No. 42-501-37472) with effective porosity (green) and permeability (black).

### 2.2.3.2 Formation Fluid

Four wells were identified through a review of chemical analyses of oilfield brines from the U.S. Geological Survey (USGS) National Produced Waters Geochemical Database v2.1 within the Devonian, Siluro-Devonian, or Fusselman formations within 20 miles of the Campo Viejo AGI wells. The location of these wells is shown in Figure 11. Water chemistry analyses conducted on oilfield brines in Gaines County, as reported to the Texas Water Development Board (TWDB), provided additional data on Devonian and Silurian reservoir fluids. Results from the synthesis of these two sources are provided in Table 1. The fluids have greater than 20,000 parts per million (ppm) total dissolved solids (TDS); therefore, these aquifers are considered saline. These analyses indicate the in situ reservoir fluid of the Devonian, Silurian, and Fusselman formations are compatible with the proposed injection fluids.

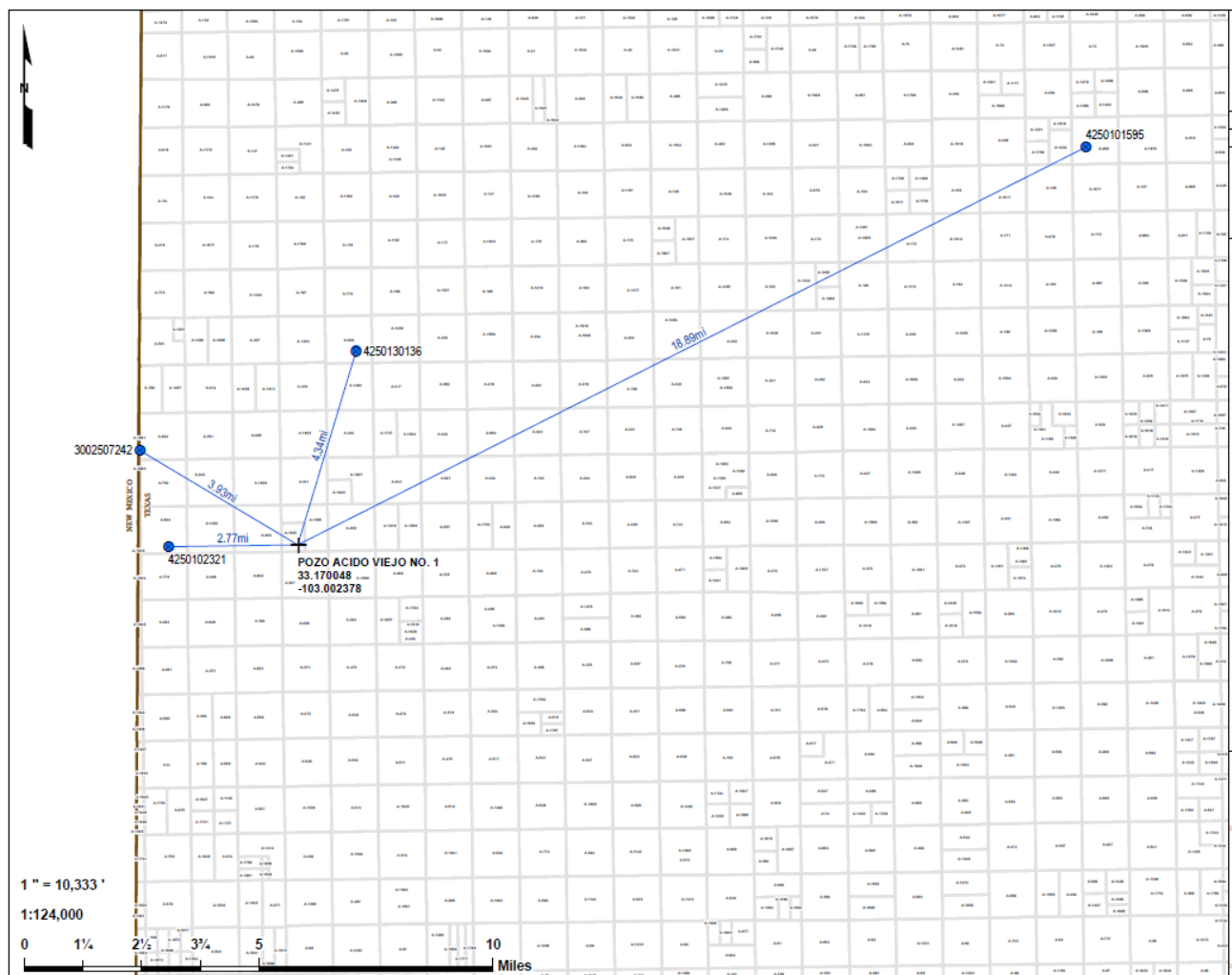


Figure 11 – Offset wells used for Formation Fluid Characterization.

Table 1 – Analysis of Siluro-Devonian age formation fluids from nearby oilfield brine samples.

Measurement	Average	Low	High
Total Dissolved Solids (ppm)	51,933	23,100	81,770
pH	7.2	7.0	7.3
Sodium (ppm)	18,550	7,426	25,377
Calcium (ppm)	2,195	1,010	2,760
Chloride (ppm)	27,250	12,810	43,800

### 2.2.3.3 Fracture Pressure Gradient

The fracture pressure gradients were estimated using Eaton’s equation. Eaton’s equation is commonly accepted as the standard practice for the determination of fracture gradients (FG). Poisson’s ratio ( $\nu$ ), overburden gradient (OBG), and pore gradient (PG) are all variables that can be changed to match the site-specific injection zone. The expected fracture gradient was determined based on data collected from literature reviews and industry standards. First, 1.05 pounds per square inch per foot (psi/ft) and 0.411 psi/ft were assumed for the overburden and pore gradients, respectively. The overburden value is considered the best practice value when there are no site-specific numbers available. The pore pressure gradient was determined from a bottomhole pressure (BHP) test performed at Pozo Acido Viejo No. 1 in April 2022. Poisson’s ratio was to be assumed to be 0.3 through literature review (Molina, Vilarras, and Zeidouni, 2016) for limestone/dolomite rock. Using these values in the subsequently shown equation, an FG of 0.68 psi/ft was calculated. A 10% safety factor was then applied to this number resulting in a maximum allowed BHP of 0.62 psi/ft. This limit was done to ensure that the injection pressure would never exceed the fracture pressure of the injection zone.

For the upper confining interval, a similar FG as the limestone was calculated. Shale would likely fracture vertically if the FG of the injection interval is exceeded (Molina, Vilarras, and Zeidouni, 2016). A Poisson’s ratio equal to the injection interval was used as a conservative estimate. The lower confining zone was assumed to be of a similar matrix to that of the injection interval, with the key difference being that the formation is much tighter (i.e., lower porosity/permeability). The Poisson’s ratio was assumed to be slightly higher in this rock. As seen in Table 2, the FG is slightly higher than the upper zones.

Table 2 – Fracture Gradient Assumptions.

	Injection Interval	Upper Confining	Lower Confining
Overburden Gradient (psi/ft)	1.05	1.05	1.05
Pore Gradient (psi/ft)	0.411	0.411	0.411
Poisson's Ratio	0.30	0.30	0.31
Fracture Gradient (psi/ft)	0.68	0.68	0.70
<b>FG + 10% Safety Factor (psi/ft)</b>	<b>0.62</b>	<b>0.62</b>	<b>0.63</b>

The following steps were taken to calculate the FG:

$$FG = \frac{v}{1-v} (OBG - PG) + PG$$
$$FG = \frac{0.3}{1-0.3} (1.05 - 0.411) + 0.411 = 0.68$$
$$FG \text{ with } SF = 0.68 \times (1 - 0.1) = \mathbf{0.62}$$

#### 2.2.4 Lower Confining Zone – Montoya Formation

The low-permeability Montoya Formation acts as the lower confining unit for the injection interval. Tight limestone rock in the Montoya section acts as a lower seal. Similar to the Siluro-Devonian, rock within the upper Ordovician has little to no reservoir development when diagenetic processes do not occur. Therefore, layers with no porosity within the injection interval and lower confining layer act as seals preventing migration of injectate beneath the proposed injection interval. Additionally, buoyancy of the proposed gas stream is lighter than the connate fluid within the formation, thereby causing it to migrate to the shallower strata making the lower confining layer less likely to encounter any of the injectate.

### 2.3 Local Structure

Regional structure near the Campo Viejo wells is dictated by carbonate buildups and structural events causing anticlinal to synclinal features throughout the area. The AGI wells are specifically located at the base of a syncline with anticlinal features to the north, west, and east. Figure 12 is a structure map of the Siluro-Devonian formation of subsea depths with the red star representing the location of the injection wells. The red and blue lines represent the cross-section reference lines.

Faulting can be seen to the west of Campo Viejo, which set up the hydrocarbon trap for the Bronco field. Figures 13 and 14 are north-south and west-east structural cross sections showing the structural dips. As seen in these figures, the Woodford is laterally present above the injection interval, alleviating risk of erosion of the upper sealant formation.

Higher resolution versions of Figures 12, 13, and 14 are provided in *Appendix A*.



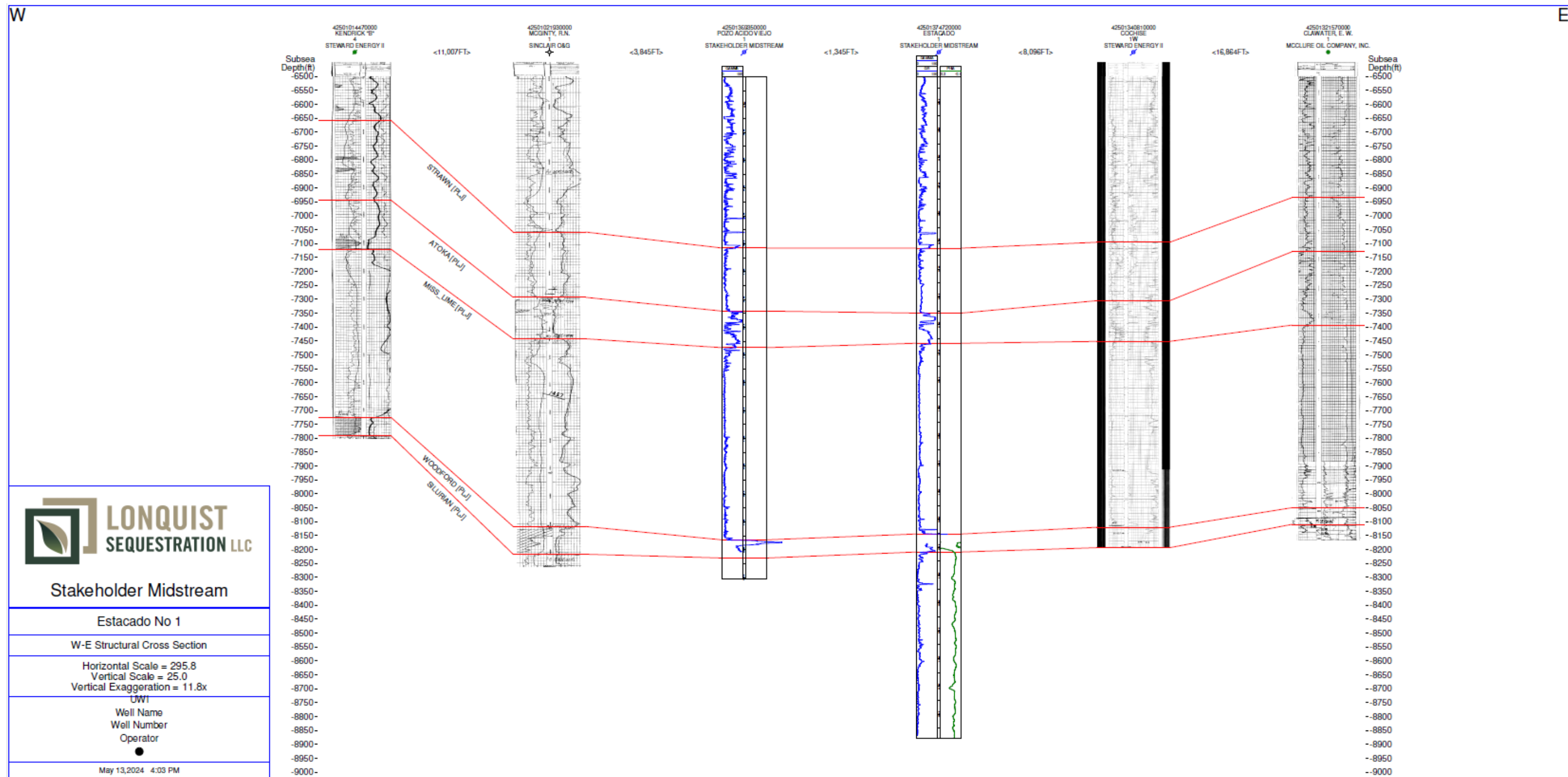


Figure 13 – Structural West-East Cross Section.



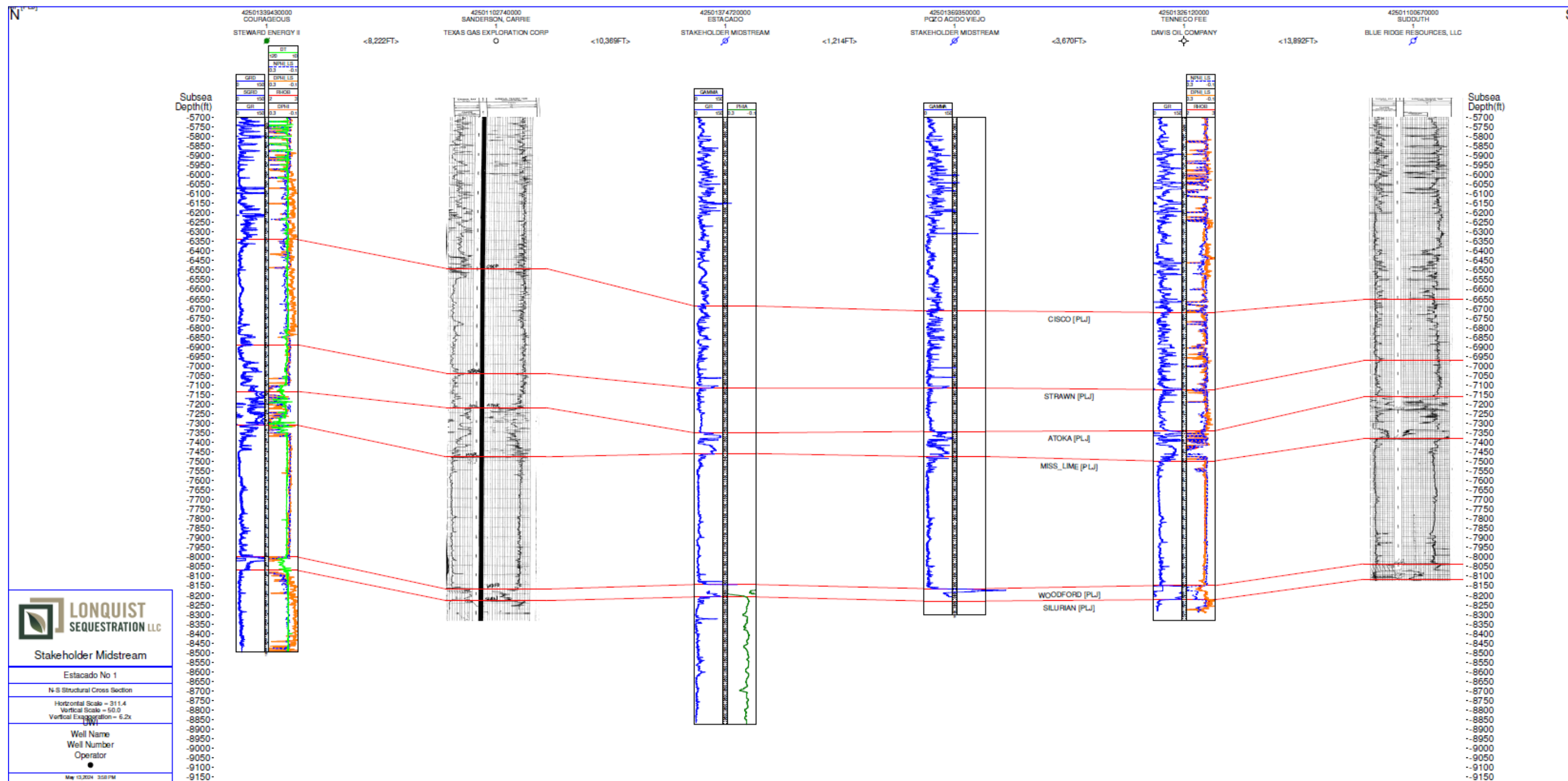


Figure 14 – Structural North-South Cross Section.



## 2.4 Injection and Confinement Summary

The lithologic and petrophysical characteristics of the Fasken formation at the Campo Viejo AGI well locations indicate that the formation has sufficient thickness, porosity, permeability, and lateral continuity to accept the proposed injection fluids. The Woodford formation shale at Campo Viejo has low permeability and is of sufficient thickness and lateral continuity to serve as the upper-confining zone. Beneath the injection interval, the low-permeability, low-porosity Montoya formation is unsuitable for fluid migration and serves as the lower confining zone. Although few wells penetrate the lower-confining zone in the area of Campo Viejo, it can be expected that lateral deposition of the tight carbonate found in the lower-confining zone to be extensive around Campo Viejo based on lack of exposure events in that time of deposition. Additionally, deeper, laterally continuous formations, including the Simpson Group, provide additional confinement.

## 2.5 Groundwater Hydrology

Yoakum County falls within the boundary of the Sandy Land Underground Water Conservation District. Three aquifers are identified by the TWDB's *Aquifers of Texas* report in the vicinity of the AGI wells: the Dockum Aquifer, Edwards-Trinity Aquifer, and Ogallala Aquifer (George, Mace, and Petrossian, 2011). Table 3 references the positions of the aquifers in geologic time and the associated geologic formations. A schematic cross section in Figure 15, near Campo Viejo, illustrates the structure and stratigraphy of these water-bearing formations. Groundwater flow direction is the same for the three aquifers, generally from northwest to southeast, as shown in Figure 16 (Teeple et al., 2021).

Table 3 – Geologic and hydrogeologic units with accompanying lithologic descriptions near Gaines, Terry, and Yoakum Counties, Texas (Teeple, et al. 2021)

Era	Period	Epoch or series	Geologic unit group or formation	Lithologic descriptions	Hydrogeologic unit
Cenozoic	Tertiary	Pliocene	Ogallala Formation	Gravel, sand, silt, and clay	High Plains aquifer system (Ogallala aquifer)
		Miocene			
Mesozoic	Cretaceous <sup>1</sup>	Comanchean Series	Washita Group <sup>2</sup>	Shale and limestone	Edwards-Trinity (High Plains) aquifer system
			Fredericksburg Group	Clay, shale, and limestone	
			Trinity Group	Sand and gravel	
	Triassic	Upper	Dockum Group	Siltstone, mudstone, shale, and sandstone	Dockum aquifer

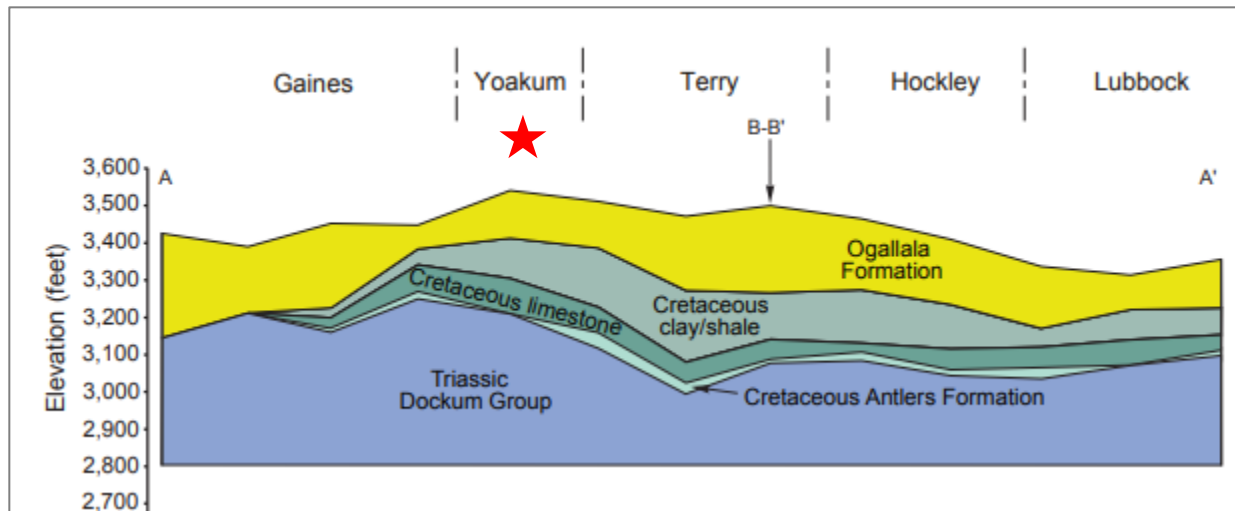


Figure 15 – NW-SE cross section of aquifers in the Campo Viejo area (George, Mace, and Petrossian, 2011).

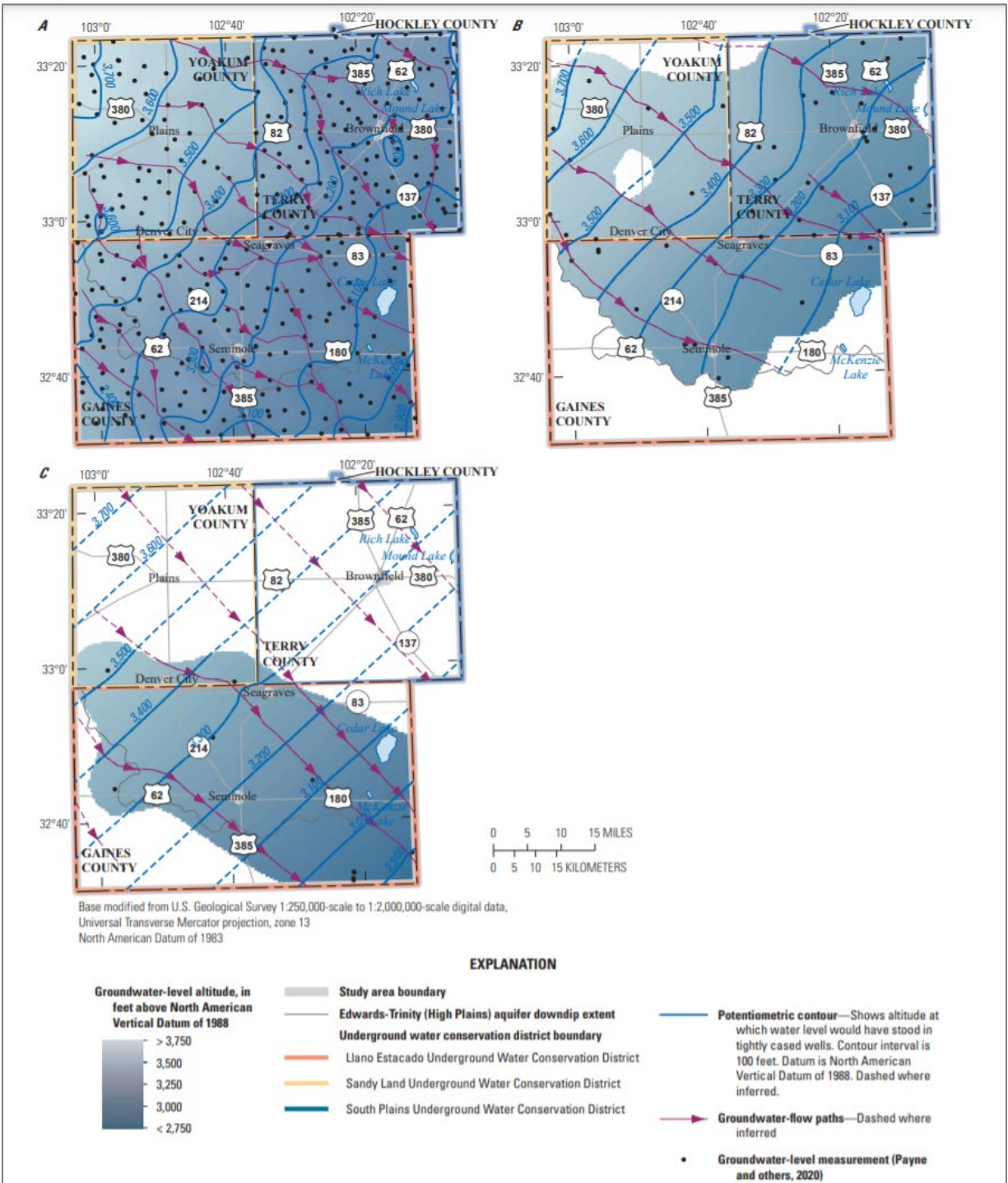


Figure 16 – Potentiometric surfaces from wells completed in A, Ogallala aquifer; B, the Edwards-Trinity aquifer; and C, the Dockum aquifer (George, Mace, and Petrossian, 2011).

The Dockum aquifer is the oldest of the three aquifers, formed from Triassic-age Dockum Group sediments, and underlies the Cretaceous Trinity and Fredericksburg Groups (Teeple et al., 2021). Figure 17 shows the subsurface and outcrop extent of the Dockum Aquifer. As shown in Figure 18, the TDS in western Yoakum County exceed 5,000 milligrams per liter (mg/L); therefore, the aquifer is considered brackish.

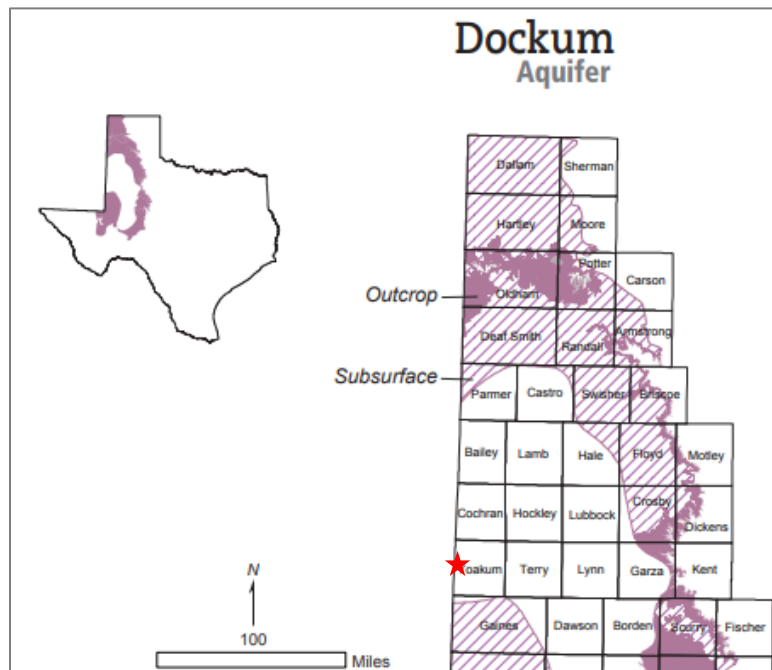


Figure 17 – Regional extent of the Dockum freshwater aquifer (TWDB).

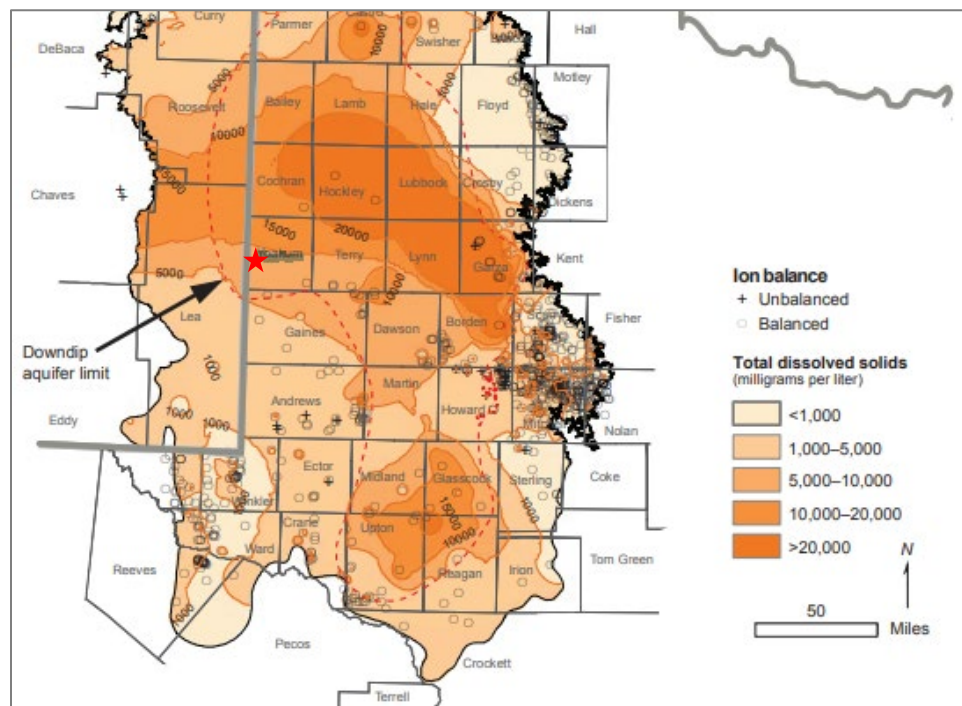


Figure 18 – Total dissolved solids in groundwater from the Dockum aquifer (Ewing et al., 2008).

The Edwards-Trinity aquifer is a collection of Cretaceous age sediments—primarily the Trinity Group Antlers formation sandstone and limestones of the Fredericksburg Group, specifically the Comanche Peak and Edwards formations. Figure 19 shows the subsurface and outcrop extent of the Edwards-Trinity aquifer. Freshwater infiltration to this aquifer is primarily from the overlying Ogallala aquifer (George, Mace, and Petrossian, 2011).

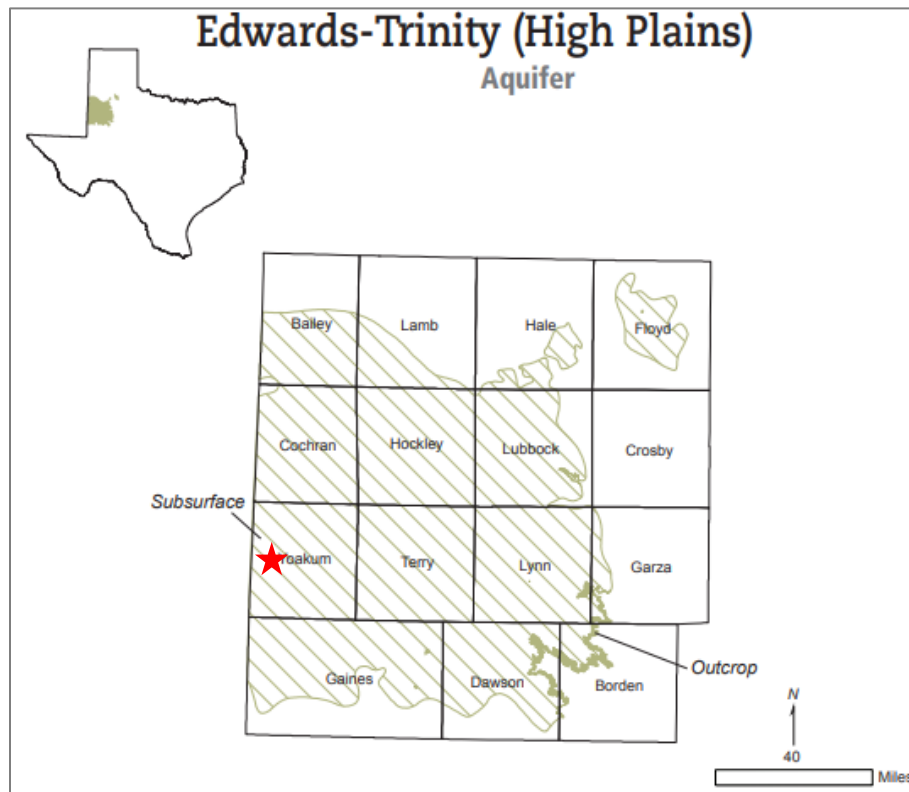


Figure 19 – Regional extent of the Edwards-Trinity freshwater aquifer (George, Mace, and Petrossian, 2011).

The Ogallala aquifer consists of sand, gravel, clay, and silt sediments (George, Mace, and Petrossian, 2011) and produces most of the freshwater for Yoakum County. Figure 19 shows the subsurface and outcrop extent of the Ogallala aquifer.

The base of the deepest aquifer is separated from the injection interval by approximately 9,800 ft of rock, including 650 ft of Salado salt. Though unlikely for reasons outlined in the confinement and potential leaks sections, if migration of injected fluid did occur above the Woodford Shale, thousands of feet of tight sandstone, limestone, shale, and anhydrite beds occur between the injection interval and the lowest water-bearing aquifer.

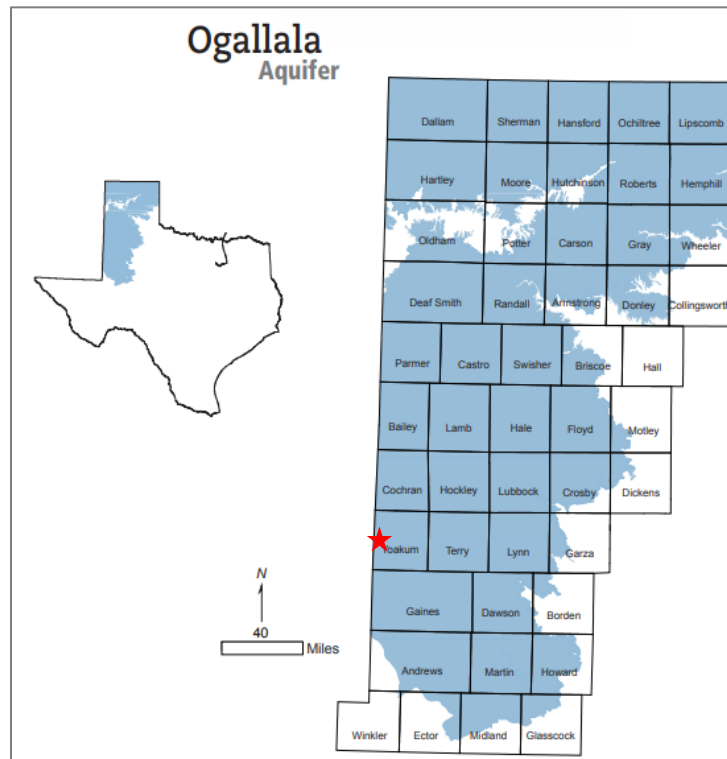


Figure 20 – Regional extent of the Ogallala freshwater aquifer (George, Mace, and Petrossian, 2011).

The TRRC’s Groundwater Advisory Unit (GAU) identified the base of Underground Sources of Drinking Water (USDW) at 2,250 ft at the location of the Campo Viejo wells. Therefore, there is approximately 9,800 ft separating the base of the USDW and the injection interval. A copy of the GAU’s Groundwater Protection Determination letters issued by the TRRC as part of the Class II permitting process Pozo Acido Viejo No. 1 and Estacado No. 1 are provided in *Appendix B*.

## 2.6 Description of the Injection Process

### 2.6.1 Current Operations

The Campo Viejo Facility and its associated Pozo Acido Viejo No. 1 well began operating in March of 2019. Since operations began, 2.8 billion cubic feet (BCF) of TAG has been injected, which equates to 143,483 metric tons of CO<sub>2</sub>. Estacado No. 1 is expected to begin injection operation in Q3 2024. Over the life of the injection period, the average daily injection rate has been 2.7 MMscf/d. The approximate current composition of the TAG stream is provided in Table 4.

Table 4 – Gas Composition of Campo Viejo Facility Outlet.

Component	Mol %
CO <sub>2</sub>	89.0
H <sub>2</sub> S	9.8
N <sub>2</sub>	1.0
Other	0.2

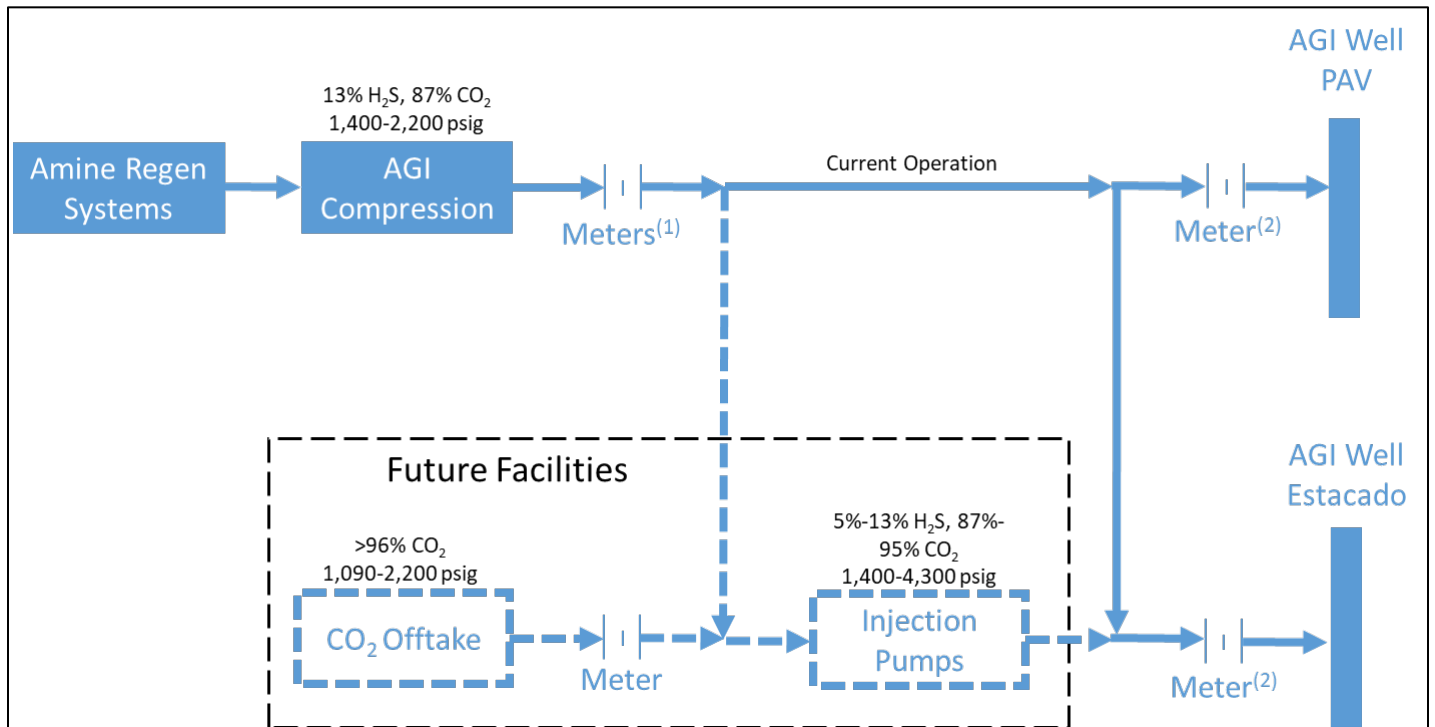
The Campo Viejo Facility is designed to compress, treat, and process natural gas produced from the surrounding counties in Texas and New Mexico. The gas is dehydrated to remove the water content, then processed to separate natural gas liquids, which are then sold, along with the pipeline quality natural gas, to various customers. TAG is then directly routed from the plant sweeteners to the AGI wells. The facility is manned 24 hours per day, 7 days per week.

### 2.6.2 Planned Operations

Stakeholder anticipates increasing the amount of CO<sub>2</sub> injected into the two AGI wells from the current rate up to 20 MMscf/d at Pozo Acido Viejo No. 1 and 19.7 MMscf/d at Estacado No. 1. Additional growth is expected both at Stakeholder facilities and regionally as rising sour gas production and flaring reduction mandates create the need for additional CO<sub>2</sub> and H<sub>2</sub>S disposal capacity. Stakeholder plans to inject into these AGI wells for a total of 25 years from the start of injection in 2019.

Figure 21 shows a high-level view of the current process flow plus the prospective additional operations over time.





- (1) Existing meters used for Subparts RR and PP reporting  
 (2) Estimated in-service Q4 2024. Will be used for Subpart RR going forward

Figure 21 – Campo Viejo Facility Process Flow Diagram.



## 2.7 Reservoir Characterization Modeling

The modeling software used to evaluate this project was Computer Modelling Group's GEM 2023.20 (GEM) simulator. This reservoir simulation software package is frequently used in the oil and gas industry for conventional, unconventional, and secondary recovery modeling. GEM uses equation-of-state (EOS) algorithms along with some of the most advanced computational methods to evaluate compositional, chemical, and geochemical processes and characteristics to produce highly accurate and reliable simulation models for carbon injection and storage. The GEM model is recognized by the EPA for use in area-of-review delineation modeling, as listed in the Class VI Well Area of Review Evaluation and Corrective Action Guidance document.

The Siluro-Devonian (Fasken) formation is the target formation for the AGI wells at the Campo Viejo Facility. The Petra software package was used to create the geologic model of the target formation. The faulting and geologic structure was then imported into GEM and used to create contours for the model grid.

Since the time that the initial MRV plan for the Pozo Acido Viejo No. 1 was approved, the Estacado No. 1 was drilled and key reservoir properties were obtained, which were not available at the time of the original MRV submission. Porosity and permeability estimates were determined using the porosity log from the Estacado No. 1. The Coates permeability equation was then used to calculate permeability with depth. Both porosity and permeability are assumed to be laterally homogeneous in the reservoir.

The reservoir is assumed to be at hydrostatic equilibrium and initially saturated with 100% brine. An infinite acting reservoir was created to simulate boundary conditions. The gas injectate is composed of H<sub>2</sub>S, CO<sub>2</sub>, methane (C<sub>1</sub>), and other components, as shown in Table 5. Core data from literature review was used to determine residual gas saturation (Ruppel and Holtz, 1994). The modeled composition only takes into consideration the CO<sub>2</sub> and H<sub>2</sub>S, as they comprise nearly 99% of total stream. For the initial injection period, these compositions are normalized up to 100%. For the proposed additional injection period, it is expected that a larger portion of the gas added is carbon dioxide, thereby changing the composition to 94% CO<sub>2</sub> and 6% H<sub>2</sub>S.

Table 5 – Modeled Initial Gas Composition.

Component	Measured Current Composition (mol%)	2019–2023 Model Composition (mol%)	2023–2044 Model Composition (mol%)
H <sub>2</sub> S	9.745	9.844	6.000
Nitrogen (N <sub>2</sub> )	0.577	0.000	0.000
CO <sub>2</sub>	89.249	90.156	94.000
Methane (C <sub>1</sub> )	0.190	0.000	0.000
Ethane (C <sub>2</sub> )	0.012	0.000	0.000
Propane (C <sub>3</sub> )	0.028	0.000	0.000
Hexane Plus (C <sub>6+</sub> )	0.199	0.000	0.000

Core data from literature review was used to determine relative permeability curves between CO<sub>2</sub> and the connate brine within the Siluro-Devonian carbonates (Ruppel and Holtz, 1994). The key inputs used in the model include an irreducible water saturation of 40% and a maximum residual gas saturation of 21%.

The grid contains 160 blocks in the x-direction (east-west) and 160 blocks in the y-direction (north-south), totaling 125,600 grid blocks per layer. Each grid block has dimensions of 300 ft x 300 ft, which results in the grid being 48,000 ft x 48,000 ft totaling a little more than an 83-square-mile area. Each layer in the model was determined by assigning zones of similar permeability and porosity to each layer, as shown previously in **Figure 10**. The model contains a total of 17 layers in the model, representing 7 layers of high permeability rock, 5 layers of moderate permeability rock, and 5 layers of intermediary low-permeability zones. The properties of each of these layers are summarized subsequently in Table 6.

Table 6 – Model Layer Properties.

Layer	Grid Top (ft)	Thickness (ft)	Porosity (%)	Permeability (mD)
1	12,131	47	1.30%	0.57
2	12,178	30	3.20%	12
3	12,208	31	5.40%	158
4	12,239	10	2.10%	0.86
5	12,249	20	2.70%	5
6	12,269	39	5.30%	127
7	12,308	51	1.00%	0.74
8	12,359	21	2.50%	5
9	12,380	32	5.30%	115
10	12,412	93	1.20%	0.62
11	12,505	18	4.20%	21
12	12,523	34	1.30%	0.97
13	12,557	33	3.50%	21
14	12,590	12	2.50%	6
15	12,602	60	5.50%	123
16	12,662	51	1.90%	2
17	12,713	76	4.50%	64

### 2.7.1 Simulation Modeling

The primary objectives of the model simulation were as follows:

- 1) Estimate the maximum areal extent and density drift of the acid gas plume after injection.
- 2) Assess the impact of offset saltwater disposal (SWD) well injection on density drift of the plume.

- 3) Determine the ability of the target formation to handle the required injection rate without fracturing the injection zone.
- 4) Assess the likelihood of the acid gas plume migrating into potential leak pathways.

The reservoir is assumed to be an aquifer filled with 100% brine. The salinity of the formation is estimated to be 100,000 ppm, typical for the region. The acid gas stream is primarily composed of CO<sub>2</sub> and H<sub>2</sub>S, as stated previously. Core data was used to help generate relative permeability curves. Cores, from the literature reviews, as previously discussed, that most closely represent the vuggy carbonate seen in this region were identified and the Corey-Brooks equations were used to develop the curves. The lowest residual gas saturation found in the cores was then used for a conservative estimate of plume size. The initial reservoir pressure is 5,091 psi, which is equivalent to a 0.411-psi/ft pressure gradient and was determined from a BHP test performed in the Pozo Acido Viejo No. 1 in April 2022. The fracture gradient of the injection zone was estimated to be 0.68 psi/ft, which was determined using Eaton's equation. A 10% safety factor was then applied to this number, thereby putting the maximum BHP allowed in the model at 0.62 psi/ft, which is equivalent to 7,424 psi.

The model also considers offset SWD injection volumes close to the Campo Viejo site. A total of 23 offset wells currently injecting into the Devonian were identified within a 5-mile radius of Pozo Acido Viejo No. 1 and Estacado No. 1. Historical injection rates of each of these wells were analyzed and projected into the model. This simulation includes the effect of water injection on the density drift of the plume and BHP.

The model runs for a total of 86 years comprised of 36 years of historical SWD injection, 25 years of active acid gas injection, and an additional 25 years of density drift. Offset SWD injection begins in 1983 and continues for the life of the model. The acid gas injection period begins in 2019 when the Pozo Acido Viejo No. 1 first became operational. Historical injection monthly rates of Pozo Acido Viejo No. 1 are taken into consideration until 2023 in the model. After this initial period, it is assumed that the injection rate increases to 20 MMscf/d for the remainder of the active injection period. In the fifth month of 2024, the Estacado No. 1 well is assumed to start injection at 19.70 MMscf/d until the end of injection. The end of injection occurs 25 years after the start of Pozo Acido Viejo No. 1 (Year 2044). At which point, the AGI wells stop injection while the offset injectors continue operations during the density drift period (also a conservative assumption).

The maximum plume extent during the 25-year injection period is shown in Figure 22. The final extent after 25 years of density drift after injection ceases is shown in Figure 23.

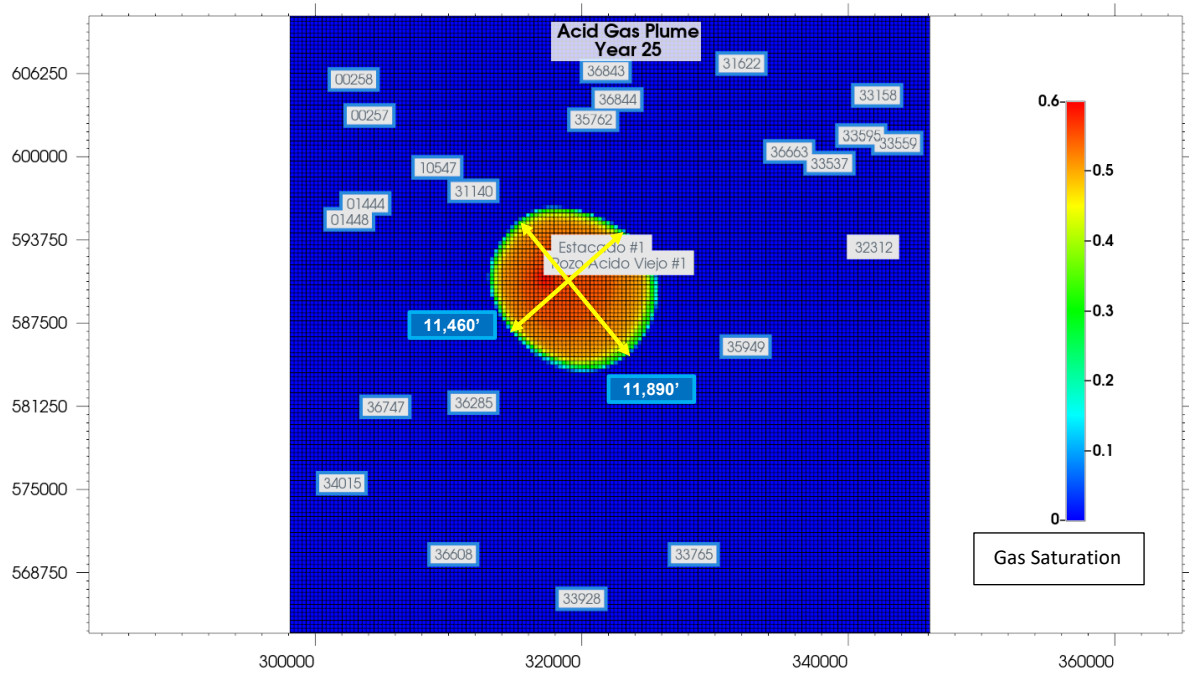


Figure 22 – Areal View Gas Saturation Plume, Year 25 (End of Injection).

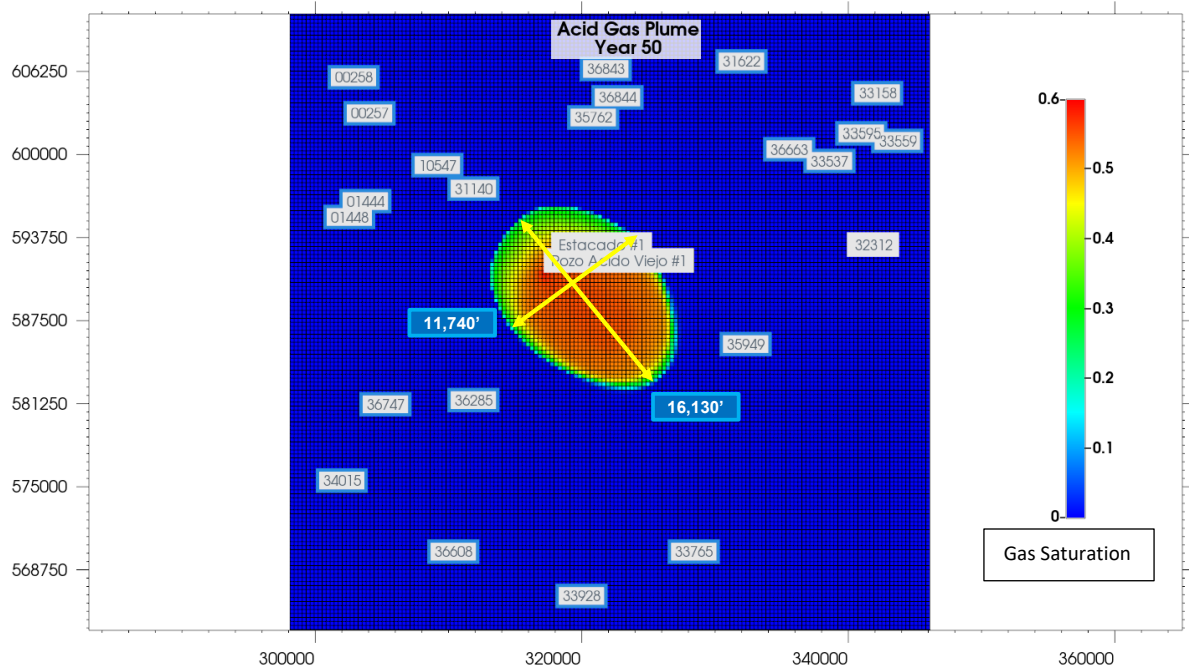
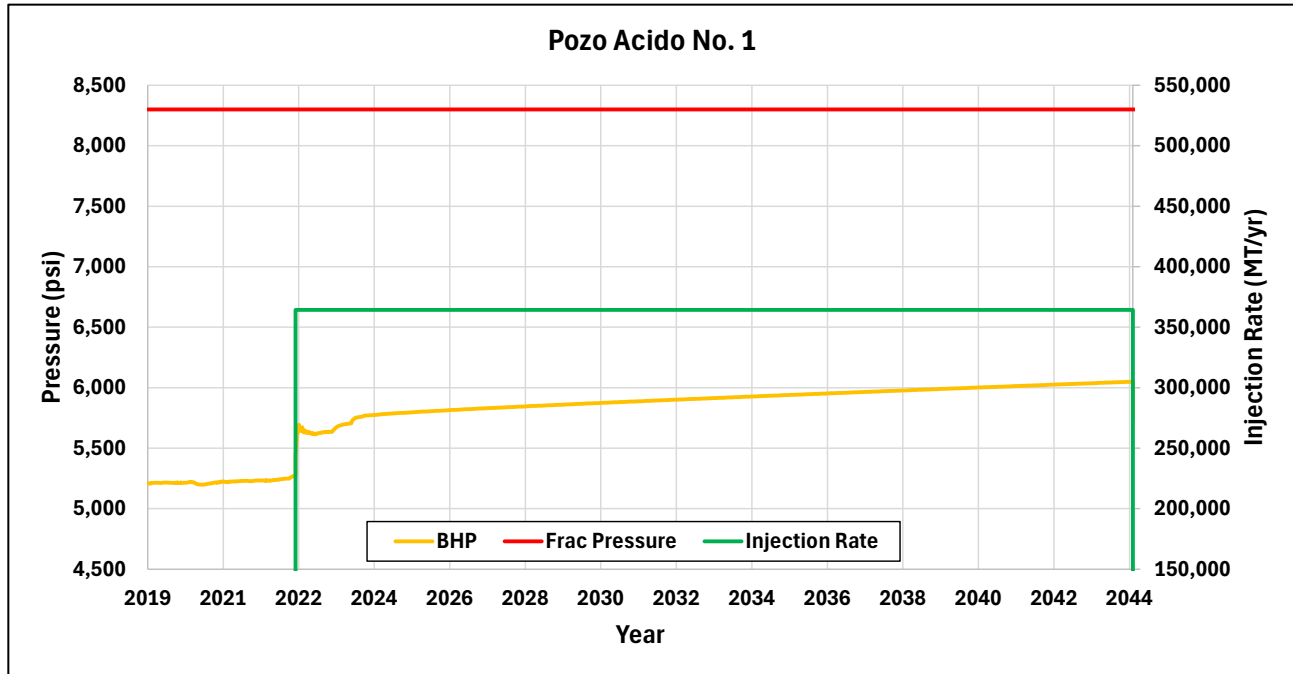


Figure 23 – Areal View Gas Saturation Plume, Year 50 (End of Simulation).

Figures 24 and 25 show the surface injection rate and BHP over the injection period and the period of density drift after injection ceases. The BHP increases steadily throughout the injection period, reaching a maximum pressure of 6,055 psi as injection ceases. This buildup of 1,070 psi keeps the

BHP well below the fracture pressure of 8,300 psi. The maximum surface pressure associated with the maximum BHP reached is approximately 3,300 psi, well below the maximum allowable 4,319 psi in accordance with the TRRC UIC permit for this well.



\*MT/yr – metric tons per year

Figure 24 – Well Injection Rate and BHP Over Time at Pozo Acido Viejo No. 1.

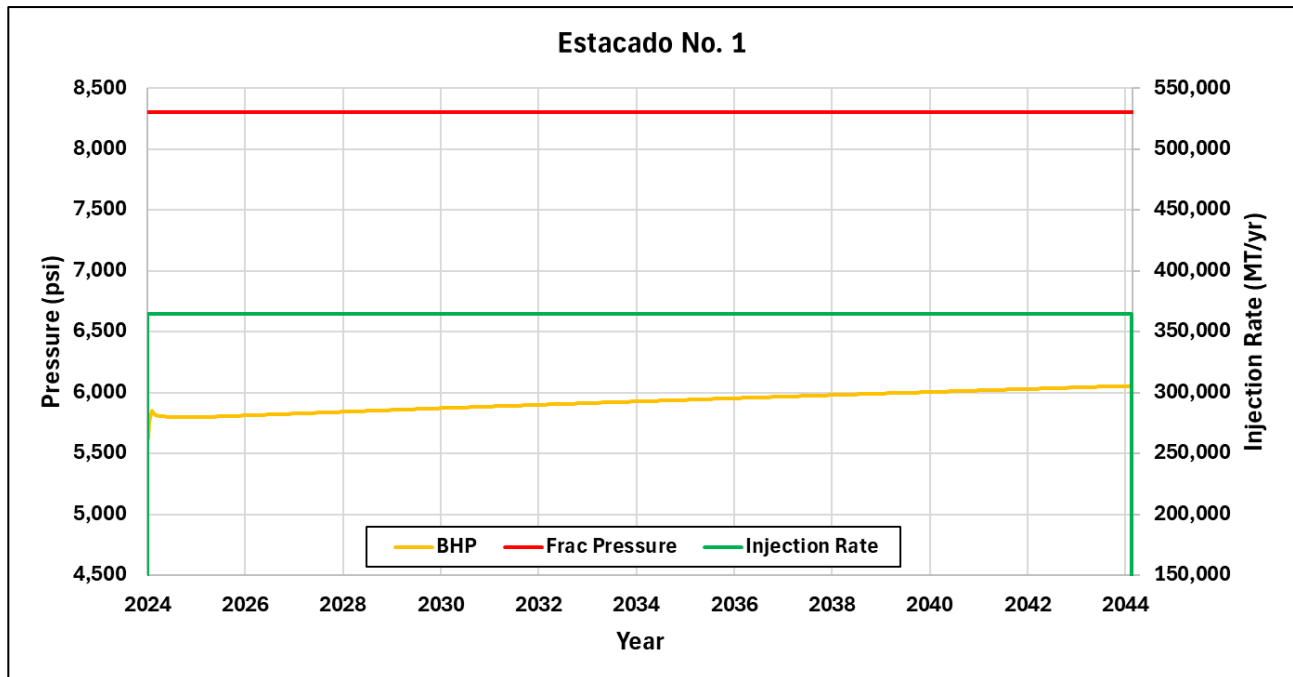


Figure 25 – Well Injection Rate and BHP over Time at Estacado No. 1.

As shown in Figure 26, the plume has a high growth-rate, as modeled in 2020 and 2023, as a result of the initial injection for each well. As the wells continue to inject and the plume establishes itself, the growth rate rapidly decreases to a more stable rate then drops again after injection ceases in 2044. By 2049, the plume is effectively stabilized with a growth rate of less than 1% increase in area per year.

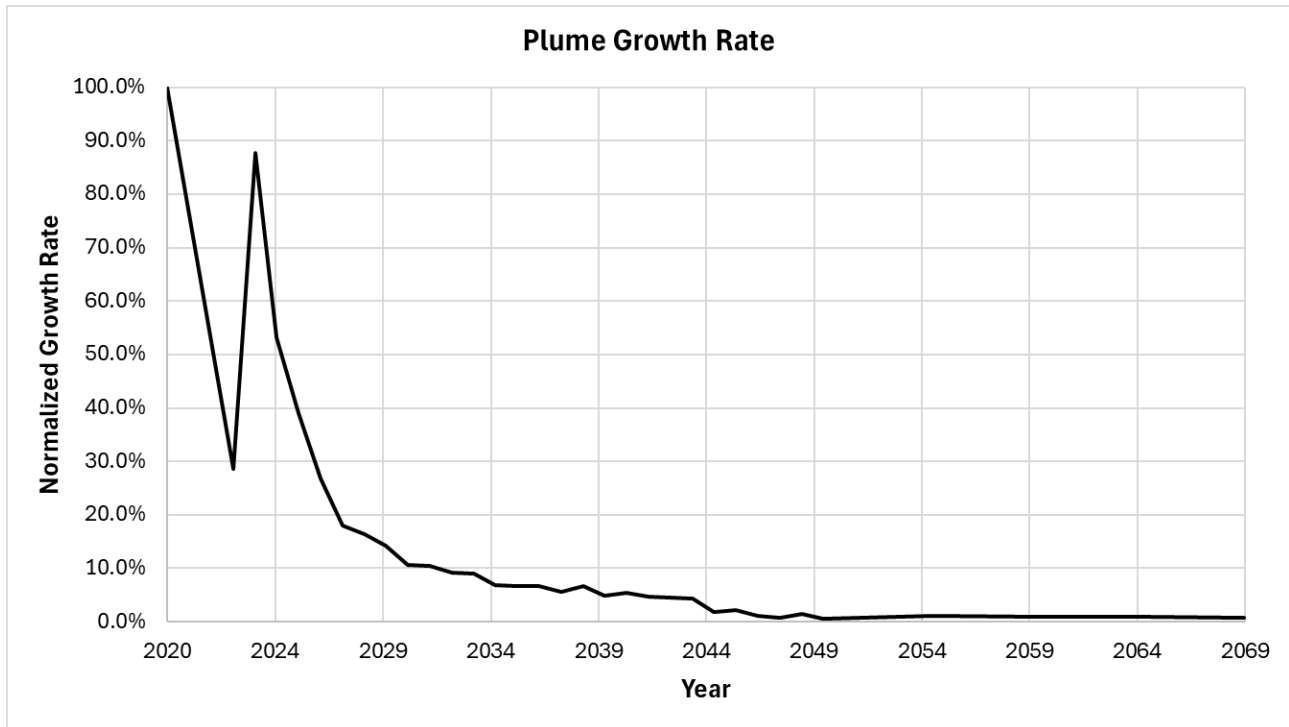


Figure 26 – Annual Growth Rate of CO<sub>2</sub> Plume

## **SECTION 3 – DELINATION OF MONITORING AREA**

This section discusses the delineation of Maximum Monitoring Area (MMA) and Active Monitoring Area (AMA), as described in EPA 40 CFR §98.448(a)(1).

### **3.1 Maximum Monitoring Area**

The MMA is defined as equal to or greater than the area expected to contain the free-phase CO<sub>2</sub> plume until the plume has stabilized plus an all-around buffer zone of at least one-half mile. Numerical simulation was used to predict the size and drift of the plume. With the GEM software package, reservoir modeling was used to determine the areal extent and density drift of the plume. The model considers the following:

- Logs from Estacado No. 1 and offset wells to estimate geologic properties
- Petrophysical analysis to calculate the heterogeneity of the rock
- Geological interpretations to determine faulting and geologic structure
- Offset injection history to adequately predict the density drift of the plume

Acid gas injectate was analyzed by a third-party vendor to determine the initial composition used in the model. The report is provided in *Appendix C*. The molar composition of the gas is primarily CO<sub>2</sub> with some H<sub>2</sub>S and CH<sub>4</sub>. The change in molar composition was also incorporated into the model as future predominantly CO<sub>2</sub> streams are added for injection. As discussed in *Section 2*, the gas was injected into the Siluro-Devonian, specifically, the Fasken formation. The geomodel was created based off the rock properties seen in the Fasken.

The plume boundary was defined by the weighted average gas saturation in the aquifer. A value of 1% gas saturation was used to determine the boundary of the plume. When injection ceases in year 25, the areal expanse of the plume will be 2,704 acres. The maximum distance between the wellbores and the edge of the plume is approximately 0.82 miles to the southeast. After 25 additional years of density drift, the areal extent of the plume is 3,479 acres with a maximum distance to the edge of the plume of approximately 2.26 miles to the southeast.

Figure 27 shows the 25-year plume boundary, the 50-year plume boundary, and the MMA.

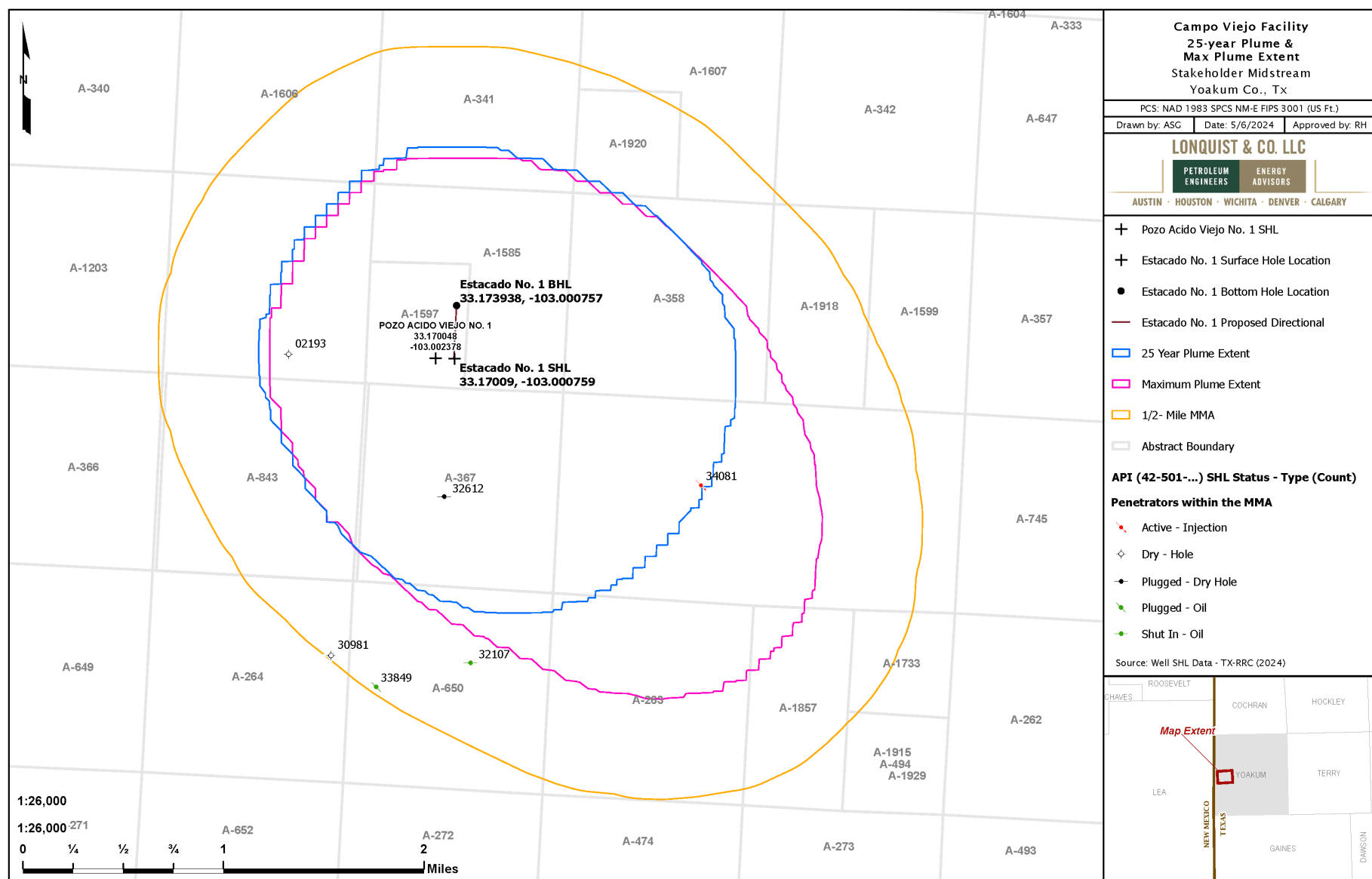


Figure 27 – 25-year plume, 50-year plume, and Maximum Monitoring Area.



### **3.2 Active Monitoring Area**

The AMA is proposed to have the same boundary as the MMA. The only probable leakage paths in the MMA are the wells that penetrate the injection interval and the surface equipment; therefore, the MMA adequately covers the area that should be monitored for CO<sub>2</sub> leakage. Leakage from groundwater wells, faults, and fractures through the confining layer and seismicity events are highly improbable, as discussed in the subsequent section and would be covered by the MMA. Further consideration was done in determining the plume boundary to provide the most conservative estimate. Anisotropy of formation was considered to allow gas to flow into the highest permeability zones. The zone with the highest permeability would take on the most gas and allow for a larger areal extent of gas.

As it is based on the stabilized CO<sub>2</sub> plume, the AMA will fully contain the plume within its boundaries in year t=50 and therefore, at t=55.

## **SECTION 4 – POTENTIAL PATHWAYS FOR LEAKAGE**

This section identifies the potential pathways for CO<sub>2</sub> to leak to the surface within the MMA and the likelihood, magnitude, and timing of such leakage. The potential leakage pathways are as follows:

- Leakage from surface equipment
- Leakage through existing wells within the MMA
- Drilling through the MMA
- Leakage through faults and fractures
- Leakage through the confining layer
- Natural or induced seismicity

A summary of the risk assessment for the potential leakage pathways is provided in Table 7.

Table 7 – Potential Leakage Pathway Risk Assessment.

<b>Potential Leakage Pathway</b>	<b>Likelihood</b>	<b>Magnitude</b>	<b>Timing</b>
Surface Equipment	Remote likelihood of mechanical failure of flowlines or distribution system.	Very Low. Automated monitoring systems and emergency shutdown valves in the event of overpressure. Competent management of operations.	During active injection.
Existing wells within the MMA	Possible. Six artificial penetrations were drilled into the injection interval.	Medium. Monitoring plans would identify leakage and the affected well remediated.	During active injection and until plume stabilizes (5 years after injection)
Drilling through the MMA	Very unlikely. The Siluro-Devonian and deeper formation are not productive in this area	Very Low. Any wells that would be drilled in the MMA would be required to be cased and cemented to prevent flow from the Siluro-Devonian.	During active injection and until plume stabilizes (5 years after injection).
Fault and fractures	Remote. A regional seismic evaluation did not identify any faulting of the confining or injection zones or within the modeled plume extents.	Very Low. Additional confinement above the Woodford Shale is provided by the Mississippi Lime.	During active injection and until plume stabilizes (5 years after injection).
Upper-Confining Layer	Remote. The mineralogic and lithologic properties of the Woodford Shale results in excellent confining characteristics.	Very Low. Additional confinement above the Woodford Shale is provided by the Mississippi Lime.	During active injection and until plume stabilizes (5 years after injection).

Potential Leakage Pathway	Likelihood	Magnitude	Timing
Natural or induced seismicity	Remote. Campo Viejo is in a seismically inactive area. Injection pressure will be kept below the maximum limit.	Very Low. Additional confinement above the Woodford Shale is provided by the Mississippi Lime if any events were to result in the development of a new pathway.	During active injection.

Table 8 – Description of Magnitude Assessment Levels.

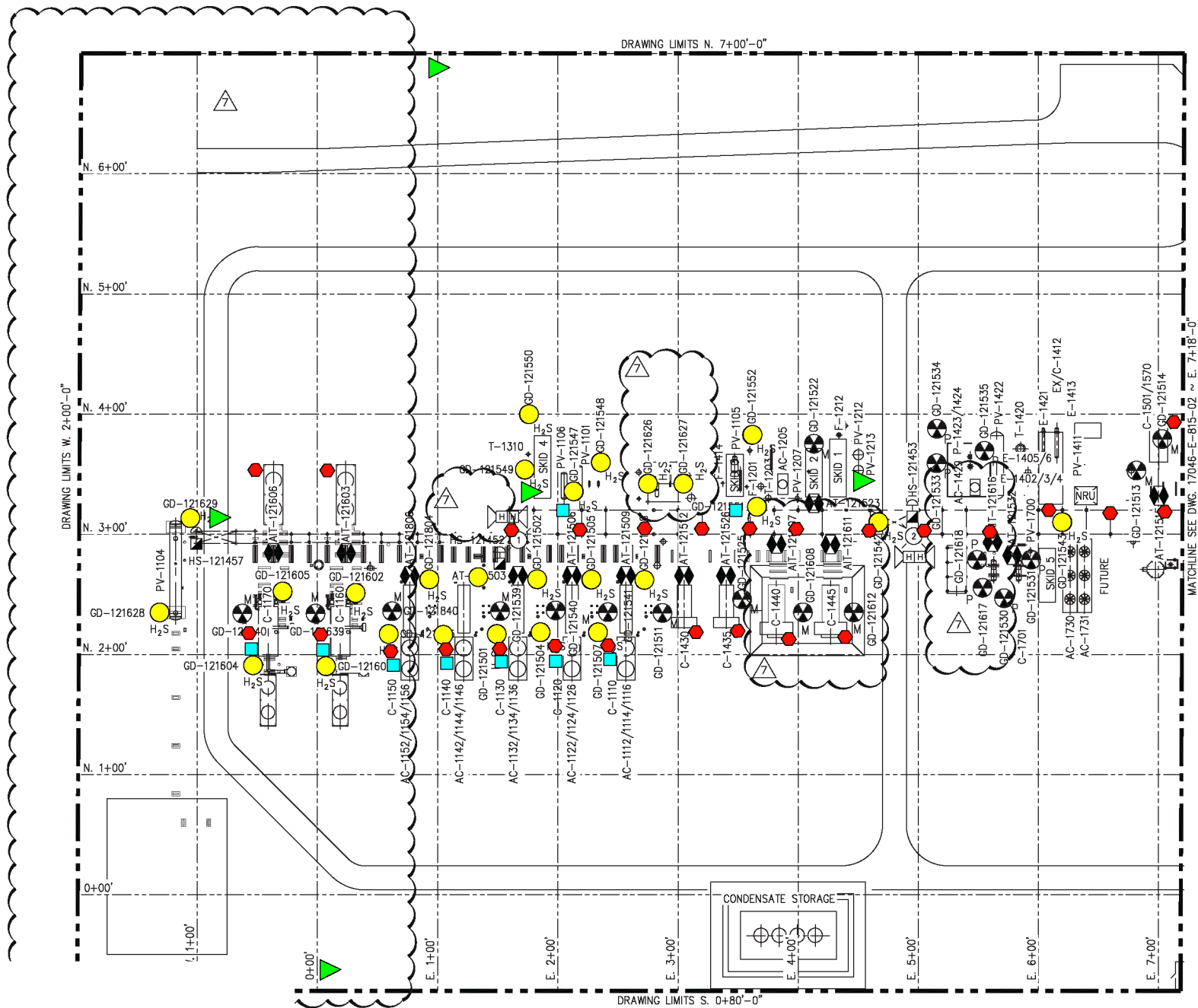
Magnitude Assessment Description
Low – Categorized as little-to-no impact to safety, health, and environment. Minimal costs to mitigate.
Medium – Potential risks to the USDW and for surface releases exists. Easily remediated.
High – Danger to the USDW and/or significant surface release. Significant cost to remediate.

The risk of leakage through potential pathways is highest during the injection period. Once injection ceases the risks of leakage from offset wells, fractures, etc. diminish quickly as the plume stabilizes. Potential risks from surface equipment would be eliminated once the wells are plugged, and surface equipment is decommissioned.











#### 4.1 Leakage from Surface Equipment

The surface facilities at the Campo Viejo Facility are designed for injecting acid gas containing H<sub>2</sub>S; and therefore, minimize leakage points, such as valves and flanges following industry standards and best practices. H<sub>2</sub>S gas detectors are located around the facility and the well site. These gas detectors trigger alarms at 10 ppm. Additionally, all Stakeholder field personnel are required to wear H<sub>2</sub>S monitors that are triggered at 10 ppm of H<sub>2</sub>S. A shut-in valve is located at the wellhead and locally controlled by pressure, with a high-pressure and low-pressure shutoff.




The facilities have been designed and constructed with additional safety systems to provide for safe operations. These systems include Emergency Shutdown (ESD) valves to isolate portions of the plant and pipeline, pressure relief valves along the pipeline to prevent over pressurization, and flares to allow piping and equipment to be depressurized rapidly under safe and controlled operating conditions in the event of a leak. Figure 28 and Figure 29 display the facility safety plot plan taken from the Campo Viejo H<sub>2</sub>S Contingency Plan and show the location of the H<sub>2</sub>S monitors in the vicinity of the plant and AGI wells. Should Stakeholder construct additional CO<sub>2</sub> facilities, as indicated in **Figure 21**, a separate meter will be installed for the additional stream to comply with the 40 CFR §98.448(a)(5) measurement. Because this meter will be near the existing facilities, it will use the existing monitoring programs discussed previously. Additionally, CO<sub>2</sub> monitors will be installed near the new meter and tied into the facility monitoring systems.



LEGEND:

-  FIRE EXTINGUISHER
-  SCBA / ESCAPE PACK
-  WIND SOCK
-  FIRE DETECTOR
-  GAS DETECTOR HYDROGEN SULFIDE
-  GAS DETECTOR METHANE
-  GAS DETECTOR PROPANE
-  ESD BUTTON
-  RED, BLUE, AMBER & WHITE STROBE LIGHTS
-  HORN

P.E. SEAL IS ONLY APPLICABLE TO THE SI REVISION JOB #10864 DATED 2/10/22

 Digitally signed by Srikanth Konduru Date: 2022.02.14 14:52:32-05'00' P.E. ENGINEERING STAMP	<b>SAULSBURY</b> ENGINEERING SERVICES SAULSBURY.COM TEXAS REGISTERED ENGINEERING FIRM F-618	REFERENCE DRAWINGS		 <b>OPTIMIZED PROCESS DESIGNS</b> ENGINEERS AND CONSTRUCTORS KATY, TEXAS PH. 281-371-7500	SAFETY PLOT PLAN SHEET 1 OF 2 CAMPO VIEJO PROCESSING FACILITY YOAKUM COUNTY, TX DRAWING SCALE 1" = 50'									
		NUMBER	TITLE											
		17045-E-817-01	TOKE MODULE CONTROLLER WIRING DIAGRAM											
DWG. REVISION #	TO #	BY	SAULSBURY	NO.	REVISION	DRAWN	CHECKED	APPROV.	DATE	DRAWN BY	SP	DATE	DATE	DATE
SI JOB NUMBER			10864	3	AS BUILT - OPD JOB #17046	JWB	JP	GS	3-8-19	CHECKED BY	JP	1-18-18	1-18-18	1-18-18
				4	ISSUED FOR CONSTRUCTION - SI JOB #10865	DE	AK	AK	03/01/20	CHECKED BY	GS	1-18-18	1-18-18	1-18-18
				5	REVISED AS NOTED - SI JOB #10865	DE	AK	AK	04/02/20	DOCUMENT				
				7	ISSUED FOR CONSTRUCTION - SI JOB #10864	DE	CWR	SK	2/10/22	CONTROL #		17046-E-811-01		
													DRAWING NUMBER	17046-E-811-01



With the level of monitoring at the Campo Viejo Facility and the two AGI wells, any release of H<sub>2</sub>S and CO<sub>2</sub> would be quickly identified, and the safety systems would quickly minimize the volume of the release. The CO<sub>2</sub> injected into the AGI wells is injected with H<sub>2</sub>S at a concentration of 10% (i.e., 100,000 ppm). At this high level of H<sub>2</sub>S concentration, even a small leakage would trigger personal and facility H<sub>2</sub>S monitors set to alarm at 10 ppm. If any leakage were to be detected, the volume of CO<sub>2</sub> released will be quantified based on the operating conditions at the time of release, as stated in *Section 7* in accordance with 40 CFR **§98.448(a)(5)**.

Higher resolution versions of Figure 28 and Figure 29 are provided in *Appendix D*.

## **4.2 Leakage from Wells Within the Monitoring Area**

### **4.2.1 Oil and Gas Operations Within the Monitoring Area**

Historical production within the area of Campo Viejo has primarily been from the shallower San Andres and Wolfcamp formations. These formations are separated from the Siluro-Devonian interval by 6,400 ft and 3,300 ft, respectively. Within the plume area of the two AGI wells, 76 wells have been drilled and completed or plugged. Of these wells, 65 are active, 10 are plugged and abandoned, and 1 is shut in. Six wells, not including the two AGI wells, penetrate the injection interval within the MMA. The casing and cementing of each of the six wells meets the TRRC regulations, as specified in TAC **§3.13(a)(4)**. These wells have been properly plugged and abandoned in accordance with TRRC regulations, as specified in **§3.14(d)**.

All the wells that penetrate the injection interval within the MMA were properly cased and cemented to prevent annular leakage of CO<sub>2</sub> to the surface. The plugged wells are also adequately protected against migration from the Siluro-Devonian by the placement of the plugs within the wellbores. Current wellbore schematics for these wells are provided in *Appendix E*. Additionally, the two AGI wells are designed to prevent migration from the injection interval to the surface through the casing and cement placed in the well, as shown in Figure 30 and Figure 31. Mechanical integrity tests (MITs) required under TRRC rules are run annually to verify that the well and wellhead can hold the appropriate amount of pressure. If the MITs were to indicate a leak, the well would be isolated, and the leak mitigated quickly, to prevent leakage to the atmosphere.

A map of all wells within the MMA is shown in Figure 32. Figure 33 shows only those wells that penetrate the injection interval. The MMA review maps, a summary of all the wells in the MMA, and detailed wellbore schematics for those wells that penetrate the injection interval are provided in *Appendix D*.

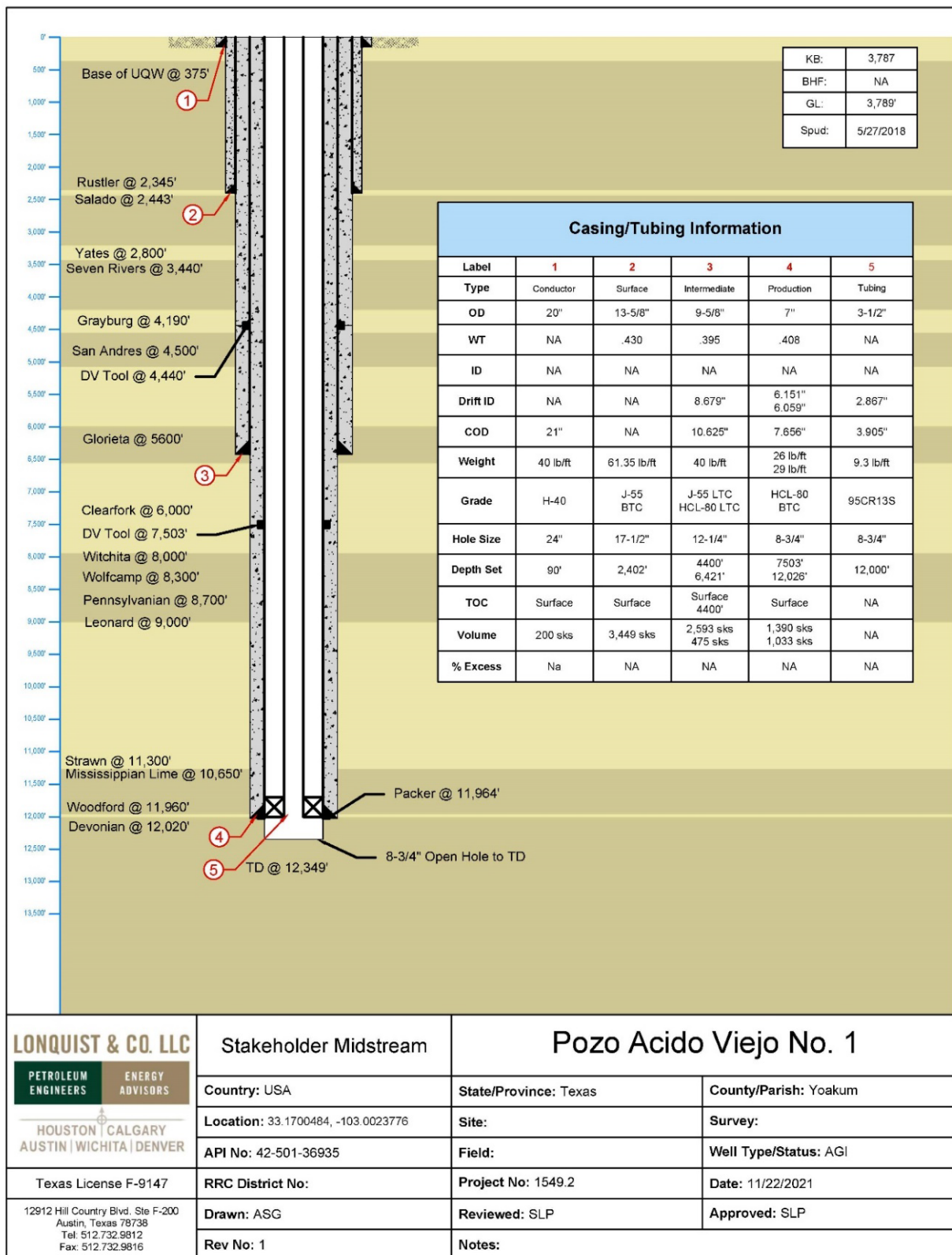


Figure 30 – Pozo Acido Viejo No. 1 Wellbore Schematic.

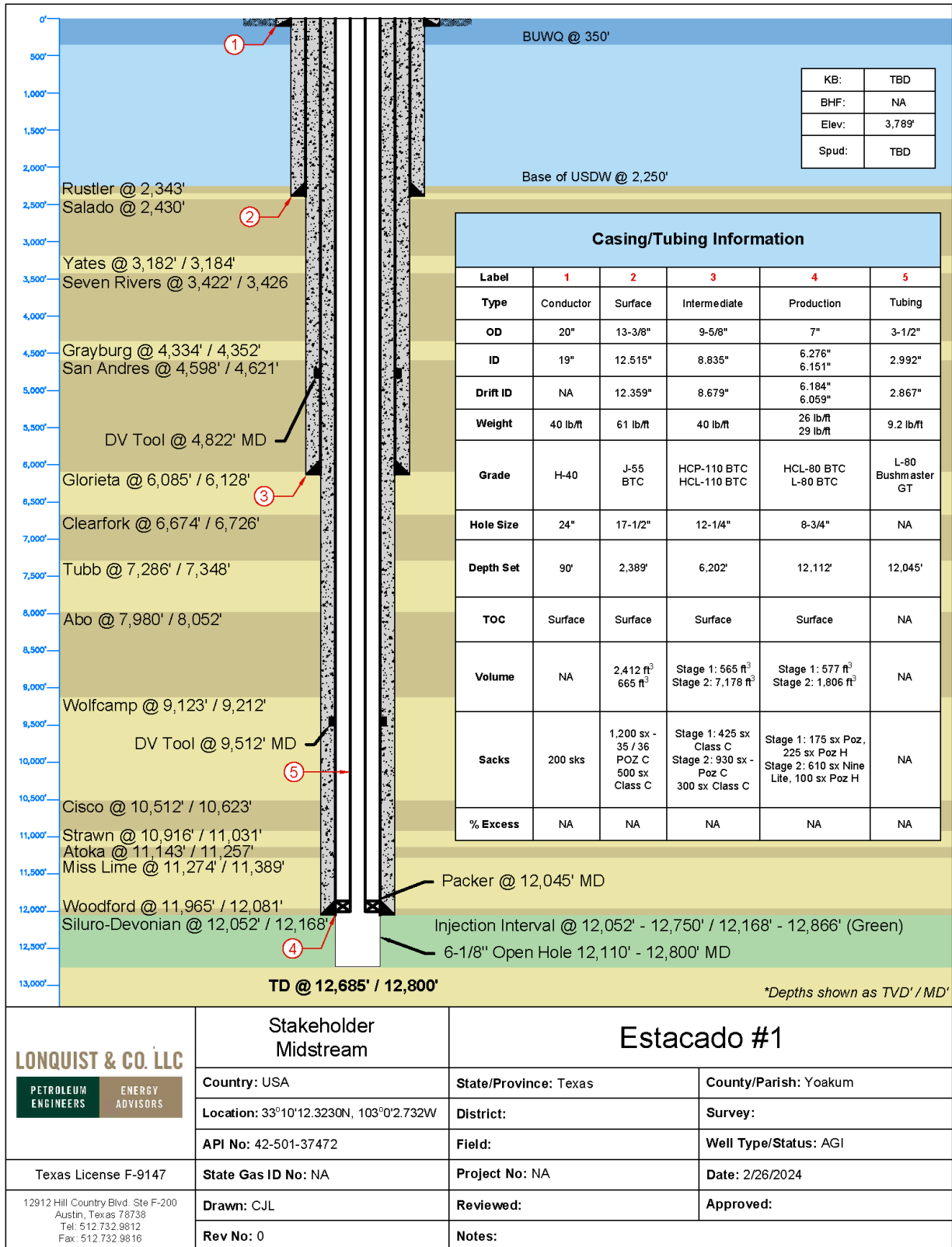
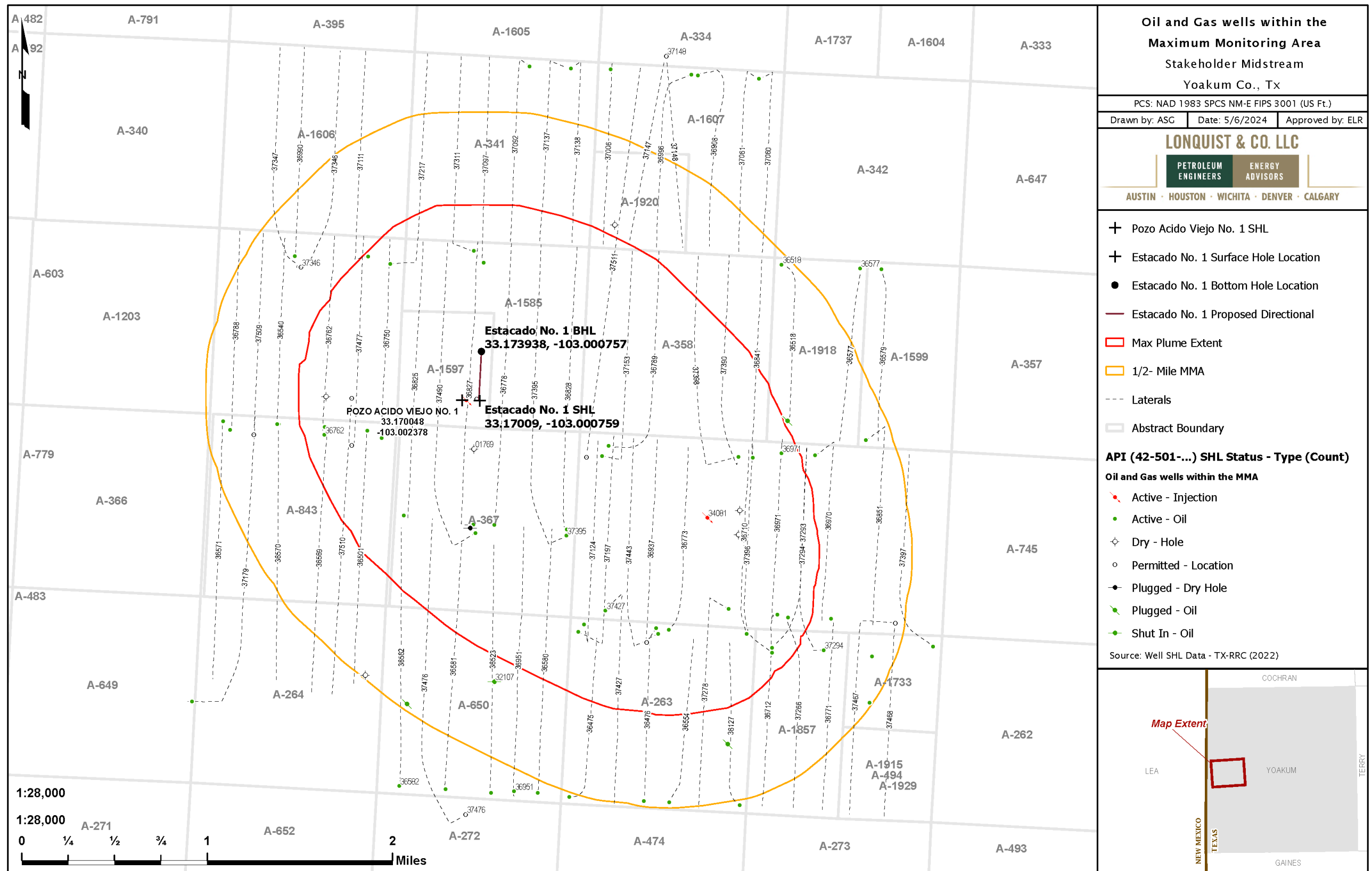
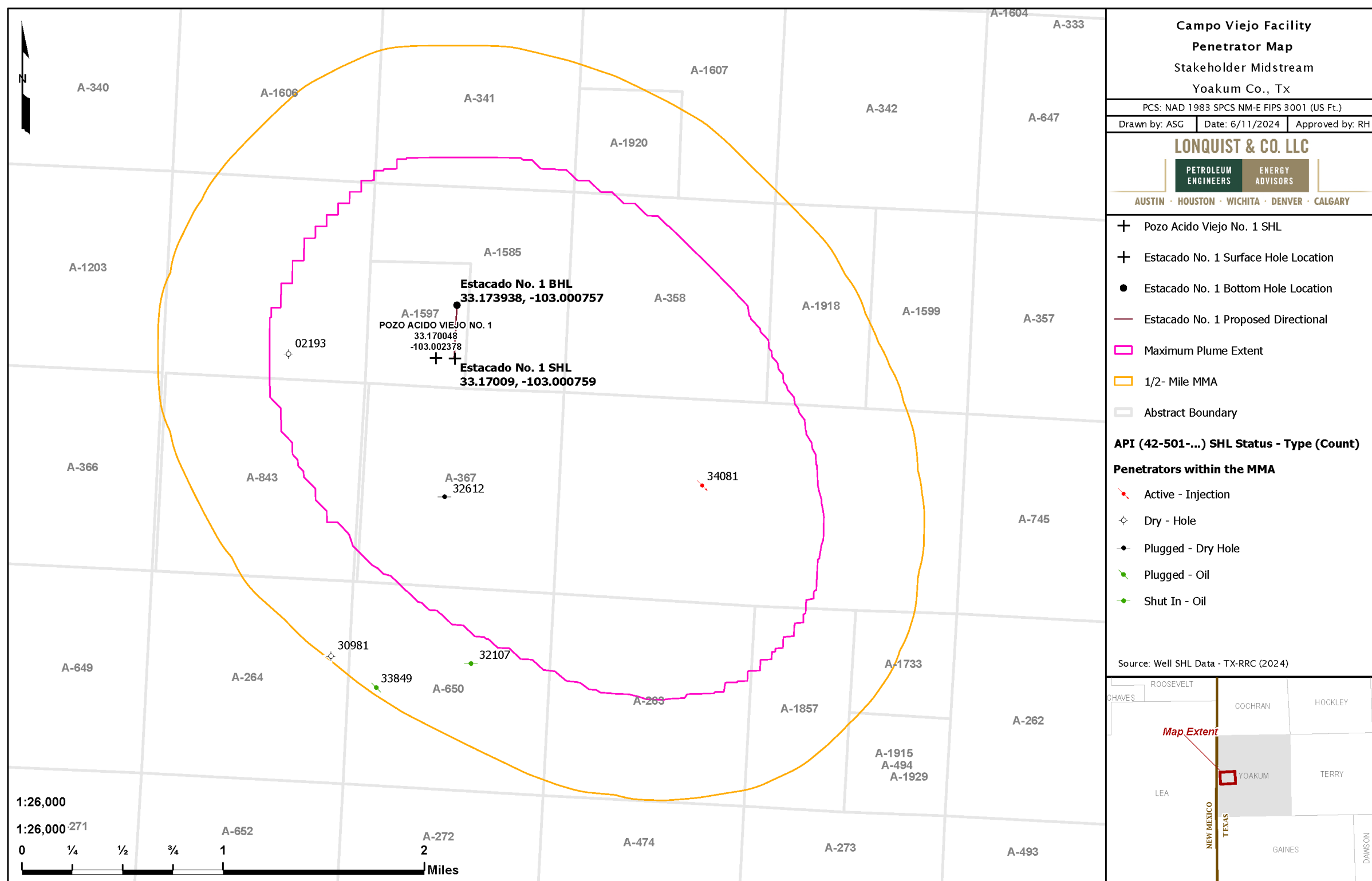


Figure 31 – Estacado No. 1 Wellbore Schematic.







#### 4.2.1.1 Future Drilling

Potential leak pathways caused by future drilling in the area are not expected to occur. The deep formations, such as the Siluro-Devonian, have proven to date to be less productive or nonproductive in this area, which is why the location was selected for injection. Also, the Pozo Acido Viejo No. 1 and the Estacado No. 1 are included in the Bronco (Siluro-Devonian) Field, which is designated by the TRRC as an H<sub>2</sub>S field. An H<sub>2</sub>S field designation alerts potential oil and gas operators to the presence of H<sub>2</sub>S. Any drilling permits issued by the TRRC around the two AGI wells include a list of formations for which oil and gas operators are required to comply with TRRC Rule 13 (entitled “Casing, Cementing, Drilling, Well Control, and Completion Requirements”) [TAC §3.13]. By way of example, see the Pozo Acido Viejo No. 1 well drilling permit provided in *Appendix B*.

TRRC Rule 13 requires oil and gas operators to set steel casing and cement across and above all formations permitted for injection under TRRC Rule 9 or immediately above all formations permitted for injection under Rule 46 for any well proposed within a one-quarter mile radius of an injection well. In this instance, any new well permitted and drilled to the injection zone located within a one-quarter-mile radius of the Pozo Acido Viejo No. 1 or Estacado No. 1 will be required under TRRC Rule 13 to set steel casing and cement above the Siluro-Devonian. Additionally, Rule 13 requires operators to case and cement across and above *all* potential flow zones and/or zones with corrosive formation fluids. The TRRC maintains a list of such known zones by the TRRC district and county and provides that list with each drilling permit issued, which is also shown in the previously mentioned permit in *Appendix B*.

If any leakage were to be detected, the volume of CO<sub>2</sub> released would be quantified based on the operating conditions at the time of release.

#### 4.2.2 **Groundwater Wells**

There are 45 groundwater wells located within the MMA, as identified by the TWDB. All the identified groundwater wells in the area have total depths less than or equal to 400 ft, as shown in Figure 34 and Table 7. Additionally, Stakeholder has a water well on the facility property with a total depth of approximately 180 ft.

The surface and intermediate casings of the two AGI wells, as shown previously in **Figure 30** and **Figure 31**, are designed to protect the shallow freshwater aquifers consistent with applicable TRRC regulations and the GAU letter issued for this location, as provided in *Appendix B*. The wellbore casings and cements also serve to prevent CO<sub>2</sub> leakage to the surface along the borehole.

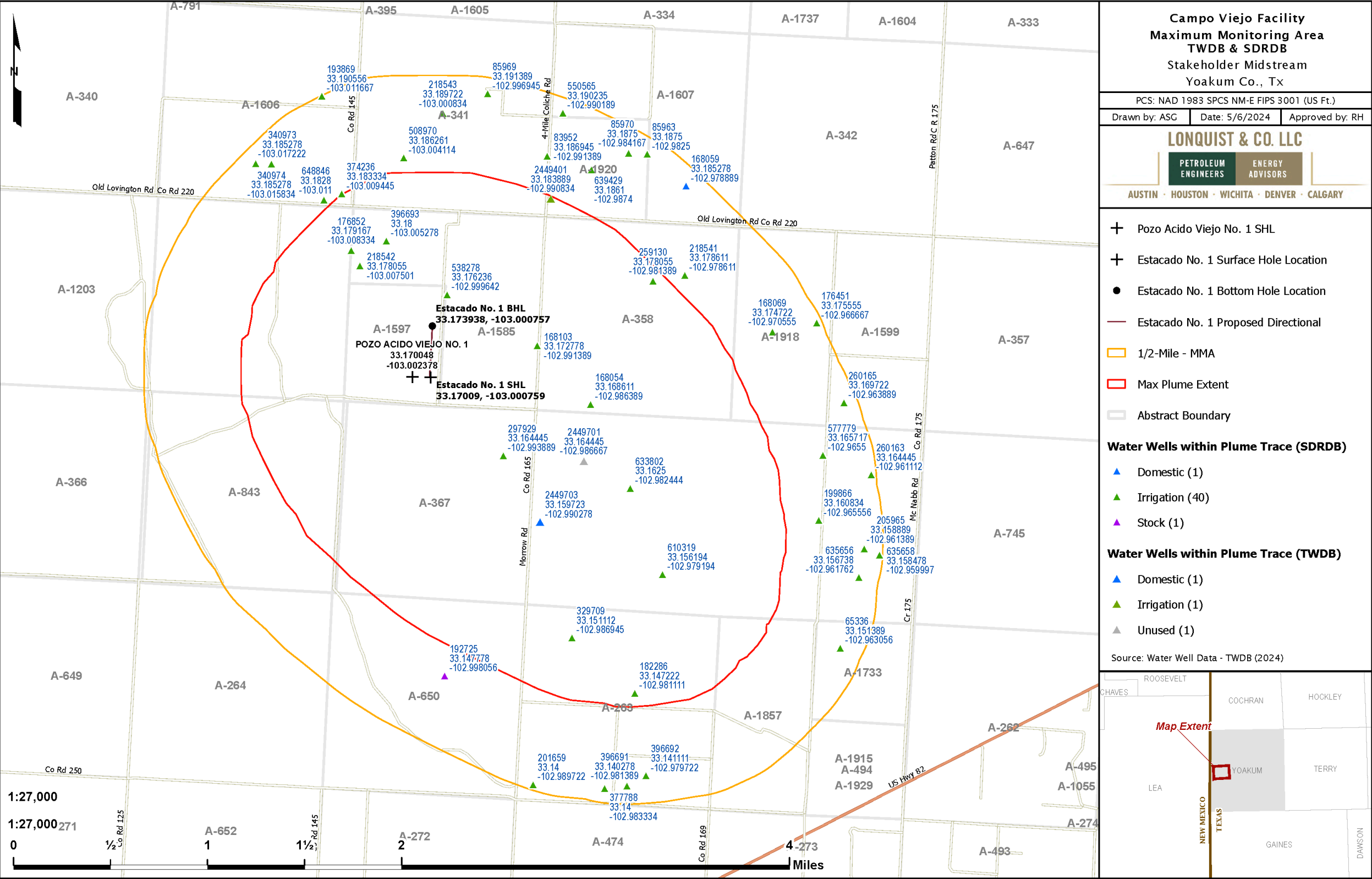


Figure 34 – Groundwater Wells Within the MMA.

Table 9 – Groundwater Well Summary.

State Well ID	Owner Name	Use	Well Depth	Elevation	TYPE
2449701	Gene Smith	Unused	167	3,775	TWDB
2449703	Larry Morrow	Domestic	200	3,774	TWDB
2449401	Robert Box	Irrigation	165	3,790	TWDB
65336	Larry Morrow	Irrigation	190	-	SDRDB
83952	D.L. Hartman Partnership	Irrigation	220	-	SDRDB
85963	J & A Farms	Irrigation	252	-	SDRDB
85969	Hartman Partnership	Irrigation	262	-	SDRDB
85970	Hartman Partnership	Irrigation	240	-	SDRDB
168054	Teichroeb, Peter	Irrigation	208	-	SDRDB
168059	Teichroeb, Peter	Domestic	206	-	SDRDB
168069	Teichroeb, Peter	Irrigation	208	-	SDRDB
168103	Teichroeb, Peter	Irrigation	206	-	SDRDB
176451	E.D. Winkles	Irrigation	180	-	SDRDB
176852	Darrel Lowrey	Irrigation	183	-	SDRDB
182286	Buford Duff	Irrigation	205	-	SDRDB
192725	LANNY SMITH	Stock	185	-	SDRDB
193869	Abe Dyck	Irrigation	301	-	SDRDB
199866	Henry Letkeman	Irrigation	354	-	SDRDB
201659	Warren, Jim	Irrigation	240	-	SDRDB
205965	Lanny Smith	Irrigation	207	-	SDRDB
218541	RANDY FORBUS	Irrigation	174	-	SDRDB
218542	BRAD MCWHIRTER	Irrigation	217	-	SDRDB
218543	BRAD MCWHIRTER	Irrigation	201	-	SDRDB
259130	RANDY FORBUS	Irrigation	176	-	SDRDB
260163	Henry Letkeman	Irrigation	323	-	SDRDB
260165	Henry Letkeman	Irrigation	323	-	SDRDB
297929	3D LandCo	Irrigation	186	-	SDRDB
329709	MELRA BEARDEN	Irrigation	200	-	SDRDB
340973	Ben Dyck	Irrigation	400	-	SDRDB
340974	Ben Dyck	Irrigation	360	-	SDRDB
374236	Ben Dyck	Irrigation	320	-	SDRDB
377788	WARREN FAMILY FARMS	Irrigation	335	-	SDRDB
396691	McWhirter Famly Farms	Irrigation	293	-	SDRDB
396692	McWhirter Family Farms	Irrigation	288	-	SDRDB
396693	Brad McWhirter	Irrigation	266	-	SDRDB
508970	BRAD McWHIRTER	Irrigation	204	-	SDRDB
538278	BRAD McWHIRTER	Irrigation	238	-	SDRDB
550565	Tommy Box	Irrigation	298	-	SDRDB
577779	Henry Letkeman	Irrigation	195	-	SDRDB

State Well ID	Owner Name	Use	Well Depth	Elevation	TYPE
610319	MARTIN KLASSEN	Irrigation	310	-	SDRDB
633802	Martin Klassen	Irrigation	325	-	SDRDB
635656	Henry Martens	Irrigation	200	-	SDRDB
635658	Henry Marten	Irrigation	200	-	SDRDB
639429	Tommy Box	Irrigation	302	-	SDRDB
648846	BEN DYCK	Irrigation	304	-	SDRDB

\*SDRDB – Submitted Drillers Report Database

### **4.3 Leakage Through Faults or Fractures**

Dynamic modeling at the Campo Viejo site indicates migration of the plume will not intersect a fault. Regional faults act as structural traps creating a seal against the migration of hydrocarbons, as demonstrated by the Bronco field. Should an unmapped fault exist within the plume boundary, vertical migration is unlikely. Shale gouge within the fault plane from a thick Woodford shale section will prevent vertical transmission of injected fluid along the fault and contain it beneath the Woodford. Faulting in this region terminates vertically beneath the Pennsylvanian-age rock. Secondary confining shales within the Wolfcampian and younger strata provide additional, redundant confining layers that would prevent CO<sub>2</sub> from migrating into freshwater aquifers.

Fractures are responsible for porosity development within the injection intervals. However, the subsequent exposure events did not produce the same solution diagenesis in the Woodford shale. Upward migration of injected gas through confining bed fractures is unlikely.

### **4.4 Leakage Through Confining Layers**

The Siluro-Devonian injection zones have competent sealing rocks above and below the porous subareally exposed carbonate. The properties of the overlying transgressive Woodford shale (i.e., widespread deposition, high illite clay and organic matter composition, and low porosity and permeability) make an excellent sealing rock to the underlying Siluro-Devonian formation. The underlying low-porosity and permeability Montoya carbonate minimizes the likelihood of downward migration of injected fluids. The relative buoyancy of injected gas to the in-situ reservoir fluid makes migration below the lower confining layer unlikely.

### **4.5 Leakage from Natural or Induced Seismicity**

The location of the Campo Viejo facility is in an area of the Permian Basin that is inactive from a seismicity perspective, whether induced or natural. A review of historical seismic events on the USGS's Advanced National Seismic System site (from 1971 to present) and the Bureau of Economic Geology's TexNet catalog (from 2017 to present), as shown in Figure 35, indicates the nearest seismic event occurred more than 60 miles away.

A regional analysis of the probabilistic fault slip potential across the Permian Basin (Snee and Zoback,

2016), as seen in Figure 36, further demonstrates that the AGI wells are located in a seismically inactive area and confirms that this area has little to no potential for an induced seismicity event. Therefore, there is no indication that seismic activity poses a risk for loss of CO<sub>2</sub> to the surface within the MMA.

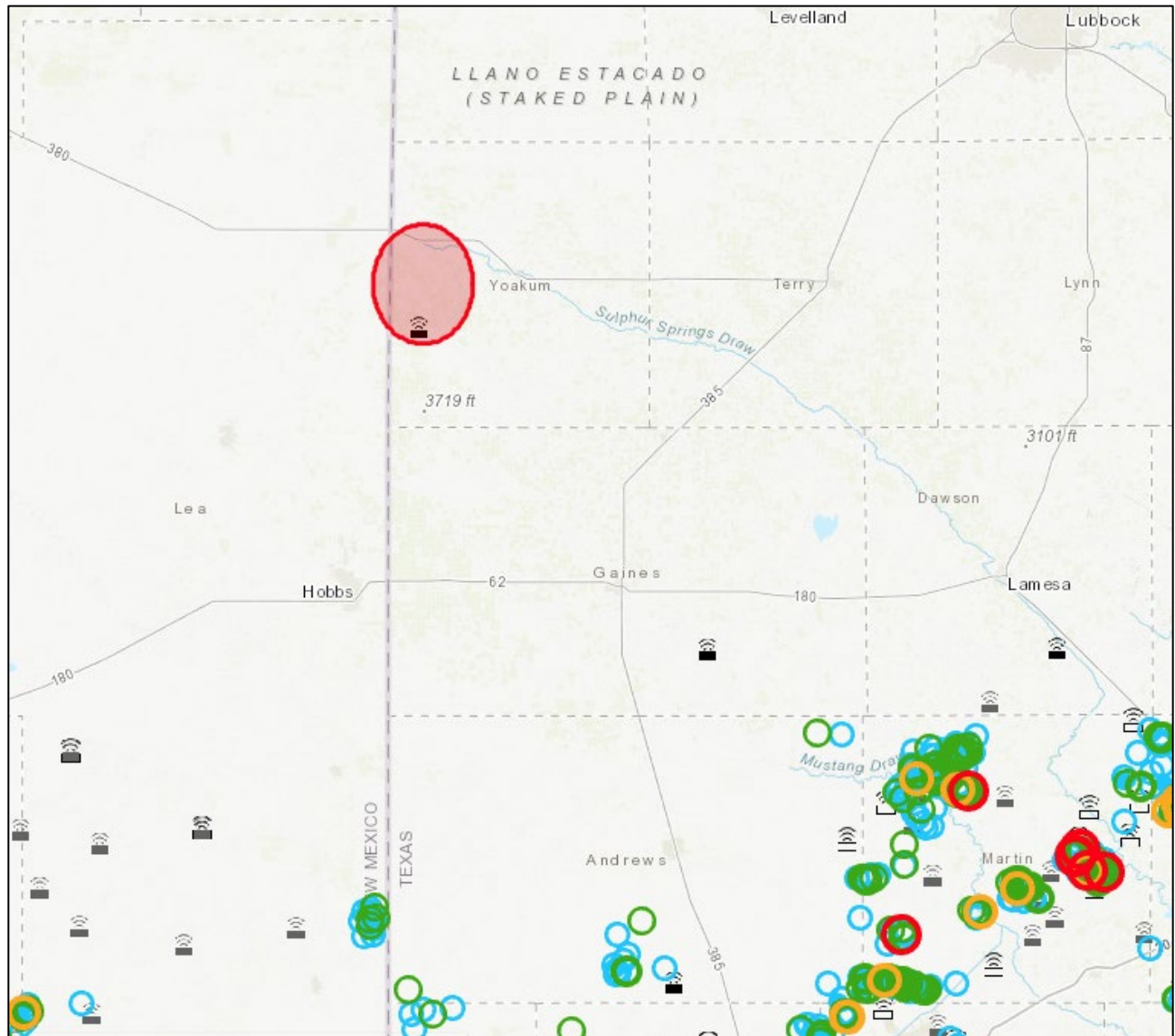


Figure 35 – Seismicity Review (TexNet, 5/7/2024).



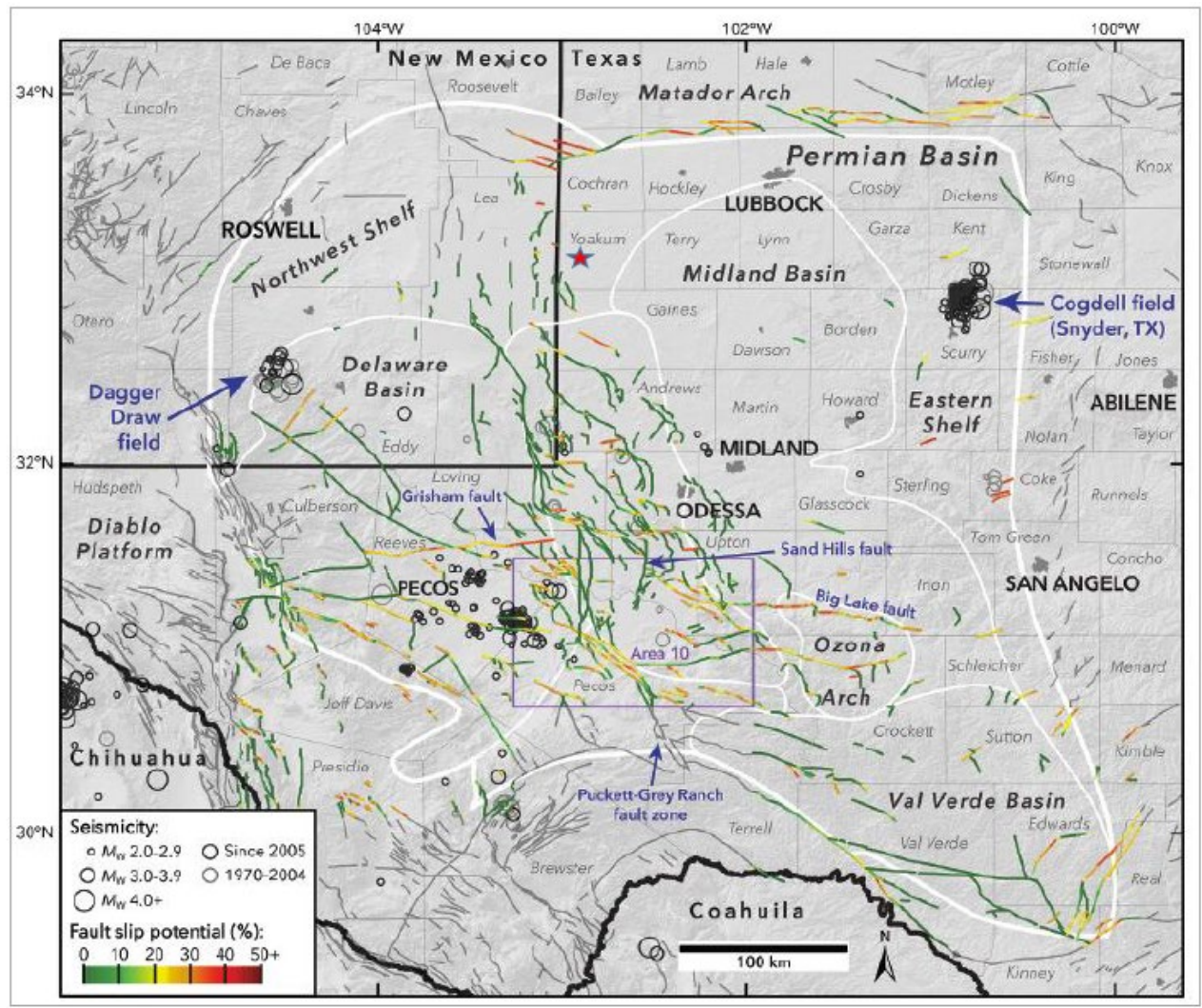


Figure 36 – Probabilistic Fault Slip Potential Analysis with Campo Viejo Location (Snee and Zobak 2016).

The Campo Viejo facility will have operating procedures and set points programmed into the control and Supervisory Control and Data Acquisition (SCADA) systems to ensure operating pressures are maintained below the fracture gradient of the injection and confining intervals, thus avoiding the potential for inducing seismicity.

While the likelihood of a natural or induced seismicity event is extremely low, Stakeholder has installed a seismic monitoring station near Campo Viejo. This monitoring station is tied into the Bureau of Economic Geology's TexNet Seismic Monitoring system. If a seismic event of 3.0 magnitude or greater is detected, Stakeholder will review the injection volumes and pressures at the AGI wells to determine if any significant changes occurred that would indicate potential leakage. In the unlikely event a leak occurs, Stakeholder will quantify the leak in accordance with the strategies discussed in *Section 7*.



## **SECTION 5 – MONITORING FOR LEAKAGE**

This section discusses the strategy that Stakeholder will employ for detecting and quantifying surface leakage of CO<sub>2</sub> through the pathways identified in *Section 4* to meet the requirements of 40 CFR §98.448(a)(3). Because the injectate stream contains both H<sub>2</sub>S and CO<sub>2</sub>, the H<sub>2</sub>S will be a proxy for CO<sub>2</sub> leakage; and therefore, the monitoring systems in place to detect H<sub>2</sub>S will also indicate a release of CO<sub>2</sub>. Table 8 summarizes the monitoring of potential leakage pathways to the surface. Monitoring will occur during the planned 25-year injection period or cessation of injection operations, plus a proposed 5-year post-injection period.

- Leakage from surface equipment
- Leakage through existing and future wells within MMA
- Leakage through faults and fractures
- Leakage through the confining layer
- Leakage through natural or induced seismicity

Because the acid gas injection stream also contains H<sub>2</sub>S, any leakage would be detected by the H<sub>2</sub>S alarms located around the facility, be quickly addressed, and would minimize the release of CO<sub>2</sub> into the atmosphere.

Table 10 – Summary of Leakage Monitoring Methods.

Leakage Pathway	Monitoring Method	Frequency
Surface Equipment	Fixed H <sub>2</sub> S monitors throughout the AGI facility	Continuous
	Daily visual inspections	Daily
	Personal H <sub>2</sub> S monitors	As needed
	Distributed Control System Monitoring (Volumes and Pressures)	Continuous
Existing Wells	Fixed H <sub>2</sub> S monitor at the AGI well	Continuous
	SCADA Continuous Monitoring at the AGI Well	Continuous
	Annual Mechanical Integrity Tests of the AGI Well	Annually
	Visual Inspections	As needed
	Quarterly CO <sub>2</sub> Measurements within MMA	Quarterly
	Annual Groundwater Samples on Property	Annually
Drilling through MMA	H <sub>2</sub> S monitoring during offset drilling operations	During operations
Faults and Fractures	SCADA Continuous Monitoring at the AGI Well (volumes and pressures)	Continuous
	Fixed H <sub>2</sub> S monitors at facility; handheld CO <sub>2</sub> monitors within MMA	Continuous/ Quarterly
Upper-Confining Layer	SCADA Continuous Monitoring at the AGI Well (volumes and pressures)	Continuous

Leakage Pathway	Monitoring Method	Frequency
	Fixed H <sub>2</sub> S monitors at facility; handheld CO <sub>2</sub> monitors within MMA	Continuous
Natural or Induced seismicity	Seismic monitoring station	Continuous

### 5.1 Leakage from Surface Equipment

Because the Campo Viejo Facility and AGI wells are designed to handle H<sub>2</sub>S, leakage from surface equipment is unlikely to occur and would be quickly detected and addressed. The facility design minimizes leak points through the equipment used and the type of connections are designed to minimize corrosion points. The H<sub>2</sub>S in the injectate serves as a proxy for the release of CO<sub>2</sub>. The facility and well site contain several H<sub>2</sub>S alarms, set with an alarm setpoint of 10 ppm of H<sub>2</sub>S, which are shown previously in **Figure 28** and **Figure 29**. Additionally, all Stakeholder field personnel are required to wear H<sub>2</sub>S monitors, which trigger the alarm at 10-ppm H<sub>2</sub>S.

The AGI facility is continuously monitored through automated systems. In addition, field personnel conduct daily visual field inspections of gauges, monitors, and leak indicators, such as vapor plumes. The effectiveness of the internal and external corrosion control program is monitored through the periodic inspection of the system and inspection of the cathodic protection system. These inspections, in addition to the automated systems, allow Stakeholder to quickly respond to any leakage situation. Should leakage be detected during active injection operations, the volume of CO<sub>2</sub> released will be calculated based on operating conditions at the time of the event, in accordance with 40 CFR §98.448(a)(5) and 40 CFR §98.444(d).

### 5.2 Leakage from Existing and Future Wells Within the Monitoring Area

Stakeholder continuously monitors and collects injection volumes and pressures through their SCADA systems and collects monthly gas composition data for the two AGI wells. This data is reviewed by qualified personnel and will follow response and reporting procedures when data is outside acceptable performance limits. Pozo Acido Viejo No. 1 and Estacado No. 1 have pressure gauges placed in the injection stream at the wellhead, and a pressure gauge on the casing annulus. A change of pressure on the annulus would indicate the presence of a possible leak. MITs performed annually would also indicate the presence of a leak. Upon a negative MIT, the well would immediately be isolated, and the leak mitigated.

The six offset penetrating wells within the MMA are adequately cased and cemented to prevent potential leakage of CO<sub>2</sub> from the injection plume. Additionally, the plugged wells were done in a way to prevent migration of CO<sub>2</sub> as provided in *Appendix E*. As discussed previously, Rule 13 would ensure that new wells in the field would be constructed in a manner to prevent migration from the injection interval.

In addition to the fixed and personal monitors described previously, Stakeholder will also establish and operate an in-field monitoring program to detect any CO<sub>2</sub> leakage within the MMA. The scope

of work will include H<sub>2</sub>S and CO<sub>2</sub> monitoring at the AGI well site as well as minimum, quarterly atmospheric monitoring near identified penetrations within the MMA. Upon approval of the MRV and through the post-injection monitoring period, Stakeholder will have these monitoring systems in place.

#### **5.2.1 Groundwater Quality Monitoring**

Stakeholder will monitor the groundwater quality in fluids above the confining interval by sampling the well on the facility property and analyzing the sample with a third-party laboratory on an annual basis. Any significant changes to the water analysis would be investigated to determine if such a change was a result of leakage from the AGI wells.

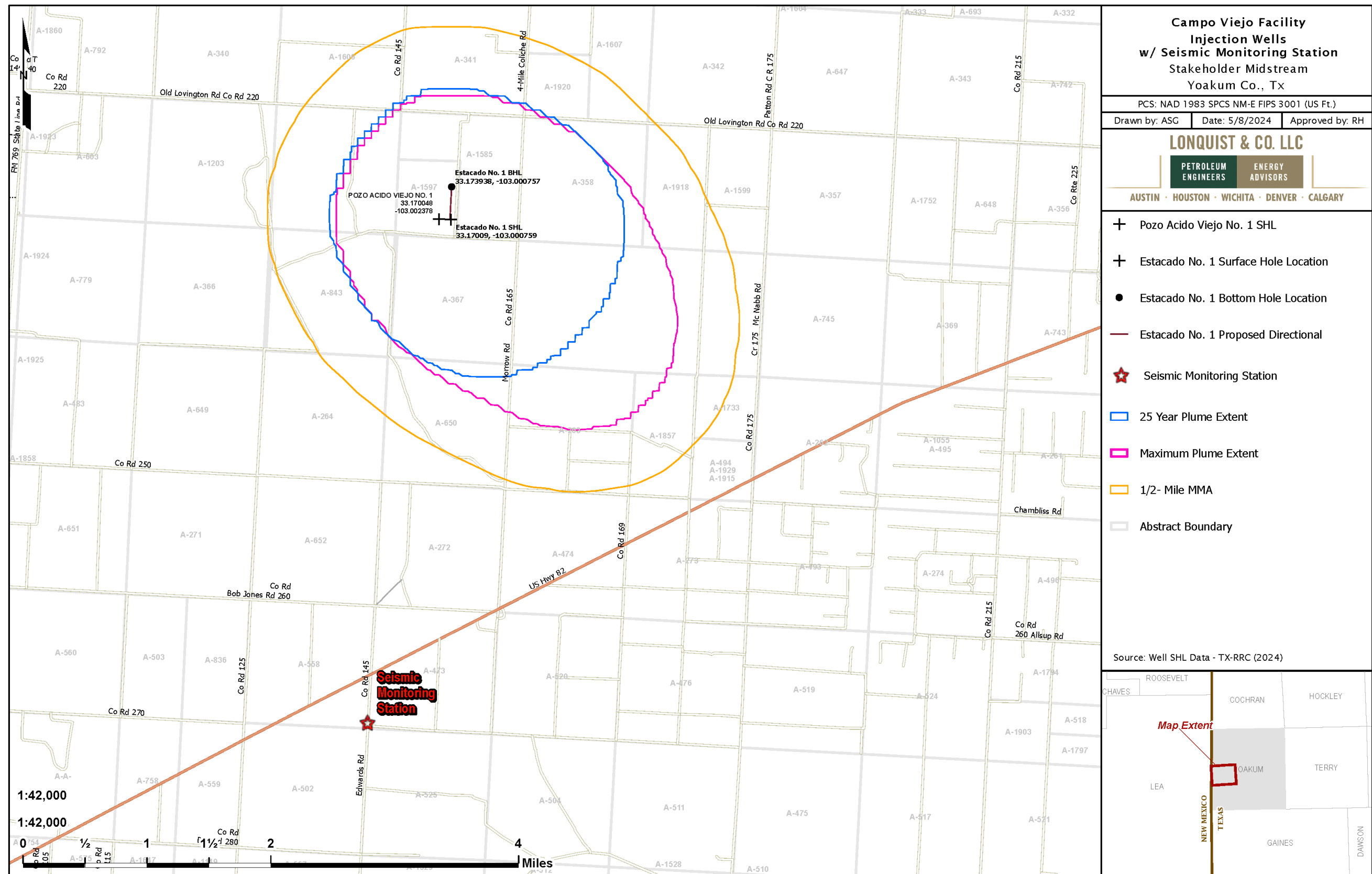
### **5.3 Leakage Through Faults, Fractures, or Confining Seals**

Stakeholder continuously monitors the operations of Campo Viejo Facility through automated systems. Any deviation from normal operating conditions indicating movement into a potential pathway, such as a fault or breakthrough of the confining seal would trigger an alert. Any such alert would be reviewed by field personnel and action taken to shut in the well, if necessary. H<sub>2</sub>S monitoring systems at the facility would alert field personnel for any release of H<sub>2</sub>S/CO<sub>2</sub> caused by such leakage.

### **5.4 Leakage Through Natural or Induced Seismicity**

Stakeholder's operations at the Campo Viejo Facility are designed to minimize the risk of induced seismicity caused by the injection of TAG into the Siluro-Devonian. The maximum allowable surface pressures, set as a condition of the permits, are designed to ensure that the bottomhole injection pressures do not reach the fracture gradient of the injection zone or confining layers.

While the likelihood of a natural or induced seismicity event is extremely low, Stakeholder has installed a seismic monitoring station near Campo Viejo, as shown in Figure 37. This monitoring station is tied into the Bureau of Economic Geology's TexNet Seismic Monitoring system. If a seismic event of 3.0 magnitude or greater is detected, Stakeholder will review the injection volumes and pressures at the AGI wells to determine if any significant changes occurred that would indicate potential leakage. In the unlikely event a leak occurs, Stakeholder will quantify the leak in accordance with the strategies discussed in *Section 7*.



## **SECTION 6 – BASELINE DETERMINATIONS**

This section identifies the strategies Stakeholder will undertake to establish the expected baselines for monitoring CO<sub>2</sub> surface leakage in accordance with 40 CFR §98.448(a)(4). Stakeholder will use the existing SCADA monitoring systems to identify changes from expected performance that may indicate leakage of CO<sub>2</sub>.

### **6.1 Visual Inspections**

Daily inspections will be conducted by field personnel at the Campo Viejo Facility and the two associated AGI wells. These inspections will aid in identifying and addressing issues timely to minimize the possibility of leakage. If any issues are identified, such as vapor clouds or ice formations, corrective actions would be taken to address such issues.

### **6.2 H<sub>2</sub>S Detection**

H<sub>2</sub>S will be initially injected into the AGI wells at a concentration of approximately 10% or 100,000 ppm. The concentration will drop to approximately 6% as additional volumes are added. H<sub>2</sub>S gas detectors are located throughout the AGI facility and well site and are set to trigger the alarm at 10 ppm. Additionally, all field personnel are required to wear personal H<sub>2</sub>S monitors, which are set to trigger the alarm at 10 ppm. Any alarm would trigger an immediate response to protect personnel and verify that the monitors are working properly. If monitors are working correctly, immediate action will be taken to secure the facility.

### **6.3 CO<sub>2</sub> Detection**

Any CO<sub>2</sub> release would be accompanied by H<sub>2</sub>S; and therefore, the H<sub>2</sub>S monitors at the facility would also serve as a CO<sub>2</sub> release warning system. In addition to the fixed and personal monitors described previously, Stakeholder has established and operates a facility monitoring program to detect any CO<sub>2</sub> leakage within the AMA. The monitoring system includes H<sub>2</sub>S and CO<sub>2</sub> monitoring at the AGI well sites and facility as well as periodic hand-held atmospheric monitoring near identified penetrations within the AMA.

### **6.4 Operational Data**

Baseline measurements of injection volumes and pressures were taken before the initial implementation of the original MRV plan for Pozo Acido Viejo No. 1. The monitoring process will continue with the addition of Estacado No. 1. Any significant deviations over time will be analyzed for indication of leakage of CO<sub>2</sub>.

## **6.5 Continuous Monitoring**

Mass of CO<sub>2</sub> emitted by surface leakage and equipment leaks will not be measured directly, because the injection stream for this well contains H<sub>2</sub>S that would be extremely dangerous for personnel to perform a direct leak survey. Any leakage would be detected and managed in accordance with Texas regulations and Stakeholder's TRRC-approved H<sub>2</sub>S Contingency Plan. Gas detectors and continuous monitoring systems would trigger an alarm upon a release. The mass of the CO<sub>2</sub> released would be calculated for the operating conditions at the time, including pressure, flowrate, size of the leak point opening, and duration of the leak. This method is consistent with 40 CFR **§98.448(a)(5)**, thereby allowing the operator to calculate site-specific variables used in the mass balance equation.

No CO<sub>2</sub> emissions will occur from venting because of the high H<sub>2</sub>S concentrations. Blowdown emissions are sent to flares and would be reported as part of the required reporting for the gas plant.

## **6.6 Groundwater Monitoring**

An initial sample was taken in 2022 from the groundwater well on Stakeholder's property. The sample was analyzed by a third-party laboratory to establish the baseline properties of the groundwater. Furthermore, the sample taken in 2023 indicated no variance from the baseline properties.

## **SECTION 7 – SITE-SPECIFIC CONSIDERATIONS FOR MASS BALANCE EQUATION**

This section identifies how Stakeholder will calculate the mass of CO<sub>2</sub> injected, emitted, and sequestered. This section also includes site-specific variables for calculating the CO<sub>2</sub> emissions from equipment leaks and vented emissions of CO<sub>2</sub> between the injection flowmeter and the injection well in accordance with 40 CFR §98.448(a)(5).

### **7.1 Mass of CO<sub>2</sub> Received**

In accordance with 40 CFR §98.443, the mass of CO<sub>2</sub> received must be calculated using the specified CO<sub>2</sub> received equations “unless you follow the procedures in 40 CFR §98.444(a)(4).” The 40 CFR §98.444(a)(4) states that “if the CO<sub>2</sub> you receive is wholly injected and is not mixed with any other supply of CO<sub>2</sub>, you may report the annual mass of CO<sub>2</sub> injected that you determined following the requirements under paragraph (b) of this section as the total annual mass of CO<sub>2</sub> received instead of using Equation RR-1 or RR-2 of this subpart to calculate CO<sub>2</sub> received.” The CO<sub>2</sub> received for these injection wells is wholly injected and not mixed with any other supply and the annual mass of CO<sub>2</sub> injected will equal the amount received. Any future streams would be metered separately before being combined into the calculated stream.

### **7.2 Mass of CO<sub>2</sub> Injected**

In accordance with 40 CFR §98.444(b), because the flowrate of CO<sub>2</sub> injected will be measured with a volumetric flowmeter, the total annual mass of CO<sub>2</sub>, in metric tons, will be calculated by multiplying the volumetric flow at standard conditions by the CO<sub>2</sub> concentration in the flow and the density of CO<sub>2</sub> at standard conditions, according to Equation RR-5:

$$CO_{2,u} = \sum_{p=1}^4 Q_{p,u} * D * C_{CO_{2,p,u}}$$

where:

CO<sub>2,u</sub> = Annual CO<sub>2</sub> mass injected (metric tons) as measured by flow meter u

Q<sub>p,u</sub> = Quarterly volumetric flowrate measurement for flowmeter u in quarter p at standard conditions (standard cubic meters per quarter)

D = Density of CO<sub>2</sub> at standard conditions (metric tons per standard cubic meter): 0.0018682

C<sub>CO<sub>2</sub>,p,u</sub> = CO<sub>2</sub> concentration measurement in flow for flow meter u in quarter p (vol. percent CO<sub>2</sub>, expressed as a decimal fraction)

p = Quarter of the year

u = Flow meter

### 7.3 Mass of CO<sub>2</sub> Produced

The Pozo Acido Viejo No. 1 and Estacado No. 1 are not part of an enhanced oil recovery project; therefore, no CO<sub>2</sub> will be produced.

### 7.4 Mass of CO<sub>2</sub> Emitted by Surface Leakage

Mass of CO<sub>2</sub> emitted by surface leakage and equipment leaks will not be measured directly, because the injection stream for this well contains H<sub>2</sub>S that would be extremely dangerous for personnel to perform a direct leak survey. Any leakage would be detected and managed as a major upset event. Gas detectors and continuous monitoring systems would trigger an alarm upon release. The mass of the CO<sub>2</sub> released would be calculated for the operating conditions at the time, including pressure, flowrate, size of the leak point opening, and duration of the leak. This method is consistent with 40 CFR §98.448(a)(5) and 40 CFR §98.444(d) allowing the operator to calculate site-specific variables used in the mass balance equation.

In the unlikely event that CO<sub>2</sub> was released as a result of surface leakage, the mass emitted would be calculated for each surface pathway according to methods outlined in the plan and totaled using Equation RR-10 as follows:

$$CO_{2E} = \sum_{x=1}^X CO_{2,x}$$

Where:

CO<sub>2E</sub> = Total annual CO<sub>2</sub> mass emitted by surface leakage (metric tons) in the reporting year

CO<sub>2,x</sub> = Annual CO<sub>2</sub> mass emitted (metric tons) at leakage pathway x in the reporting year

X = Leakage pathway

Calculation methods from Subpart W will be used to calculate CO<sub>2</sub> emissions caused by any surface leakage between the flowmeter used to measure injection quantity and the injection wellhead.

As discussed previously, the potential for pathways for all previously mentioned forms of leakage are unlikely. Given the possibility of uncertainty around the cause of a leakage pathway that is mentioned previously, Stakeholder believes the most appropriate method to quantify the mass of CO<sub>2</sub> released will be determined on a case-by-case basis. Any mass of CO<sub>2</sub> detected leaking to the surface will be quantified by using industry-proven engineering methods, including, but not limited to, engineering analysis on surface and subsurface measurement data, dynamic reservoir modeling, and history-matching of the sequestering reservoir performance, among others. In the unlikely event that a leak occurs, it will be addressed, quantified, and documented within the appropriate timeline. Any records of leakage events will be kept and stored as stated in *Section 10*.



## 7.5 Mass of CO<sub>2</sub> Sequestered

The mass of CO<sub>2</sub> sequestered in subsurface geologic formations will be calculated based on Equation RR-12, as this well will not actively produce oil or natural gas or any other fluids, as follows:

$$CO_2 = CO_{2I} - CO_{2E} - CO_{2FI}$$

Where:

CO<sub>2</sub> = Total annual CO<sub>2</sub> mass sequestered in subsurface geologic formations (metric tons) at the facility in the reporting year

CO<sub>2I</sub> = Total annual CO<sub>2</sub> mass injected (metric tons) in the well or group of wells covered by this source category in the reporting year

CO<sub>2E</sub> = Total annual CO<sub>2</sub> mass emitted (metric tons) by surface leakage in the reporting year

CO<sub>2FI</sub> = Total annual CO<sub>2</sub> mass emitted (metric tons) from equipment leaks and vented emissions of CO<sub>2</sub> from equipment located on the surface between the flow meter used to measure injection quantity and the injection wellhead, for which a calculation procedure is provided in Subpart W of this part

CO<sub>2FI</sub> will be calculated in accordance with Subpart W reporting of GHGs. Because no venting would occur because of the high H<sub>2</sub>S concentrations of the injectate stream, the calculations would be based on the blowdown emissions that would be sent to flares and would be reported as part of the required GHG reporting for the gas plant. Calculation methods from Subpart W will be used to calculate CO<sub>2</sub> emissions from equipment located on the surface between the flowmeter used to measure injection quantity and the injection wellhead.

## **SECTION 8 – IMPLEMENTATION SCHEDULE FOR THE MRV PLAN**

Because this plan is an amendment to the previously approved MRV plan for Pozo Acido Viejo No. 1, the MRV plan is currently implemented and will continue to report the information required under Subpart RR. The Annual Subpart RR Report will be filed on March 31 of the year following the reporting year.

## **SECTION 9 – QUALITY ASSURANCE**

This section identifies how Stakeholder plans to manage quality assurance and control to meet the requirements of 40 CFR §98.444.

### **9.1 Monitoring Quality Assurance/Quality Control**

#### *CO<sub>2</sub> Injected*

- The flowrate of the CO<sub>2</sub> being injected will be measured with a volumetric flowmeter, consistent with industry best practices. These flowrates will be compiled quarterly.
- The composition of the CO<sub>2</sub> stream will be measured upstream of the volumetric flowmeter with a continuous gas composition analyzer or representative sampling consistent with industry best practices.
- The gas composition measurements of the injected stream will be averaged quarterly.
- The CO<sub>2</sub> measurement equipment will be calibrated according to manufacturer recommendations.

#### *CO<sub>2</sub> Emissions from Leaks and Vented Emissions*

- Gas detectors will be operated continuously, except for maintenance and calibration.
- Gas detectors will be calibrated according to manufacturer recommendations and API standards.
- Calculation methods from subpart W will be used to calculate CO<sub>2</sub> emissions from equipment located on the surface between the flowmeter used to measure injection quantity and the injection wellhead.

#### *Measurement Devices*

- Flowmeters will be continuously operated except for maintenance and calibration.
- Flowmeters will be calibrated according to the requirements in 40 CFR §98.3(i).
- Flowmeters will be operated in accordance with an appropriate standard method as published by a consensus-based standards organization.
- Flowmeter calibrations will be traceable to the National Institute of Standards and Technology (NIST).

All measured volumes of CO<sub>2</sub> will be converted to standard cubic meters at a temperature of 60degrees Fahrenheit (°F) and an absolute pressure of 1 atmosphere.

### **9.2 Missing Data**

In accordance with 40 CFR §98.445, Stakeholder will use the following procedures to estimate missing data if unable to collect the data needed for the mass balance calculations:

- If a quarterly quantity of CO<sub>2</sub> injected is missing, the amount will be estimated using a representative quantity of CO<sub>2</sub> injected from the nearest previous period of time at a similar injection pressure.
- Fugitive CO<sub>2</sub> emissions from equipment leaks from facility surface equipment will be estimated and reported in accordance with the procedures specified in subpart W of 40 CFR §98.

### **9.3 MRV Plan Revisions**

If any of the changes outlined in 40 CFR §98.448(d) occur, Stakeholder will revise and submit an amended MRV plan within 180 days to the Administrator for approval.

## **SECTION 10 – RECORDS RETENTION**

Stakeholder will retain records, as required by 40 CFR §98.3(g). These records will be retained for at least 3 years and include the following :

- Quarterly records of the CO<sub>2</sub> injected
  - Volumetric flow at standard conditions
  - Volumetric flow at operating conditions
  - Operating temperature and pressure
  - Concentration of the CO<sub>2</sub> stream
- Annual records of the information used to calculate the CO<sub>2</sub> emitted by surface leakage from leakage pathways
- Annual records of information used to calculate CO<sub>2</sub> emitted from equipment leaks and vented emissions of CO<sub>2</sub> from equipment located on the surface between the flowmeter used to measure injection quantity and the injection wellhead.

## **References**

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Comer, John B., 1991. Stratigraphic Analysis of the Upper Devonian Woodford Formation, Permian Basin, West Texas and Southeastern New Mexico: Bureau of Economic Geology Report of Investigations, no. 201.

Ewing et al., 2008 – NOT SHOWN IN REFERENCES

George, Peter G.; Mace, Robert E.; and Petrossian, Rima, 2011. Aquifers of Texas: Texas Water Development Board Report, no 380.

Hoak, T.; Sundberg, K.; and Ortoleva, P. Overview of the Structural Geology and Tectonics of the Central Basin Platform, Delaware Basin, and Midland Basin, West Texas and New Mexico: Department of Energy Open File Report.

Molina, Oscar; Villarras, Victor; and Zeidouni, Mehdi, 2016. Geologic carbon storage for shale gas recovery: 13<sup>th</sup> International Conference on Greenhouse Gas Control Technologies, GHGT-13, 14-18.

Ruppel, Stephen C. and Holtz, Mark H., 1994. Depositional and Diagenetic Facies Patterns and Reservoir Development in Silurian and Devonian Rocks of the Permian Basin: Bureau of Economic Geology Report of Investigations, no. 216.

Snee, Jens-Erik Lund and Zoback, Mark D., 2016. State of stress in the Permian Basin, Texas and New Mexico: Implications for induced seismicity.

Teeple, Andrew P.; Ging, Patricia B.; Thomas, Jonathan V.; Wallace, David S.; and Payne, Jason D., 2021. Hydrogeologic Framework, Geochemistry, Groundwater-Flow System, and Aquifer Hydraulic Properties Used in the Development of a Conceptual Model of the Ogallala, Edwards-Trinity (High Plains), and Dockum Aquifers in and Near Gaines, Terry, and Yoakum Counties, Texas: USGS Scientific Investigations Report 2021-5009.

## **APPENDICES**

## **APPENDIX A – GEOLOGY**

APPENDIX A-1: SILURO-DEVONIAN STRUCTURE MAP

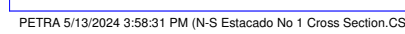
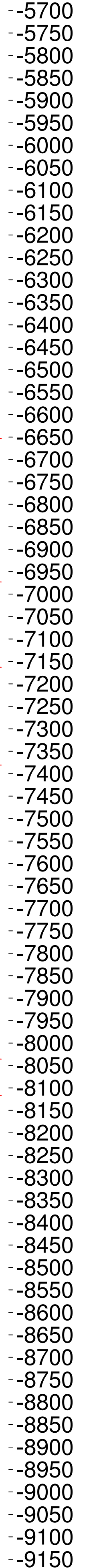
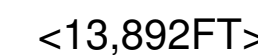
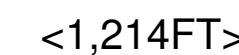
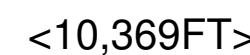
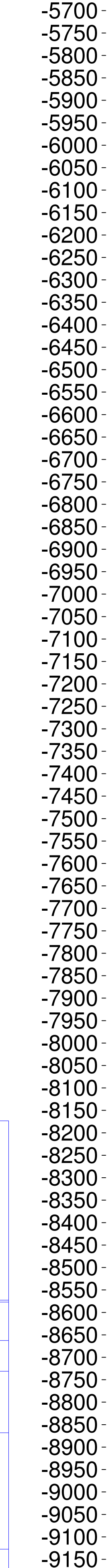
APPENDIX A-2: N-S CROSS SECTION

APPENDIX A-3: W-E CROSS SECTION













A-3

Stakeholder Midstream

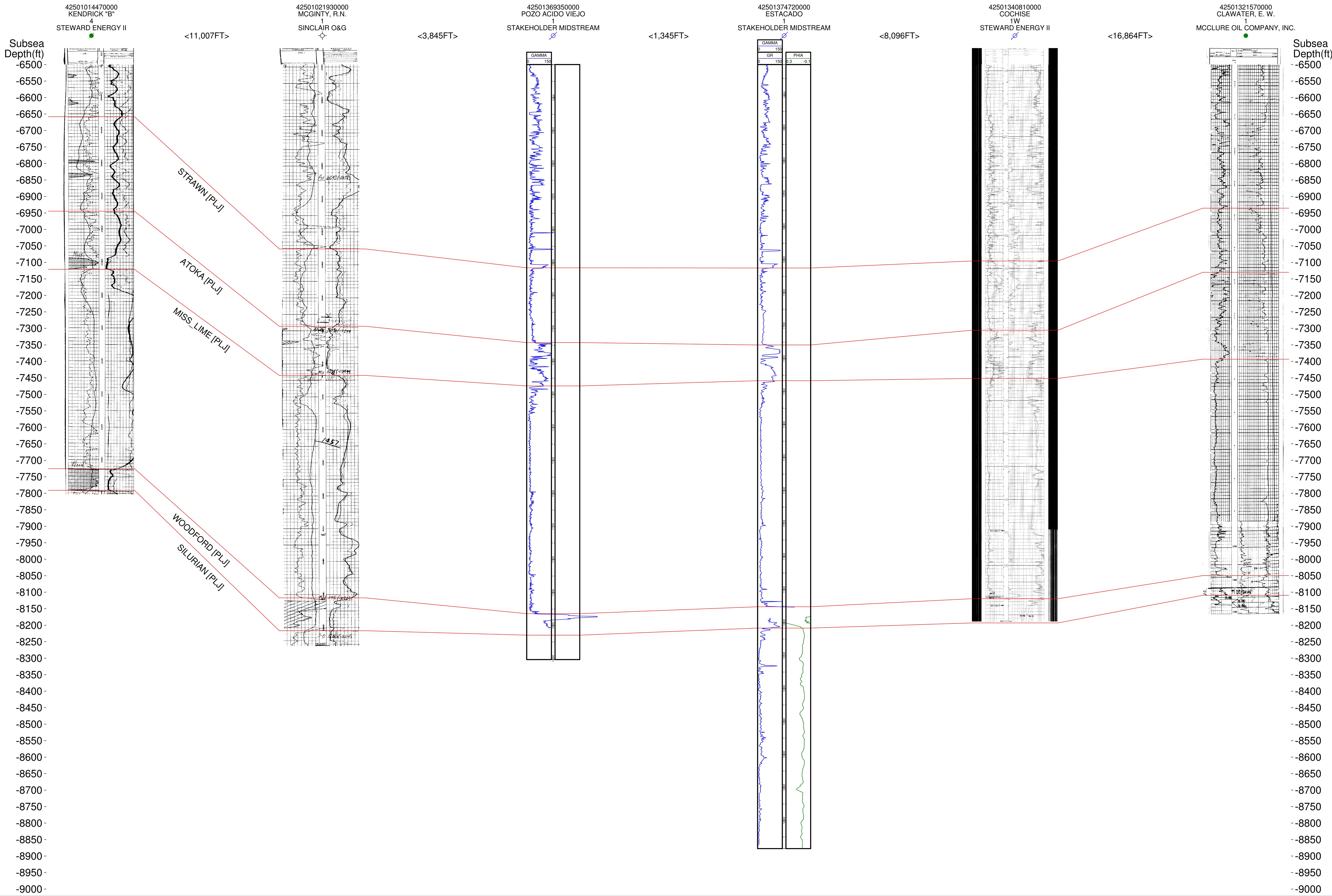
Estacado No 1

W-E Structural Cross Section

Horizontal Scale = 295.8  
Vertical Scale = 25.0  
Vertical Exaggeration = 11.8x

UWI  
Well Name  
Well Number  
Operator

May 13,2024 4:03 PM



## **APPENDIX B – TEXAS RAILROAD COMMISSION FORMS**

APPENDIX B-1: UIC CLASS II ORDER – POZO ACIDO VIEJO NO. 1

APPENDIX B-2: GAU GROUNDWATER PROTECTION DETERMINATION – POZO ACIDO VIEJO NO. 1

APPENDIX B-3: DRILLING PERMIT – POZO ACIDO VIEJO NO. 1

APPENDIX B-4: COMPLETION REPORT – POZO ACIDO VIEJO NO. 1

APPENDIX B-5: UIC CLASS II ORDER – ESTACADO NO. 1 (DRAFT)

APPENDIX B-6: GAU GROUNDWATER PROTECTION DETERMINATION – ESTACADO NO. 1

APPENDIX B-7: DRILLING PERMIT – ESTACADO NO. 1

B-1

WAYNE CHRISTIAN, CHAIRMAN  
CHRISTI CRADDICK, COMMISSIONER  
JIM WRIGHT, COMMISSIONER



DANNY SORRELLS  
ASSISTANT EXECUTIVE DIRECTOR  
DIRECTOR, OIL AND GAS DIVISION  
PAUL DUBOIS, P.E.  
ASSISTANT DIRECTOR, TECHNICAL PERMITTING

# RAILROAD COMMISSION OF TEXAS

## OIL AND GAS DIVISION

### PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL AND GAS

#### PROJECT NO. F-21146, COMMERCIAL AMENDMENT

STAKEHOLDER GAS SERVICES, LLC  
401 E SONTERRA BLVD STE 215  
SAN ANTONIO TX 78258

Authority is granted to inject into the well identified herein in accordance with Statewide Rule 46 of the Railroad Commission of Texas and based on the information contained in the application (Forms H-1 and H-1A) dated April 04, 2022, for the permitted interval(s) of the SILURO-DEVONIAN formation(s) and subject to the following terms and special conditions:

POZO ACIDO VIEJO (70951) LEASE  
BRONCO (SILURO-DEVONIAN) FIELD  
YOAKUM COUNTY  
DISTRICT 8A

#### WELL IDENTIFICATION AND PERMIT PARAMETERS:

Well No.	API No.	UIC Number	Permitted Fluids	Top Interval (feet)	Bottom Interval (feet)	Maximum Liquid Daily Injection Volume (BBL/day)	Maximum Gas Daily Injection Volume (MCF/day)	Maximum Surface Injection Pressure for Liquid (PSIG)	Maximum Surface Injection Pressure for Gas (PSIG)
1	50136935	000117488	Carbon Dioxide (CO <sub>2</sub> ); Hydrogen Sulfide (H <sub>2</sub> S); Other Non-Hazardous O/G Waste	12,020	12,349		20,000		4,319

**SPECIAL CONDITIONS:**

<b>Well No.</b>	<b>API No.</b>	<b>Special Conditions</b>
1	50136935	<p>1. An annual annulus pressure test must be performed and the test results submitted in accordance with the Instructions of Form H-5.</p> <p>2. The tubing-casing annulus pressure must be monitored at least weekly and reported annually on Form H-10 to the Commission's Austin Offices.</p> <p>3. This is not an Underground Injection Control (UIC) Class VI permit for geologic sequestration of CO<sub>2</sub>. Geologic sequestration of CO<sub>2</sub> that occurs incidental to oil and gas operations is authorized under a Class II UIC permit under certain circumstances, including but not limited to there being a legitimate/material oil and gas exploration/production purpose for the injection that does not cause or contribute to an increased risk to USDW.</p> <p>4. Bottomhole Pressure (BHP) Test: 5 Year Lifetime (A) Operator shall perform an initial static BHP test to quantify reservoir pressure prior to injection into the permitted formation(s) or have performed within 12 months prior to issuance of the amended permit or within 90 days of the issuance of the amended permit to quantify reservoir pressure prior to changing injection conditions according to the permit amendments. (B) Operator shall conduct a BHP test at least once every five (5) years from the date of the test in (A) above, and provide the Commission an opportunity to witness the test as stated in (D) below. The analysis of the BHP test shall be provided under the supervision, seal, and signature of a registered professional engineer in Texas. The test analysis shall be filed with the Injection-Storage Permits Unit (UIC) within 30 days of completion of the BHP test. (C) Measurement for the BHP test shall be performed via wireline tool(s), or other Commission approved bottom hole pressure measurement technique. (D) Operator must notify the District Office 48 hours in advance of the test in order to provide opportunity for the RRC field inspector to witness the test. Operator shall provide raw data from the test to UIC within 48 hours of completing the test.</p> <p>5. Fluid migration and pressure monitoring report: The operator must submit a report of monitoring data, including but not limited to: pressure and temperature data, used to determine fluid migration from the disposal well and pressure increases in the reservoir. The report must include, at a minimum, all monitoring data recorded since the last report (or since data recording began for the first report) through the date 30 days before the MIT is due and a summary analysis of the data. The summary analysis must include data trends and anomalies and any likely explanation for those trends or anomalies, for example, any significant operational events. The operator must submit the report with the Mechanical Integrity Test (MIT) filing to the Disposal/Injection Well Pressure Test (H-5) online system.</p> <p>6. NOTE: UIC staff has approved the "Surface Shut-In Pressure Test" technique, submitted by the operator on August 8, 2022 and included in the permit application, to quantify reservoir pressure as required in Special Condition No. 4.</p> <p>7. NOTE: The operator must notify the Injection-Storage Permits Unit (UIC) and District Office of any event that may have jeopardized the mechanical and/or hydraulic integrity of any segment of the processing, injection, or storage components of the permitted facility.</p>



## STANDARD CONDITIONS:

1. Injection must be through tubing set on a packer.
2. The District Office must be notified 48 hours prior to:
  - a. running tubing and setting packer;
  - b. beginning any work over or remedial operation;
  - c. conducting any required pressure tests or surveys.
3. The wellhead must be equipped with a pressure observation valve on the tubing and for each annulus.
4. Prior to beginning injection and subsequently after any work over, an annulus pressure test must be performed. The test pressure must equal the maximum authorized injection pressure or 500 psig, whichever is less, but must be at least 200 psig. The test must be performed and the results submitted in accordance with the instructions of Form H-5.
5. The injection pressure and injection volume must be monitored at least monthly and reported annually on Form H-10 to the Commission's Austin office.
6. Within 30 days after completion, conversion to disposal, or any work over which results in a change in well completion, a new Form W-2 or G-1 must be filed to show the current completion status of the well. The date of the disposal well permit and the permit number must be included on the new Form W-2 or G-1.
7. Written notice of intent to transfer the permit to another operator by filing Form P-4 must be submitted to the Commission at least 15 days prior to the date of the transfer.
8. A well herein authorized cannot be converted to a producing well and have an allowable assigned without filing an amended Form W-1 and receiving Commission approval.
9. Unless otherwise required by conditions of the permit, completion and operations of the well shall be in accordance with the information represented on the application (Forms H-1 and H-1A).
10. This permit will expire when the Form W-3, Plugging Record, is filed with the Commission. Furthermore, permits issued for wells to be drilled will expire three (3) years from the date of the permit unless drilling operations have commenced.

11. The operator shall be responsible for complying with the following requirements so as to assure that discharges of oil and gas waste will not occur:
  - a. Prior to beginning operation, all collecting pits, skimming pits, or washout pits must be permitted under the requirements of Statewide Rule 8.
  - b. Prior to beginning operation, a catch basin constructed of concrete, steel, or fiberglass must be installed to catch oil and gas waste which may spill as a result of connecting and disconnecting hoses or other apparatus while transferring oil and gas waste from tank trucks to the disposal facility.
  - c. Prior to beginning operation, all fabricated waste storage and pretreatment facilities (tanks, separators, or flow lines) shall be constructed of steel, concrete, fiberglass, or other materials approved by the Director or Director's delegate. These facilities must be maintained so as to prevent discharges of oil and gas waste.
  - d. Prior to beginning operation, dikes shall be placed around all waste storage, pretreatment, or disposal facilities. The dikes shall be designed so as to be able to contain a volume equal to the maximum holding capacity of all such facilities. Any liquids or wastes that do accumulate in the containment area shall be removed within 24 hours and disposed of in an authorized disposal facility.
  - e. Prior to beginning operation, the facility shall have security to prevent unauthorized access. Access shall be secured by a 24-hour attendant, a fence and locked gate when unattended, or a key-controlled access system. For a facility without a 24-hour attendant, fencing shall be required unless terrain or vegetation prevents truck access except through entrances with lockable gates.
  - f. Prior to beginning operation, each storage tank shall be equipped with a device (visual gauge or alarm) to alert drivers when each tank is within 130 barrels from being full.
12. Form P-18, Skim Oil Report, must be filed in duplicate with the District Office by the 15<sup>th</sup> day of the month following the month covered by the report.
13. If the facility will have staff on-site for periods of time necessitating bathroom accommodations, these accommodations must be designed, installed, and maintained by a person licensed to do so and the accommodations must comply with all applicable local, county, and State health regulations.



Provided further that, should it be determined that such injection fluid is not confined to the approved interval, then the permission given herein is suspended and the fluid injection operation must be stopped until the fluid migration from such interval is eliminated. Failure to comply with all of the conditions of this permit may result in the operator being referred to enforcement to consider assessment of administrative penalties and/or the cancellation of the permit.

APPROVED AND ISSUED ON August 16, 2022.

*Sean Avitt*  
(for)

Sean Avitt, Manager  
Injection-Storage Permits Unit

Amendment Comments:

Well No.	API No.	Amendment Comments
1	50136935	1. Amends permit dated 2018/08/21. 2. Amends packer setting depth from 11900 feet. 3. Amends maximum surface injection pressure for gas from 6010 psig. 4. Amends maximum daily injection volume for gas from 6900 MCF/day.

## GROUNDWATER PROTECTION DETERMINATION

Form GW-2



## Groundwater Advisory Unit

**Date Issued:** 01 November 2017**GAU Number:** 182849

**Attention:** STAKEHOLDER MIDSTREAM,  
777 E SONTERRA STE 100  
SAN ANTONIO, TX 78258

**Operator No.:** 811202**API Number:** 50100000**County:** YOAKUM**Lease Name:** Pozo Acido Viejo**Lease Number:****Well Number:** 1**Total Vertical Depth:** 12600**Latitude:** 33.169934**Longitude:** -103.001911**Datum:** NAD27**Purpose:** Injection into Producing Zone (H1)**Location:** Survey-Gibson, J H; Abstract-1597; Block-D; Section-452

To protect usable-quality groundwater at this location, the Groundwater Advisory Unit of the Railroad Commission of Texas recommends:

The interval from the land surface to a depth of 375 feet must be protected.

The BASE OF UNDERGROUND SOURCES OF DRINKING WATER (USDW) is estimated to occur at a depth of 2250 feet at the site of the referenced well.

Note: Unless stated otherwise, this recommendation is intended to apply only to the subject well and not for area-wide use. This recommendation is for normal drilling, production, and plugging operations only. It does not apply to saltwater disposal operation into a nonproductive zone (RRC Form W-14).

This determination is based on information provided when the application was submitted on 10/30/2017. If the location information has changed, you must contact the Groundwater Advisory Unit, and submit a new application if necessary. If you have questions, please contact us at 512-463-2741 or [gau@rrc.texas.gov](mailto:gau@rrc.texas.gov).

Groundwater Advisory Unit, Oil and Gas Division

## Railroad Commission of Texas

### PERMIT TO DRILL, RE-COMPLETE, OR RE-ENTER ON REGULAR OR ADMINISTRATIVE EXCEPTION LOCATION

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#### CONDITIONS AND INSTRUCTIONS

**Permit Invalidation.** It is the operator's responsibility to make sure that the permitted location complies with Commission density and spacing rules in effect on the spud date. The permit becomes invalid automatically if, because of a field rule change or the drilling of another well, the stated location is not in compliance with Commission field rules on the spud date. If this occurs, application for an exception to Statewide Rules 37 and 38 must be made and a special permit granted prior to spudding. Failure to do so may result in an allowable not being assigned and/or enforcement procedures being initiated.

**Notice Requirements.** Per H.B 630, signed May 8, 2007, the operator is required to provide notice to the surface owner no later than the 15th business day after the Commission issues a permit to drill. Please refer to subchapter Q Sec. 91.751-91.755 of the Texas Natural Resources Code for applicability.

**Permit expiration.** This permit expires two (2) years from the date of issuance shown on the original permit. The permit period will not be extended.

**Drilling Permit Number.** The drilling permit number shown on the permit **MUST** be given as a reference with any notification to the district (see below), correspondence, or application concerning this permit.

**Rule 37 Exception Permits.** This Statewide Rule 37 exception permit is granted under either provision Rule 37 (h)(2)(A) or 37(h)(2)(B). Be advised that a permit granted under Rule 37(h)(2)(A), notice of application, is subject to the General Rules of Practice and Procedures and if a protest is received under Section 1.3, "Filing of Documents," and/or Section 1.4, "Computation of Time," the permit may be deemed invalid.

#### Before Drilling

**Fresh Water Sand Protection.** The operator must set and cement sufficient surface casing to protect all usable-quality water, as defined by the Railroad Commission of Texas (RRC) Groundwater Advisory Unit (GWAU). Before drilling a well, the operator must obtain a letter from the Railroad Commission of Texas stating the depth to which water needs protection. Write: Railroad Commission of Texas, Groundwater Advisory Unit (GWAU), P.O. Box 12967, Austin, TX 78711-3087. File a copy of the letter with the appropriate district office.

**Accessing the Well Site.** If an OPERATOR, well equipment TRANSPORTER or WELL service provider must access the well site from a roadway on the state highway system (Interstate, U.S. Highway, State Highway, Farm-to-Market Road, Ranch-to-Market Road, etc.), an access permit is required from TxDOT. Permit applications are submitted to the respective TxDOT Area Office serving the county where the well is located.

**Water Transport to Well Site.** If an operator intends to transport water to the well site through a temporary pipeline laid above ground on the state's right-of-way, an additional TxDOT permit is required. Permit applications are submitted to the respective TxDOT Area Office serving the county where the well is located.

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#### \*NOTIFICATION

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The operator is **REQUIRED** to notify the district office when setting surface casing, intermediate casing, and production casing, or when plugging a dry hole. The district office **MUST** also be notified if the operator intends to re-enter a plugged well or re-complete a well into a different regulatory field. Time requirements are given below. The drilling permit number **MUST** be given with such notifications.

#### During Drilling

**Permit at Drilling Site.** A copy of the Form W-1 Drilling Permit Application, the location plat, a copy of Statewide Rule 13 alternate surface casing setting depth approval from the district office, if applicable, and this drilling permit must be kept at the permitted well site throughout drilling operations.

**\*Notification of Setting Casing.** The operator **MUST** call in notification to the appropriate district office (phone number shown on permit) a minimum of eight (8) hours prior to the setting of surface casing, intermediate casing, AND production casing. The individual giving notification **MUST** be able to advise the district office of the drilling permit number.

**\*Notification of Re-completion/Re-entry.** The operator MUST call in notification to the appropriate district office (phone number shown on permit) a minimum of eight (8) hours prior to the initiation of drilling or re-completion operations. The individual giving notification MUST be able to advise the district office of the drilling permit number.

### **Completion and Plugging Reports**

**Hydraulic Fracture Stimulation using Diesel Fuel:** Most operators in Texas do not use diesel fuel in hydraulic fracturing fluids. Section 322 of the Energy Policy Act of 2005 amended the Underground Injection Control (UIC) portion of the federal Safe Drinking Water Act (42 USC 300h(d)) to define "underground injection" to *EXCLUDE* " ...the underground injection of fluids or propping agents (*other than diesel fuels*) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities." (italic and underlining added.) Therefore, hydraulic fracturing may be subject to regulation under the federal UIC regulations if diesel fuel is injected or used as a propping agent. EPA defined "diesel fuel" using the following five (5) Chemical Abstract Service numbers: 68334-30-5 Primary Name: Fuels, diesel; 68476-34-6 Primary Name: Fuels, diesel, No. 2; 68476-30-2 Primary Name: Fuel oil No. 2; 68476-31-3 Primary Name: Fuel oil, No. 4; and 8008-20-6 Primary Name: Kerosene. As a result, an injection well permit would be required before performing hydraulic fracture stimulation using diesel fuel as defined by EPA on any well in Texas. Hydraulic fracture stimulation using diesel fuel as defined by EPA on a well in Texas without an injection well permit could result in enforcement action.

**Producing Well.** Statewide Rule 16 states that the operator of a well shall file with the Commission the appropriate completion report within thirty (30) days after completion of the well or within ninety (90) days after the date on which the drilling operation is completed, whichever is earlier. Completion of the well in a field authorized by this permit voids the permit for all other fields included in the permit unless the operator indicates on the initial completion report that the well is to be a dual or multiple completion and promptly submits an application for multiple completion. All zones are required to be completed before the expiration date on the existing permit. Statewide Rule 40(d) requires that upon successful completion of a well in the same reservoir as any other well previously assigned the same acreage, proration plats and P-15s (if required) must be submitted with no double assignment of acreage.

**Dry or Noncommercial Hole.** Statewide Rule 14(b)(2) prohibits suspension of operations on each dry or non-commercial well without plugging unless the hole is cased and the casing is cemented in compliance with Commission rules. If properly cased, Statewide Rule 14(b)(2) requires that plugging operations must begin within a period of one (1) year after drilling or operations have ceased. Plugging operations must proceed with due diligence until completed. An extension to the one-year plugging requirement may be granted under the provisions stated in Statewide Rule 14(b)(2).

**Intention to Plug.** The operator must file a Form W-3A (Notice of Intention to Plug and Abandon) with the district office at least five (5) days prior to beginning plugging operations. If, however, a drilling rig is already at work on location and ready to begin plugging operations, the district director or the director's delegate may waive this requirement upon request, and verbally approve the proposed plugging procedures.

**\*Notification of Plugging a Dry Hole.** The operator MUST call in notification to the appropriate district office (phone number shown on permit) a minimum of four (4) hours prior to beginning plugging operations. The individual giving the notification MUST be able to advise the district office of the drilling permit number and all water protection depths for that location as stated in the Texas Commission on Environmental Quality letter.

DIRECT INQUIRIES TO: DRILLING PERMIT SECTION, OIL AND GAS DIVISION

PHONE  
(512) 463-6751

MAIL:  
PO Box 12967  
Austin, Texas, 78711-2967

**RAILROAD COMMISSION OF TEXAS**  
**OIL & GAS DIVISION**

PERMIT TO DRILL, DEEPEN, PLUG BACK, OR RE-ENTER ON A REGULAR OR ADMINISTRATIVE EXCEPTION LOCATION

PERMIT NUMBER <div style="text-align: right;">834810</div>	DATE PERMIT ISSUED OR AMENDED <div style="text-align: center;">Jan 09, 2018</div>	DISTRICT <div style="text-align: center;">* 8A</div>			
API NUMBER <div style="text-align: right;">42-501-36935</div>	FORM W-1 RECEIVED <div style="text-align: center;">Jan 04, 2018</div>	COUNTY <div style="text-align: center;">YOAKUM</div>			
TYPE OF OPERATION <div style="text-align: center;">NEW DRILL</div>	WELLBORE PROFILE(S) <div style="text-align: center;">Vertical</div>	ACRES <div style="text-align: center;">200</div>			
OPERATOR <div style="text-align: right;">811207</div> <div style="text-align: center;">STAKEHOLDER GAS SERVICES, LLC</div> <div style="text-align: center;">401 E SONTERRA BLVD STE 215</div> <div style="text-align: center;">SAN ANTONIO, TX 78258-0000</div>		NOTICE This permit and any allowable assigned may be revoked if payment for fee(s) submitted to the Commission is not honored. <b>District Office Telephone No:</b> <div style="text-align: center;">(432) 684-5581</div>			
LEASE NAME <div style="text-align: center;">POZO ACIDO VIEJO</div>		WELL NUMBER <div style="text-align: center;">1</div>			
LOCATION <div style="text-align: center;">10.3 miles W direction from PLAINS, TX</div>		TOTAL DEPTH <div style="text-align: center;">14000</div>			
Section, Block and/or Survey <div style="display: flex; justify-content: space-between;"> <div>SECTION ◀ 452</div> <div>BLOCK ◀ D</div> <div>ABSTRACT ◀ 1597</div> </div> <div style="display: flex; justify-content: space-between;"> <div>SURVEY ◀ GIBSON, J H / READ, W K</div> </div>					
DISTANCE TO SURVEY LINES <div style="text-align: center;">1862.8 ft. W    754.6 ft. S</div>		DISTANCE TO NEAREST LEASE LINE <div style="text-align: center;">754.6 ft.</div>			
DISTANCE TO LEASE LINES <div style="text-align: center;">777.2 ft. E    754.6 ft. S</div>		DISTANCE TO NEAREST WELL ON LEASE <div style="text-align: center;">See FIELD(s) Below</div>			
FIELD(s) and LIMITATIONS: <div style="text-align: center;">* SEE FIELD DISTRICT FOR REPORTING PURPOSES *</div>					
FIELD NAME LEASE NAME		ACRES NEAREST LEASE	DEPTH NEAREST WE	WELL # NEAREST WE	DIST
----- BRONCO (SILURO-DEVONIAN) POZO ACIDO VIEJO		----- 200.00 754.6	----- 12,000 0	----- 1 0	----- 8A
RESTRICTIONS: Do not use this well for injection/disposal/hydrocarbon storage purposes without approval by the Environmental Services section of the Railroad Commission, Austin, Texas office. This is a hydrogen sulfide field. Hydrogen Sulfide Fields with perforations must be isolated and tested per State Wide Rule 36 and a Form H-9 filed with the district office. Fields with SWR 10 authority to downhole commingle must be isolated and tested individually prior to commingling production.					
THE FOLLOWING RESTRICTIONS APPLY TO ALL FIELDS					
This well shall be completed and produced in compliance with applicable special field or statewide spacing and density rules. If this well is to be used for brine mining, underground storage of liquid hydrocarbons in salt formations, or underground storage of gas in salt formations, a permit for that specific purpose must be obtained from Environmental Services prior to construction, including drilling, of the well in accordance with Statewide Rules 81, 95, and 97.					
This well must comply to the new SWR 3.13 requirements concerning the isolation of any potential flow zones and zones with corrosive formation fluids. See approved permit for those formations that have been identified for the county in which you are drilling the well in.					

**RAILROAD COMMISSION OF TEXAS  
OIL & GAS DIVISION  
SWR #13 Formation Data**

**YOAKUM (501) County**

Formation	Shallow Top	Deep Top	Remarks	Geological Order	Effective Date
RED BED-SANTA ROSA	1,100	1,100		1	12/17/2013
YATES	2,800	3,450		2	12/17/2013
SAN ANDRES	4,500	5,500	high flows, H2S, corrosive	3	12/17/2013
GLORIETA	5,600	6,000		4	12/17/2013
CLEARFORK	6,000	7,900	Active CO2 Flood	5	12/17/2013
WICHITA	8,000	8,200		6	12/17/2013
LEONARD	9,000	9,700		7	12/17/2013
WOLFCAMP	8,300	10,700		8	12/17/2013
PENNSYLVANIAN	8,700	8,700		9	12/17/2013
STRAWN	11,300	11,500		10	12/17/2013
MISSISSIPPIAN	10,650	10,800		11	12/17/2013
DEVONIAN	11,200	13,100		12	12/17/2013
DEVONIAN-SILURIAN	11,500	11,500		13	12/17/2013

The above list may not be all inclusive, and may also include formations that do not intersect all wellbores. Formation "TOP" information listed reflects an estimated range based on geologic variances across the county. To clarify, the "Deep Top" is not the bottom of the formation; it is the deepest depth at which the "TOP" of the formation has been or might be encountered. This is a dynamic list subject to updates and revisions. It is the operator's responsibility to make sure that at the time of spudding the well the most current list is being referenced. Refer to the RRC website at the following address for the most recent information.  
<http://www.rrc.texas.gov/oil-gas/compliance-enforcement/rule-13-geologic-formation-info>

## RAILROAD COMMISSION OF TEXAS

Oil and Gas Division

Tracking No.: 201485

Status: Approved

This facsimile W-2 was generated electronically  
from data submitted to the RRC.

API No. 42- 501-36935

7. RRC District No.  
8A8. RRC Lease No.  
70951


## Oil Well Potential Test, Completion or Recompletion Report, and Log


1. FIELD NAME (as per RRC Records or Wildcat) <b>BRONCO (SILURO-DEVONIAN)</b>		2. LEASE NAME <b>POZO ACIDO VIEJO</b>		9. Well No. <b>1</b>	
3. OPERATOR'S NAME (Exactly as shown on Form P-5, Organization Report) <b>STAKEHOLDER GAS SERVICES, LLC</b>		RRC Operator No. <b>811207</b>		10. County of well site <b>YOAKUM</b>	
4. ADDRESS <b>401 E SONTERRA BLVD STE 215 SAN ANTONIO, TX 78258-0000</b>				11. Purpose of filing Initial Potential <input type="checkbox"/> Retest <input type="checkbox"/> Reclass <input type="checkbox"/> Well record only (Explain In remarks) <input checked="" type="checkbox"/>	
5. If Operator has changed within last 60 days, name former operator					
6a. Location (Section, Block, and Survey) <b>452 , D , GIBSON, J H / READ, W K , A-1597</b>		6b. Distance and direction to nearest town in this county. <b>PLAINS, TX</b>			
12. If workover or reclass, give former field (with reservoir) & Gas ID or oil lease no. <b>FIELD &amp; RESERVOIR</b>				GAS ID or OIL LEASE #	Oil-O Gas-G
<b>N/A</b>					Well #
13. Type of electric or other log run <b>None</b>				14. Completion or recompletion date <b>01/08/2019</b>	

## SECTION I- POTENTIAL TEST DATA IMPORTANT: Test should be for 24 hours unless otherwise specified infield rules.

15. Date of test		16. No. of hours tested		17. Production method (Flowing, Gas Lift, Jetting, Pumping- Size & Type of pump)		18. Choke size	
19. Production during Test Period		Oil - BBLS	Gas - MCF	Water - BBLS	Gas - Oil Ratio	Flowing Tubing Pressure PSI	
20. Calculated 24-Hour Rate		Oil - BBLS	Gas - MCF	Water - BBLS	Oil Gravity-API-60°	Casing Pressure PSI	
21. Was swab used during this test?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	22. Oil produced prior to test (New & Reworked wells)		23. Injection Gas-Oil Ratio	
REMARKS: N/A							

INSTRUCTIONS: File an original and one copy of the completed FormW-2 in the appropriate RRC District Office within 30 days after completing a well and within 10 days after a potential test. If an operator does not properly report the results of a potential test within the 10-day period, the effective date of the allowable assigned to the well will not extend back more than 10 days before the W-2 was received in the District Office. (Statewide Rules 16 and 51) To report a completion or recompletion, fill in both sides of this form. To report a retest, fill in only the front side.

 <b>WELL TESTERS CERTIFICATION</b> I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I conducted or supervised this test by observation of (a) meter readings or (b) the top and bottom gauges of each tank into which production was run during the test. I further certify that the potential test data shown above is true, correct, and complete, to the best of my knowledge.			
Signature: Well Tester		Name of Company	RRC Representative

 <b>OPERATOR'S CERTIFICATION</b> I declare under penalties prescribed in Sec. 91.143, Texas Natural Resources Code, that I am authorized to make this report, that this report was prepared by me or under my supervision and direction, and that data and facts stated therein are true, correct and complete, to the best of my knowledge.			
Type or printed name of operator's representative		Consultant	
(806) 665-0338		Title of Person	
01/31/2020		Rebecca Dunn	
Telephone: Area Code	Number	Month	Day Year
		Signature	

SECTION III										DATA ON WELL COMPLETION AND LOG (Not Required on Retest)																													
24. Type of Completion										25. Permit to Drill, Plug Back or Deepen																													
New Well <input checked="" type="checkbox"/> Deepening <input type="checkbox"/> Plug Back <input type="checkbox"/> Other <input type="checkbox"/>										DATE 01/09/2018 PERMIT NO. 834810																													
26. Notice of Intention to Drill this well was filed in Name of										Rule 37 Exception																													
STAKEHOLDER GAS SERVICES, LLC										PERMIT NO.																													
27. Number of producing wells on this lease in this field (reservoir) including this well					28. Total number of acres in this lease					Water Injection Permit					PERMIT NO.																								
0					200.0					Salt Water Disposal Permit					PERMIT NO.																								
29. Date Plug Back, Deepening, Workover or Drilling Operations:					Commenced					Completed					30. Distance to nearest well, Same Lease & Reservoir																								
					05/25/2018					06/23/2018					Other																								
31. Location of well, relative to nearest lease boundaries										777.2 Feet From East										Line and 754.6 Feet from																			
										South										Line of the POZO ACIDO VIEJO										Lease									
32. Elevation (DF, RKB, RT, GR ETC.)										33. Was directional survey made other than inclination (Form W-12)?										Yes										No									
3787 GL																																							
34. Top of Pay			35. Total Depth			36. P. B. Depth			37. Surface Casing Determined by			Field Rules			Recommendation of T.D.W.R.			<input checked="" type="checkbox"/>			Dt. of Letter			11/01/2017															
			12349												Railroad Commission (Special)			<input type="checkbox"/>			Dt. of Letter																		
38. Is well multiple completion?																																							
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																																							
39. If multiple completion, list all reservoir names (completions in this well) and Oil Lease or Gas ID No.															GAS ID or OIL LEASE #					Oil-0 Gas-G					Well #														
FIELD & RESERVOIR																																							
N/A																																							
40. Intervals Drilled by:			Rotary Tools			Cable Tools			41. Name of Drilling Contractor												42. Is Cementing Affidavit Attached?																		
			<input checked="" type="checkbox"/>																		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No																		
43. CASING RECORD (Report All Strings Set in Well)																																							
CASING SIZE			WT #/FT.			DEPTH SET			MULTISTAGE TOOL DEPTH			TYPE & AMOUNT CEMENT (sacks)			HOLE SIZE			TOP OF CEMENT			SLURRY VOL. cu. ft.																		
20						90						C HSR 169			24			SURF			200.0																		
13 3/8						2402						C HSR 1600			17 1/2			SURF			3449.0																		
9 5/8						6421			4400			C HSR 1250			12 1/4			0			2593.0																		
9 5/8						6421						C HSR 358			12 1/4			4400			475.0																		
7						12026			7503			C HSR 717			8 3/4			250			1390.0																		
7						12026						C & H HSR 535			8 3/4			7503			1033.0																		
44. LINER RECORD																																							
Size					Top					Bottom					Sacks Cement					Screen																			
N/A																																							
45. TUBING RECORD																									46. Producing Interval (this completion) Indicate depth of perforation or open hole														
Size			Depth Set			Packer Set			From 12026										To 12349 OH																				
3 1/2			11964			11964			From										To																				
									From										To																				
									From										To																				
47. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.																																							
Depth Interval										Amount and Kind of Material Used																													
12026.0										12349.0															2000 GALS 15% HCL														
48. FORMATION RECORD (LIST DEPTHS OF PRINCIPAL GEOLOGICAL MARKERS AND FORMATION TOPS)																																							
Formations					Depth					Formations					Depth																								
RED BED-SANTA ROSA					1100.0					WOLFCAMP					8300.0																								
YATES					2800.0					PENNSYLVANIAN					8700.0																								
SAN ANDRES - HIGH FLOWS, H2S, CORROSIVE					4500.0					STRAWN					11300.0																								
GLORIETA					5600.0					MISSISSIPPIAN					10650.0																								
CLEARFORK - ACTIVE CO2 FLOOD					6000.0					DEVONIAN					12020.0																								



48.	FORMATION RECORD (LIST DEPTHS OF PRINCIPAL GEOLOGICAL MARKERS AND FORMATION TOPS)			
	Formations	Depth	Formations	Depth
	WICHITA	8000.0	DEVONIAN-SILURIAN	11050.0
	LEONARD	9000.0		
	REMARKS: ACID GAS INJECTION WELL INTO THE DEVONIAN. OIL & GAS DOCKET NO 8A-0310710 - FINAL ORDER			



# RAILROAD COMMISSION OF TEXAS

## OIL AND GAS DIVISION

### PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL AND GAS

**(DRAFT PERMIT ONLY) PROJECT NO. placeholder-0.-22-39-64-65-01-97-00-90-6**

STAKEHOLDER GAS SERVICES, LLC  
19122 US HWY 281 N STE 113  
SAN ANTONIO TX 78258

(DRAFT PERMIT ONLY) Authority is granted to inject into the well(s) identified herein in accordance with Statewide Rule 46 of the Railroad Commission of Texas and based on the information contained in the application (Forms H-1 and H-1A) dated July 17, 2023, for the permitted interval(s) of the SILURO-DEVONIAN formation(s) and subject to the following terms and special conditions:

ESTACADO (000000) LEASE  
BRONCO (SILURO-DEVONIAN) FIELD  
YOAKUM COUNTY  
DISTRICT 8A

#### WELL IDENTIFICATION AND PERMIT PARAMETERS:

Well No.	API No.	UIC No.	Permitted Fluids	Top Interval (feet)	Bottom Interval (feet)	Maximum Gas Daily Injection Volume (MCF/day)	Maximum Surface Injection Pressure for Gas (PSIG)
1	50137472	placeholder-0.-29-34-44-37-98-63-70-74	Carbon Dioxide (CO <sub>2</sub> ); Hydrogen Sulfide (H <sub>2</sub> S)	12052	12750	19700	4300

**SPECIAL CONDITIONS:**

<b>Well No.</b>	<b>API No.</b>	<b>Special Conditions</b>
1	50137472	<p><b>1. For wells with long string casing set more than 100 feet below the permitted injection interval, the plug back depth shall be within 100 feet of the bottom of the permitted injection interval. For wells with open hole completions, the plug back depth shall be no deeper than the bottom of the permitted injection interval.</b></p> <p><b>2. This is not an Underground Injection Control (UIC) Class VI permit for geologic sequestration of CO<sub>2</sub>. Geologic sequestration of CO<sub>2</sub> that occurs incidental to oil and gas operations is authorized under a Class II UIC permit under certain circumstances, including but not limited to there being a legitimate/material oil and gas exploration/production purpose for the injection that does not cause or contribute to an increased risk to USDW.</b></p> <p><b>3. The operator shall provide to UIC a geophysical log and a mud log of the subject well with the top(s) and bottom(s) of the permitted formation(s) and the top and base of the injection interval annotated on the log. Top and bottom of the permitted injection interval may be modified based on geophysical log or mud log indications of the top and bottom of the permitted formation.</b></p> <p><b>4. Injection shall be no deeper than 100 feet above the base of the deepest formation overlying the top of Cambrian-period stratum or top of Precambrian stratum if Cambrian is not preserved at the well location. Specifically, the formation(s) referred to may be within the Devonian, Silurian or Ordovician-period strata.</b></p> <p><b>5. Note: this is a directionally deviated well. The permitted interval is 12052-12750 feet TVD / 12168-12866 feet MD.</b></p> <p><b>6. Step-Rate Test (SRT):</b>  <b>(A) The operator shall conduct a SRT to determine the reservoir fracture initiation pressure prior to initial injection into the permitted formation(s), using the RRC SRT guidelines. <a href="https://www.rrc.state.tx.us/oil-and-gas/publications-and-notices/manuals/injection-disposal-well-manual/summary-of-standards-and-procedures/technical-review/step-rate-test-guidelines/">https://www.rrc.state.tx.us/oil-and-gas/publications-and-notices/manuals/injection-disposal-well-manual/summary-of-standards-and-procedures/technical-review/step-rate-test-guidelines/</a></b>  <b>(B) The operator shall notify the appropriate District Office at least 48 hours in advance of the test to provide opportunity for the Commission to witness the SRT.</b>  <b>(C) The operator shall provide raw data from the test to the Injection-Storage Permits Unit (UIC) in Austin within 48 hours of completing the SRT.</b>  <b>(D) An analysis of the step-rate test shall be filed with the Injection-</b></p>

(DRAFT PERMIT ONLY) PROJECT NO. placeholder-0.-22-39-64-65-01-97-00-90-6

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Note: This document will only be distributed electronically.

		<p><b>Storage Permits Unit in Austin within 30 days of completion of the SRT. The SRT analysis shall be filed with the initial mechanical integrity test, Form H-5.</b></p> <p><b>(E) All SRT documents must be prepared, signed and sealed by a Professional Engineer registered in Texas, according to The Texas Engineering Practice Act. The following SRT data should be submitted to UIC in Austin for review:</b></p> <ul style="list-style-type: none"> <li><b>(i) The formation fracture pressure,</b></li> <li><b>(ii) Fracture gradient analysis and determination,</b></li> <li><b>(iii) A plot of injection rate versus pressure, and</b></li> <li><b>(iv) A plot and table of the SRT data (injection rate and pressure versus time).</b></li> </ul> <p><b>7. A. The operator shall notify the Commission within 24 hours of a discovery of any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; or any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between USDWs. Within 20 days of such a discovery, the operator shall file a report with the Commission documenting the event, findings, and response actions taken.</b></p> <p><b>B. The permittee shall report the source(s) and the properties of injected acid gas as they are added. In no case may the volume of acid gas exceed the limit indicated in permit.</b></p> <p><b>C. The well's construction and materials used must be resistant to corrosion per the proposed wellbore schematic that was submitted in the application.</b></p>
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**STANDARD CONDITIONS:**

1. Injection must be through tubing set on a packer.
2. The District Office must be notified 48 hours prior to:
  - a. running tubing and setting packer;
  - b. beginning any work over or remedial operation;
  - c. conducting any required pressure tests or surveys.
3. The wellhead must be equipped with a pressure observation valve on the tubing and for each annulus.
4. Prior to beginning injection and subsequently after any work over, an annulus pressure test must be performed. The test pressure must equal the maximum authorized injection pressure

(DRAFT PERMIT ONLY) PROJECT NO. placeholder-0.-22-39-64-65-01-97-00-90-6

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or 500 psig, whichever is less, but must be at least 200 psig. The test must be performed and the results submitted in accordance with the instructions of Form H-5.

5. The injection pressure and injection volume must be monitored at least monthly and reported annually on Form H-10 to the Commission's Austin office.
6. Within 30 days after completion, conversion to disposal, or any work over which results in a change in well completion, a new Form W-2 or G-1 must be filed to show the current completion status of the well. The date of the disposal well permit and the permit number must be included on the new Form W-2 or G-1.
7. Written notice of intent to transfer the permit to another operator by filing Form P-4 must be submitted to the Commission at least 15 days prior to the date of the transfer.
8. A well herein authorized cannot be converted to a producing well and have an allowable assigned without filing an amended Form W-1 and receiving Commission approval.
9. Unless otherwise required by conditions of the permit, completion and operations of the well shall be in accordance with the information represented on the application (Forms H-1 and H-1A).
10. This permit will expire when the Form W-3, Plugging Record, is filed with the Commission. Furthermore, permits issued for wells to be drilled will expire three (3) years from the date of the permit unless drilling operations have commenced.

Provided further that, should it be determined that such injection fluid is not confined to the approved interval, then the permission given herein is suspended and the fluid injection operation must be stopped until the fluid migration from such interval is eliminated. Failure to comply with all of the conditions of this permit may result in the operator being referred to enforcement to consider assessment of administrative penalties and/or the cancellation of the permit.

DRAFT PERMIT ONLY [FUTURE PERMIT APPROVAL DATE].

---

[manager name][manager title line 0]  
[manager title line 1]  
[manager title line 2]

(DRAFT PERMIT ONLY) PROJECT NO. placeholder-0.-22-39-64-65-01-97-00-90-6

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Note: This document will only be distributed electronically.

## GROUNDWATER PROTECTION DETERMINATION

Form GW-2



## Groundwater Advisory Unit

**Date Issued:** 23 March 2023**GAU Number:** 364662

**Attention:** STAKEHOLDER GAS  
 19122 US HWY 281 N STE  
 SAN ANTONIO, TX 78258

**Operator No.:** 811207

**API Number:** 00000000  
**County:** YOAKUM  
**Lease Name:** ESTACADO  
**Lease Number:**  
**Well Number:** 1  
**Total Vertical:** 12750  
**Latitude:** 33.169986  
**Longitude:** -103.000262  
**Datum:** NAD27

**Purpose:** Injection into Producing Zone (H1)**Location:** Survey-GIBSON, J H; Abstract-1597; Block-D; Section-452

To protect usable-quality groundwater at this location, the Groundwater Advisory Unit of the Railroad Commission of Texas recommends:

The base of usable-quality water-bearing strata is estimated to occur at a depth of 350 feet at the site of the referenced well.

The BASE OF UNDERGROUND SOURCES OF DRINKING WATER (USDW) is estimated to occur at a depth of 2250 feet at the site of the referenced well.

Note: Unless stated otherwise, this recommendation is intended to apply to all wells drilled within 200 feet of the subject well. Unless stated otherwise, this recommendation is for normal drilling, production, and plugging operations only.

This determination is based on information provided when the application was submitted on 03/20/2023. If the location information has changed, you must contact the Groundwater Advisory Unit, and submit a new application if necessary. If you have questions, please contact us at 512-463-2741 or gau@rrc.texas.gov.

Groundwater Advisory Unit, Oil and Gas Division

Form GW-2 P.O. Box 12967 Austin, Texas 78771-2967 512-463-2741 Internet address: www.rrc.texas.  
 Rev. 02/2014

## Railroad Commission of Texas

### PERMIT TO DRILL, RE-COMPLETE, OR RE-ENTER ON REGULAR OR ADMINISTRATIVE EXCEPTION LOCATION

---

#### CONDITIONS AND INSTRUCTIONS

**Permit Invalidation.** It is the operator's responsibility to make sure that the permitted location complies with Commission density and spacing rules in effect on the spud date. The permit becomes invalid automatically if, because of a field rule change or the drilling of another well, the stated location is not in compliance with Commission field rules on the spud date. If this occurs, application for an exception to Statewide Rules 37 and 38 must be made and a special permit granted prior to spudding. Failure to do so may result in an allowable not being assigned and/or enforcement procedures being initiated.

**Notice Requirements.** Per H.B 630, signed May 8, 2007, the operator is required to provide notice to the surface owner no later than the 15th business day after the Commission issues a permit to drill. Please refer to subchapter Q Sec. 91.751-91.755 of the Texas Natural Resources Code for applicability.

**Permit expiration.** This permit expires two (2) years from the date of issuance shown on the original permit. The permit period will not be extended.

**Drilling Permit Number.** The drilling permit number shown on the permit **MUST** be given as a reference with any notification to the district (see below), correspondence, or application concerning this permit.

**Rule 37 Exception Permits.** This Statewide Rule 37 exception permit is granted under either provision Rule 37 (h)(2)(A) or 37(h)(2)(B). Be advised that a permit granted under Rule 37(h)(2)(A), notice of application, is subject to the General Rules of Practice and Procedures and if a protest is received under Section 1.3, "Filing of Documents," and/or Section 1.4, "Computation of Time," the permit may be deemed invalid.

#### Before Drilling

**Fresh Water Sand Protection.** The operator must set and cement sufficient surface casing to protect all usable-quality water, as defined by the Railroad Commission of Texas (RRC) Groundwater Advisory Unit (GWAU). Before drilling a well, the operator must obtain a letter from the Railroad Commission of Texas stating the depth to which water needs protection. Write: Railroad Commission of Texas, Groundwater Advisory Unit (GWAU), P.O. Box 12967, Austin, TX 78711-3087. File a copy of the letter with the appropriate district office.

**Accessing the Well Site.** If an OPERATOR, well equipment TRANSPORTER or WELL service provider must access the well site from a roadway on the state highway system (Interstate, U.S. Highway, State Highway, Farm-to-Market Road, Ranch-to-Market Road, etc.), an access permit is required from TxDOT. Permit applications are submitted to the respective TxDOT Area Office serving the county where the well is located.

**Water Transport to Well Site.** If an operator intends to transport water to the well site through a temporary pipeline laid above ground on the state's right-of-way, an additional TxDOT permit is required. Permit applications are submitted to the respective TxDOT Area Office serving the county where the well is located.

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#### \*NOTIFICATION

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The operator is **REQUIRED** to notify the district office when setting surface casing, intermediate casing, and production casing, or when plugging a dry hole. The district office **MUST** also be notified if the operator intends to re-enter a plugged well or re-complete a well into a different regulatory field. Time requirements are given below. The drilling permit number **MUST** be given with such notifications.

#### During Drilling

**Permit at Drilling Site.** A copy of the Form W-1 Drilling Permit Application, the location plat, a copy of Statewide Rule 13 alternate surface casing setting depth approval from the district office, if applicable, and this drilling permit must be kept at the permitted well site throughout drilling operations.

**\*Notification of Setting Casing.** The operator **MUST** call in notification to the appropriate district office (phone number shown on permit) a minimum of eight (8) hours prior to the setting of surface casing, intermediate casing, AND production casing. The individual giving notification **MUST** be able to advise the district office of the drilling permit number.

**\*Notification of Re-completion/Re-entry.** The operator MUST call in notification to the appropriate district office (phone number shown on permit) a minimum of eight (8) hours prior to the initiation of drilling or re-completion operations. The individual giving notification MUST be able to advise the district office of the drilling permit number.

### **Completion and Plugging Reports**

**Hydraulic Fracture Stimulation using Diesel Fuel:** Most operators in Texas do not use diesel fuel in hydraulic fracturing fluids. Section 322 of the Energy Policy Act of 2005 amended the Underground Injection Control (UIC) portion of the federal Safe Drinking Water Act (42 USC 300h(d)) to define "underground injection" to *EXCLUDE* "...the underground injection of fluids or propping agents (*other than diesel fuels*) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities." (italic and underlining added.) Therefore, hydraulic fracturing may be subject to regulation under the federal UIC regulations if diesel fuel is injected or used as a propping agent. EPA defined "diesel fuel" using the following five (5) Chemical Abstract Service numbers: 68334-30-5 Primary Name: Fuels, diesel; 68476-34-6 Primary Name: Fuels, diesel, No. 2; 68476-30-2 Primary Name: Fuel oil No. 2; 68476-31-3 Primary Name: Fuel oil, No. 4; and 8008-20-6 Primary Name: Kerosene. As a result, an injection well permit would be required before performing hydraulic fracture stimulation using diesel fuel as defined by EPA on any well in Texas. Hydraulic fracture stimulation using diesel fuel as defined by EPA on a well in Texas without an injection well permit could result in enforcement action.

**Producing Well.** Statewide Rule 16 states that the operator of a well shall file with the Commission the appropriate completion report within ninety (90) days after completion of the well or within one hundred and fifty (150) days after the date on which the drilling operation is completed, whichever is earlier. Completion of the well in a field authorized by this permit voids the permit for all other fields included in the permit unless the operator indicates on the initial completion report that the well is to be a dual or multiple completion and promptly submits an application for multiple completion. All zones are required to be completed before the expiration date on the existing permit. Statewide Rule 40(d) requires that upon successful completion of a well in the same reservoir as any other well previously assigned the same acreage, proration plats and P-15s or P-16s (if required) or a lease plat and P-16 must be submitted with no double assignment of acreage unless authorized by rule.

**Dry or Noncommercial Hole.** Statewide Rule 14(b)(2) prohibits suspension of operations on each dry or non-commercial well without plugging unless the hole is cased and the casing is cemented in compliance with Commission rules. If properly cased, Statewide Rule 14(b)(2) requires that plugging operations must begin within a period of one (1) year after drilling or operations have ceased. Plugging operations must proceed with due diligence until completed. An extension to the one-year plugging requirement may be granted under the provisions stated in Statewide Rule 14(b)(2).

**Intention to Plug.** The operator must file a Form W-3A (Notice of Intention to Plug and Abandon) with the district office at least five (5) days prior to beginning plugging operations. If, however, a drilling rig is already at work on location and ready to begin plugging operations, the district director or the director's delegate may waive this requirement upon request, and verbally approve the proposed plugging procedures.

**\*Notification of Plugging a Dry Hole.** The operator MUST call in notification to the appropriate district office (phone number shown on permit) a minimum of four (4) hours prior to beginning plugging operations. The individual giving the notification MUST be able to advise the district office of the drilling permit number and all water protection depths for that location as stated in the Groundwater Advisory Unit letter.

DIRECT INQUIRIES TO: DRILLING PERMIT SECTION, OIL AND GAS DIVISION

PHONE  
(512) 463-6751

MAIL:  
PO Box 12967  
Austin, Texas, 78711-2967



**RAILROAD COMMISSION OF TEXAS**  
**OIL & GAS DIVISION**

PERMIT TO DRILL, DEEPEN, PLUG BACK, OR RE-ENTER ON A REGULAR OR ADMINISTRATIVE EXCEPTION LOCATION

PERMIT NUMBER <div style="text-align: right;">890902</div>	DATE PERMIT ISSUED OR AMENDED (AMENDED)    Oct 11, 2023	DISTRICT <div style="text-align: right;">*    8A</div>			
API NUMBER <div style="text-align: right;">42-501-37472</div>	FORM W-1 RECEIVED <div style="text-align: right;">Oct 10, 2023</div>	COUNTY <div style="text-align: right;">YOAKUM</div>			
TYPE OF OPERATION <div style="text-align: right;">NEW DRILL</div>	WELLBORE PROFILE(S) <div style="text-align: right;">Directional</div>	ACRES <div style="text-align: right;">200</div>			
OPERATOR <div style="text-align: right;">811207</div> STAKEHOLDER GAS SERVICES, LLC 19122 US HWY 281 N STE 113 SAN ANTONIO, TX 78258		NOTICE This permit and any allowable assigned may be revoked if payment for fee(s) submitted to the Commission is not honored. <b>District Office Telephone No:</b> (432) 684-5581			
LEASE NAME <div style="text-align: right;">ESTACADO</div>		WELL NUMBER <div style="text-align: right;">1</div>			
LOCATION <div style="text-align: right;">10.1 miles SW direction from PLAINS</div>		TOTAL DEPTH <div style="text-align: right;">12750</div>			
Section, Block and/or Survey SECTION    452                      BLOCK    D                      ABSTRACT    1597 SURVEY    GIBSON, J H / READ, W K					
DISTANCE TO SURVEY LINES <div style="text-align: right;">770 ft. SOUTH    2358 ft. WEST</div>		DISTANCE TO NEAREST LEASE LINE <div style="text-align: right;">ft.</div>			
DISTANCE TO LEASE LINES <div style="text-align: right;">770 ft. SOUTH    282 ft. E</div>		DISTANCE TO NEAREST WELL ON LEASE <div style="text-align: right;">See FIELD(s) Below</div>			
FIELD(s) and LIMITATIONS: <div style="text-align: center;">*    SEE FIELD DISTRICT FOR REPORTING PURPOSES    *</div>					
FIELD NAME LEASE NAME		ACRES NEAREST LEASE	DEPTH NEAREST LEASE	WELL # NEAREST WE	DIST
----- BRONCO (SILURO-DEVONIAN) ESTACADO -----		200.00	12,750	1 0	8A
----- WELLBORE PROFILE(s) FOR FIELD: Directional -----					
RESTRICTIONS:    Do not use this well for injection/disposal/hydrocarbon storage purposes without approval by the Environmental Services section of the Railroad Commission, Austin, Texas office. This is a hydrogen sulfide field. Hydrogen Sulfide Fields with perforations must be isolated and tested per State Wide Rule 36 and a Form H-9 filed with the district office. Fields with SWR 10 authority to downhole commingle must be isolated and tested individually prior to commingling production.  Bottom Hole: BH1 Lease Lines:                      296.0 F NORTH L 283.0 F EAST L Survey Lines:                    2170.0 F SOUTH L 2358.0 F WEST L					
THE FOLLOWING RESTRICTIONS APPLY TO ALL FIELDS					
This well shall be completed and produced in compliance with applicable special field or statewide spacing and density rules. If this well is to be used for brine mining, underground storage of liquid hydrocarbons in salt formations, or underground storage of gas in salt formations, a permit for that specific purpose must be obtained from Environmental Services prior to construction, including drilling, of the well in accordance with Statewide Rules 81, 95, and 97.					

**RAILROAD COMMISSION OF TEXAS**  
**OIL & GAS DIVISION**

PERMIT TO DRILL, DEEPEN, PLUG BACK, OR RE-ENTER ON A REGULAR OR ADMINISTRATIVE EXCEPTION LOCATION

PERMIT NUMBER <div style="text-align: right;">890902</div>	DATE PERMIT ISSUED OR AMENDED (AMENDED)    Oct 11, 2023	DISTRICT <div style="text-align: right;">*    8A</div>										
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FIELD NAME	ACRES	DEPTH	WELL #	DIST								
LEASE NAME	NEAREST LEASE		NEAREST WE									
This well must comply to the new SWR 3.13 requirements concerning the isolation of any potential flow zones and zones with corrosive formation fluids. See approved permit for those formations that have been identified for the county in which you are drilling the well in.												

**RAILROAD COMMISSION OF TEXAS  
OIL & GAS DIVISION  
SWR #13 Formation Data**

**YOAKUM (501) County**

Formation	Remarks	Geological Order	Effective Date
RED BED-SANTA ROSA		1	12/17/2013
YATES		2	12/17/2013
SAN ANDRES	high flows, H2S, corrosive	3	12/17/2013
GLORIETA		4	12/17/2013
CLEARFORK	Active CO2 Flood	5	12/17/2013
WICHITA		6	12/17/2013
LEONARD		7	12/17/2013
WOLFCAMP		8	12/17/2013
PENNSYLVANIAN		9	12/17/2013
STRAWN		10	12/17/2013
MISSISSIPPIAN		11	12/17/2013
DEVONIAN		12	12/17/2013
DEVONIAN-SILURIAN		13	12/17/2013

The above list may not be all inclusive, and may also include formations that do not intersect all wellbores. The listing order of the Formation information reflects the general stratigraphic order and relative geologic age. This is a dynamic list subject to updates and revisions. It is the operator's responsibility to make sure that at the time of spudding the well the most current list is being referenced. Refer to the RRC website at the following address for the most recent information.

<http://www.rrc.texas.gov/oil-gas/compliance-enforcement/rule-13-geologic-formation-info>

## **APPENDIX C – GAS COMPOSITION**

9252G	30110	Campo Viejo North Acid Gas	
Sample Point Code	Sample Point Name	Sample Point Location	
Laboratory Services	2024091209	0222	DLA - Spot
Source Laboratory	Lab File No	Container Identity	Sampler
USA	USA	USA	Texas
District	Area Name	Field Name	Facility Name
May 28, 2024 07:16	May 28, 2024 07:16	May 28, 2024 12:53	May 29, 2024
Date Sampled	Date Effective	Date Received	Date Reported
69.00	System Administrator		1583 @ 109
Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions
Stakeholder Midstream		NG	
Operator		Lab Source Description	

Component	Normalized Mol %	Un-Normalized Mol %	GPM
H2S (H2S)	10.0000	10.0	
Nitrogen (N2)	0.0360	0.04	
CO2 (CO2)	89.1840	99.101	
Methane (C1)	0.1450	0.16	
Ethane (C2)	0.0000	0	0.0000
Propane (C3)	0.0380	0.042	0.0100
I-Butane (IC4)	0.0000	0	0.0000
N-Butane (NC4)	0.0170	0.019	0.0050
I-Pentane (IC5)	0.0000	0	0.0000
N-Pentane (NC5)	0.0000	0	0.0000
Hexanes Plus (C6+)	0.5800	0.638	0.2520
TOTAL	100.0000	110.0000	0.2670

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

Analyzer Information			
Device Type:	Gas Chromatograph	Device Make:	Shimadzu
Device Model:	GC-2014	Last Cal Date:	May 27, 2024

Gross Heating Values (Real, BTU/ft³)			
14.696 PSI @ 60.00 Å°F		14.73 PSI @ 60.00 Å°F	
Dry	Saturated	Dry	Saturated
96.7	96.00	96.9	96.2

Calculated Total Sample Properties	
GPA2145-16 *Calculated at Contract Conditions	
Relative Density Real	Relative Density Ideal
1.5022	1.4936
Molecular Weight	
43.2580	

C6+ Group Properties		
Assumed Composition		
C6 - 60.000%	C7 - 30.000%	C8 - 10.000%

Field H2S
100000 PPM

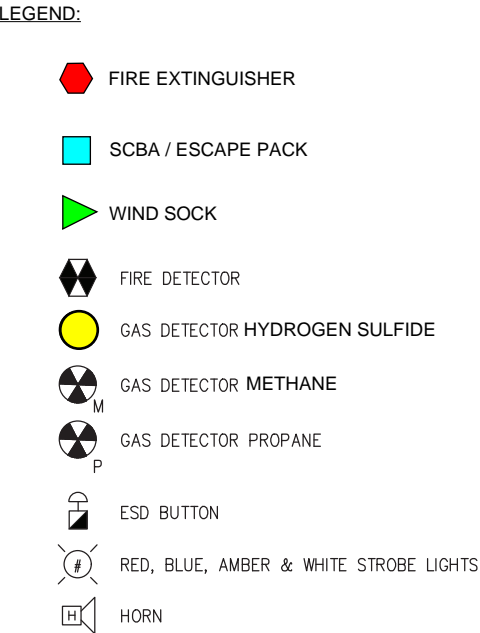
**PROTREND STATUS:** Passed By Validator on May 30, 2024  
**DATA SOURCE:** Imported

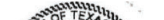
**PASSED BY VALIDATOR REASON:**  
 Close enough to be considered reasonable.

**VALIDATOR:**  
 Ashley Russell

**VALIDATOR COMMENTS:**  
 OK

## **APPENDIX D – FACILITY SAFETY PLOT PLANS**



 <p><b>SAULSBURY</b> ENGINEERING SERVICES SAULSBURY.COM TEXAS REGISTERED ENGINEERING FIRM F-518</p> <p>DWG. REVISION: #7 TO #7 BY SAULSBURY</p> <p>SI JOB NUMBER: 10864 PROJ. MANAGER: M. GULLY</p> <p>P.E. ENGINEERING STAMP</p>	<p>REFERENCE DRAWINGS</p> <table border="1"> <thead> <tr> <th>NUMBER</th> <th>TITLE</th> </tr> </thead> <tbody> <tr> <td>17045-E-817-01</td> <td>STONE MODULE CONTROLLER WIRING DIAGRAM</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		NUMBER	TITLE	17045-E-817-01	STONE MODULE CONTROLLER WIRING DIAGRAM							<p><b>OPTIMIZED PROCESS DESIGNS</b> ENGINEERS AND CONSTRUCTORS KATY, TEXAS</p> <p>PH. 281-371-7500      OPD JOB #17046</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>REVISION</th> <th>DRAWN</th> <th>CHECKED</th> <th>APPRVD</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>AS BUILT - OPD JOB #17046</td> <td>JWB</td> <td>JP</td> <td>GS</td> <td>3-8-19</td> </tr> <tr> <td>4</td> <td>ISSUED FOR CONSTRUCTION - SI JOB #10665</td> <td>DE</td> <td>AK</td> <td>AK</td> <td>03/06/20</td> </tr> <tr> <td>5</td> <td>REVISED AS NOTED - SI JOB #10665</td> <td>DE</td> <td>AK</td> <td>AK</td> <td>04/02/20</td> </tr> <tr> <td>7</td> <td>ISSUED FOR CONSTRUCTION - SI JOB #10864</td> <td>DE</td> <td>CWR</td> <td>SK</td> <td>2/10/22</td> </tr> </tbody> </table>						NO.	REVISION	DRAWN	CHECKED	APPRVD	DATE	3	AS BUILT - OPD JOB #17046	JWB	JP	GS	3-8-19	4	ISSUED FOR CONSTRUCTION - SI JOB #10665	DE	AK	AK	03/06/20	5	REVISED AS NOTED - SI JOB #10665	DE	AK	AK	04/02/20	7	ISSUED FOR CONSTRUCTION - SI JOB #10864	DE	CWR	SK	2/10/22	<p>SAFETY PLOT PLAN SHEET 1 OF 2 CAMPO VIEJO PROCESSING FACILITY YOAKUM COUNTY, TX</p> <p>DRAWING SCALE: 1" = 50'</p> <table border="1"> <thead> <tr> <th>DRAWN BY</th> <th>SP</th> <th>1-18-18</th> </tr> </thead> <tbody> <tr> <td>CHECKED BY</td> <td>JP</td> <td>1-18-18</td> </tr> <tr> <td>APPROVED BY</td> <td>GS</td> <td>1-18-18</td> </tr> </tbody> </table> <p>DOCUMENT CONTROL # 17046-E-811-01</p>		DRAWN BY	SP	1-18-18	CHECKED BY	JP	1-18-18	APPROVED BY	GS	1-18-18	<p><b>STAKEHOLDER MIDSTREAM</b></p> <p>STAKEHOLDER MIDSTREAM APPROVED * DATE 1-18-18 STAKEHOLDER MIDSTREAM PROJECT # DRAWING NUMBER 17046-E-811-01</p>	
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APPROX. S. 17+20'

POZO ACIDO  
AGI WELLHEAD

APPROX. S. 19+20'

CHAIN LINK  
FENCE  
200' x 300'

APPROX. S. 17+20'

ESTACADO  
AGI WELLHEAD

APPROX. S. 19+20'

APPROX. E. 18+50'











MATCHLINE SEE DWG. 17046-E-815-01 ~ E. 7+18'-0"

DRAWING LIMITS N. 8+00'-0"

DRAWING LIMITS S. 0+80'-0"

**SEE DETAIL 'A'**

LEGEND:

-  FIRE EXTINGUISHER
-  SCBA / ESCAPE PACK
-  WIND SOCK
-  FIRE DETECTOR
-  GAS DETECTOR HYDROGEN SULFIDE
-  GAS DETECTOR METHANE
-  GAS DETECTOR PROPANE
-  ESD BUTTON
-  RED, BLUE, AMBER & WHITE STROBE LIGHTS
-  HORN



Digitally signed by Srikanth Konduru  
Date: 2022.02.11 14:53:03+06'00'

**SAULSBURY**

ENGINEERING SERVICES  
SAULSBURY.COM  
TEXAS REGISTERED ENGINEERING FIRM F-518

DWG. REVISION #4 TO #4 BY SAULSBURY	
SI JOB NUMBER:	10864
PROJ. MANAGER	M. GUILLY

[illegible]

## OPTIMIZED PROCESS DESIGNS

ENGINEERS AND CONSTRUCTORS

KATY, TEXAS

PH. 281-371-7500

OPD JOB #17046

NO.	REVISION	DRAWN	CHECKED	APPRVD	DATE
4	ISSUED FOR CONSTRUCTION - SI JOB #10864	DE	CWR	SK	2/10/20
0	ISSUED FOR CONSTRUCTION - OPD JOB #17046	SP	JP	GS	5-18-20
1	REVISED AS NOTED - OPD JOB #17046	JWB	JP	GS	6-22-20
2	AS BUILT - OPD JOB #17046	JWB	JP	GS	7-8-20

SAFETY PLOT PLAN  
SHEET 2 OF 2  
CAMPO VIEJO PROCESSING FACILITY  
YOAKUM COUNTY, TX

-6	YOAKUM COUNTY, TX	
	DRAWING SCALE	1" = 50'

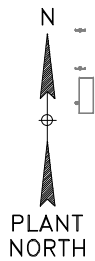
SCALE		
DRAWN BY	SP	1-18-1
CHECKED BY	JP	1-18-1
APPROVED BY	GS	1-18-1
DOCUMENT CONTROL #	17046-E-811-0	

**STAKEHOLDER**  
**MIDSTREAM**

	STAKEHOLDER MIDSTREAM APPROVED	*
8	DATE	1-18-18
8	STAKEHOLDER MIDSTREAM PROJECT #	
2	DRAWING NUMBER	17046-E-811-02

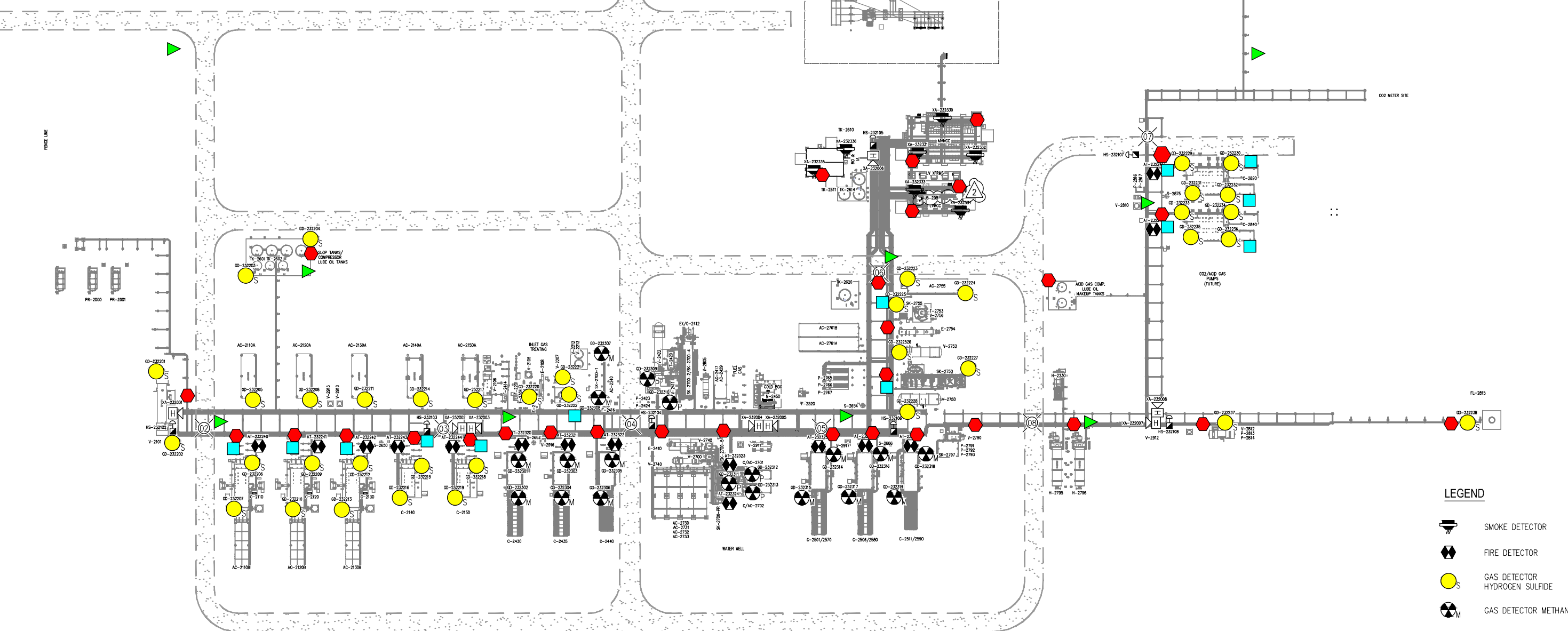
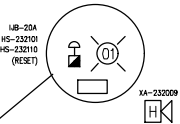
P.E. SEAL IS ONLY APPLICABLE TO THE SI REVISION JOB #10864 DATED 2/10/22





NOTES:

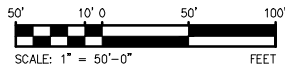
- 1) TRAIN II ESD BUTTON AND RESET TO BE LOCATED INSIDE CONTROL ROOM.
- 2) TRAIN II STROBE BANK TO BE LOCATED ON OUTSIDE OF CONTROL ROOM BUILDING ADJACENT TO EXISTING TRAIN I STROBE BANK.
- 3) IJB-20A TO BE LOCATED INSIDE CONTROL ROOM.




LEGEND

- SMOKE DETECTOR
- FIRE DETECTOR
- GAS DETECTOR HYDROGEN SULFIDE
- GAS DETECTOR METHANE
- GAS DETECTOR PROPANE
- ESD BUTTON
- RED, BLUE, AMBER & WHITE STROBE LIGHTS
- HORN OR SIREN

- FIRE EXTINGUISHER
- SCBA / ESCAPE PACK
- WIND SOCK



REFERENCE DRAWINGS	
NUMBER	TITLE



# KAHUNA

11400 Westmoor Cir. Ste. 325  
Westminster, CO 80021  
303.451.7374

NO.	REVISION	DRAWN	CHECKED	APPRVD	DATE
0	ISSUED FOR CONSTRUCTION	TRP	ZS	ZS	08/28/23
1	REVISED FOR CONSTRUCTION	EK	ZS	ZS	01/12/24
2	REVISED FOR CONSTRUCTION	GJ	ZVS	ZVS	02/12/24

**KAHUNA**  
11400 Westmoor Cir. Ste. 325  
Westminster, CO 80021  
303.451.7374

INSTRUMENTATION				OVERALL SAFETY LOCATION			
CAMPO VIEJO TRAIN II				YOAKUM COUNTY, TX			
DRAWING SCALE				AS NOTED			
DRAWN BY V. PSICHENKO				08/25/23			
CHECKED BY D. CHERRY				08/25/23			
APPROVED BY D. CHERRY				08/25/23			
DOCUMENT CONTROL #							

**STAKEHOLDER MIDSTREAM**

STAKEHOLDER MIDSTREAM	
APPROVED	DATE

## **APPENDIX E – MMA/AMA REVIEW MAPS**

APPENDIX E-1: 25-YEAR PLUME EXTENT, 50-YEAR PLUME EXTENT AND MAXIMUM MONITORING AREA MAP

APPENDIX E-2: OIL AND GAS WELLS WITHIN THE MMA MAP

APPENDIX E-3: INJECTION INTERVAL PENETRATING WELLS WITHIN THE MMA MAP

APPENDIX E-4: OIL AND GAS WELLS WITHIN THE MMA LIST

APPENDIX E-5: GROUNDWATER WELLS WITHIN THE MMA

APPENDIX E-6: WELLBORE SCHEMATICS FOR INJECTION INTERVAL PENETRATING WELLS







**Campo Viejo Facility**  
**Oil and Gas wells within the MMA**

API	WELL NAME	WELL NO.	STATUS	OPERATOR	FIELD	TVD (Ft.)
4250101769	T. W. READ	1	Dry - Hole	Commission's hardcopy map	-	5445
4250102193	R. N. McGinty	1	Dry - Hole	Commission's hardcopy map	-	12615
4250130568	LIBERTY NATIONAL BANK	1	Dry - Hole	Commission's hardcopy map	-	5374
4250130881	LIBERTY NATIONAL BANK	2	Dry - Hole	Commission's hardcopy map	-	5490
4250130981	WEST PLAINS	1	Dry - Hole	Commission's hardcopy map	-	12020
4250132107	MCGINTY 2	2	Shut In - Oil	STEWARD ENERGY II, LLC	HARVARD (DEVONIAN)	12028
4250132612	TENNECO FEE	1	Plugged - Dry Hole	DAVIS OIL COMPANY	WILDCAT	12130
4250132807	HIGGINBOTHAM BROS. & CO.	1	Plugged - Oil	HENDERSON, VICTOR W.	BRAHANEY	5320
4250133849	MCGINTY	1	Plugged - Oil	STEWARD ENERGY II, LLC	HARVARD (DEVONIAN)	11928
4250134081	COCHISE	1W	Active - Injection	STEWARD ENERGY II, LLC	BRAHANEY	11979
4250135778	CHAPPLE, H.	3	Active - Oil	WALSH PETROLEUM, INC.	BRAHANEY	5308
4250135948	CHAPPLE, H.	4	Active - Oil	BURK ROYALTY CO., LTD.	BRAHANEY	5302
4250136127	WHAT A MELLON 519	1H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5310
4250136475	WHAT A MELLON 519	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5316
4250136476	WHAT A MELLON 519	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5314
4250136501	SKINNY DENNIS 468	1H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5319
4250136518	COUSIN WILLARD 450	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5326
4250136523	SMOKIN TRAIN 520	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5273
4250136540	BLAZIN SKIES 453	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5240
4250136554	WHAT A MELLON 519	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5300
4250136569	SKINNY DENNIS 468	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5315
4250136570	SKINNY DENNIS 468	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5315
4250136571	SKINNY DENNIS 468	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5322
4250136577	COUSIN WILLARD 450	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5312
4250136579	COUSIN WILLARD 450	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5316
4250136580	SMOKIN TRAIN 520	1H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5277
4250136581	SMOKIN TRAIN 520	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5261
4250136582	SMOKIN TRAIN 520	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5260
4250136710	COCHISE UNIT 470	1H	Active - Oil	WALSH PETROLEUM, INC.	BRAHANEY	5237
4250136712	HUFFINES 518	1H	Active - Oil	BURK ROYALTY CO., LTD.	BRAHANEY	5243
4250136750	BLAZIN SKIES 453	1H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5215
4250136762	BLAZIN SKIES 453	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5261
4250136771	HUFFINES 518	2H	Active - Oil	BURK ROYALTY CO., LTD.	BRAHANEY	5234
4250136773	COCHISE UNIT 470	2H	Active - Oil	WALSH PETROLEUM, INC.	BRAHANEY	5310
4250136778	BANJO BILL 452	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5229
4250136788	BLAZIN SKIES 453	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5248
4250136789	NEVERMIND 451	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5267
4250136825	UNDER THE BRIDGE 452A	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5295
4250136827	UNDER THE BRIDGE 452	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5277
4250136828	BANJO BILL 452 A	1H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5298
4250136841	NEVERMIND 451	1H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5308
4250136851	DIANNE CHAPIN 471	2H	Active - Oil	SIXESS ENERGY, LLC	BRAHANEY	5343
4250136908	OLD SWITCHEROO 418	5H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5314
4250136935	POZO ACIDO VIEJO	1	Active - Injection	STAKEHOLDER GAS SERVICES, LLC	BRONCO (SILURO-DEVONIAN)	12349

**Campo Viejo Facility**  
**Oil and Gas wells within the MMA**

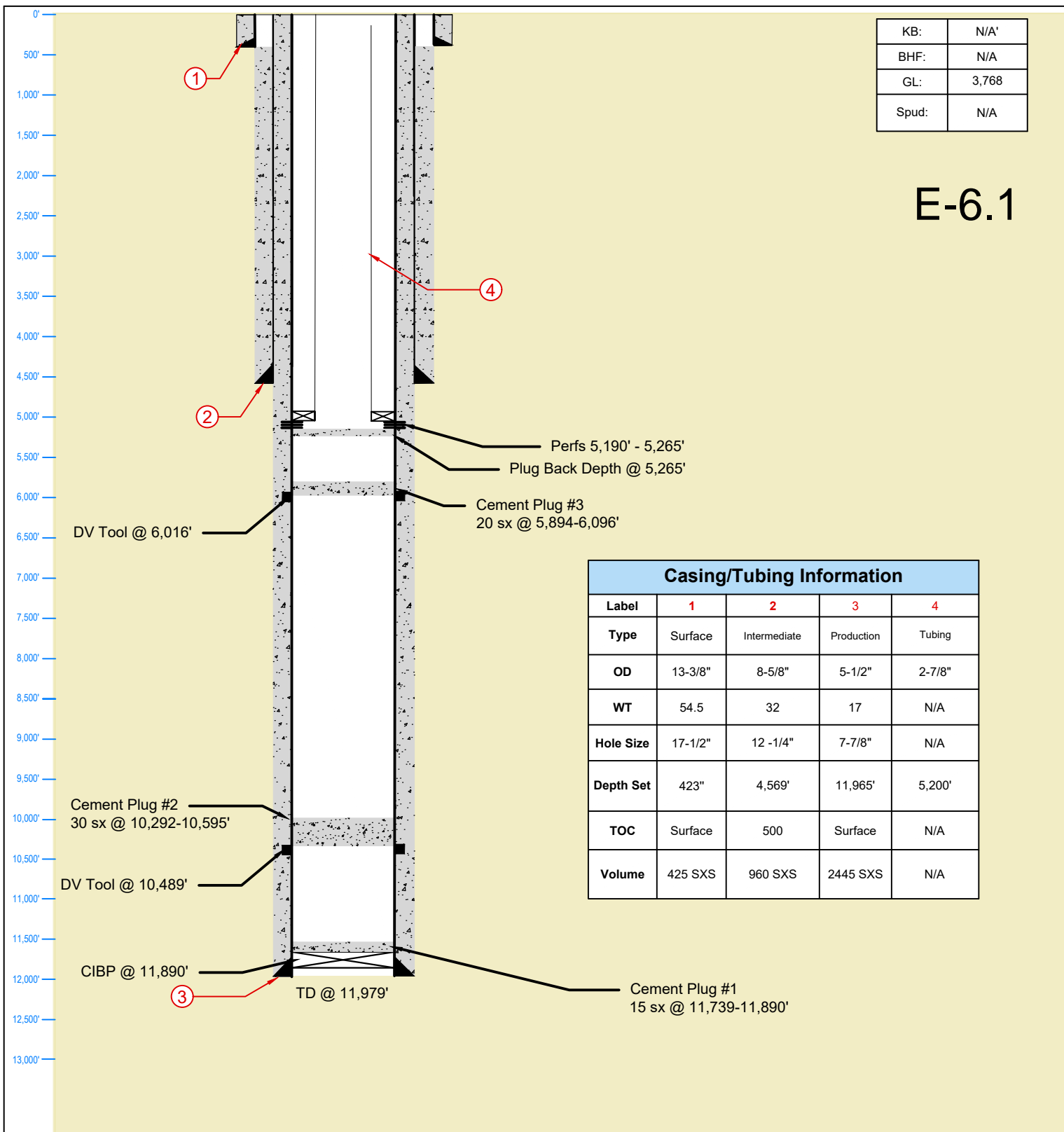
4250136937	SANDMAN 470	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5195
4250136951	SMOKIN TRAIN 520	15H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5182
4250136970	DIANNE CHAPIN 471	3H	Active - Oil	WALSH PETROLEUM, INC.	BRAHANEY	5342
4250136971	DIANNE CHAPIN 471	4H	Active - Oil	SIXESS ENERGY, LLC	BRAHANEY	5343
4250136990	SIXTEEN STONE 416	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5317
4250136996	OLD SWITCHEROO 418	3H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5315
4250137006	STEWARD ENERGY II, LLC	1H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5323
4250137060	OLD SWITCHEROO 418	7H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5315
4250137061	OLD SWITCHEROO 418	6H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5316
4250137092	CHICKEN ROASTER 417	5H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5318
4250137097	LIGHTNING CRASHES 417	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5295
4250137111	SIXTEEN STONE 416	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5301
4250137124	SANDMAN 470	6H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5357
4250137137	CHICKEN ROASTER 417	6H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5327
4250137138	CHICKEN ROASTER 417	7H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5325
4250137147	OLD SWITCHEROO 418	2H	Permitted - Location	HADAWAY CONSULT AND ENGINEER,LLC	SABLE (SAN ANDRES)	6000
4250137148	OLD SWITCHEROO 418	4H	Permitted - Location	HADAWAY CONSULT AND ENGINEER,LLC	SABLE (SAN ANDRES)	6000
4250137153	NEVERMIND 451	35H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5311
4250137179	SKINNY DENNIS 468	35H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5289
4250137197	SANDMAN 470	5H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5232
4250137217	LIGHTNING CRASHES 417	6H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5332
4250137266	HUFFINES 518	3H	Active - Oil	WALSH PETROLEUM, INC.	BRAHANEY	5500
4250137278	WHAT A MELLON 519	15H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5423
4250137293	DIANNE CHAPIN 471	7H	Active - Oil	WALSH PETROLEUM, INC.	BRAHANEY	5389
4250137294	DIANNE CHAPIN 471	6H	Active - Oil	WALSH PETROLEUM, INC.	BRAHANEY	5392
4250137311	LIGHTNING CRASHES 417	5H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5344
4250137346	SIXTEEN STONE 416	3H	Permitted - Location	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5600
4250137347	SIXTEEN STONE 416	5H	Permitted - Location	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5600
4250137390	NEVERMIND 451	2H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5389
4250137395	BANJO BILL 452 C	15H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5412
4250137396	COCHISE UNIT 470	3H	Active - Oil	SIXESS ENERGY, LLC	BRAHANEY	5379
4250137397	DIANNE CHAPIN 471	5H	Active - Oil	SIXESS ENERGY, LLC	BRAHANEY	5405
4250137398	NEVERMIND 451	25H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5392
4250137427	WHAT A MELLON 519	35H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5428
4250137443	SANDMAN 470	4H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5390
4250137467	C.D.U.	1H	Permitted - Location	BURK ROYALTY CO., LTD.	BRAHANEY	5500
4250137468	C.D.U.	2H	Permitted - Location	BURK ROYALTY CO., LTD.	BRAHANEY	5500
4250137472	ESTACADO	1	Permitted - Location	STAKEHOLDER GAS SERVICES, LLC	BRONCO (SILURO-DEVONIAN)	12750
4250137476	SMOKIN TRAIN 520	35H	Permitted - Location	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5600
4250137477	BLAZIN SKIES 453	15H	Permitted - Location	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5600
4250137490	UNDER THE BRIDGE 452 C	35H	Active - Oil	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5311
4250137509	BLAZIN SKIES 453	35H	Permitted - Location	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5600
4250137510	SKINNY DENNIS 468	15H	Permitted - Location	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5600
4250137511	NEVER SWITCH 451 A	4H	Permitted - Location	STEWARD ENERGY II, LLC	PLATANG (SAN ANDRES)	5600
4250170375	A. J Granger	1	Dry - Hole	Commission's hardcopy map	-	5500

**Campo Viejo Facility**  
**Oil and Gas wells within the MMA**

4250170377	Cora Reed	1	Dry - Hole	Commission`s hardcopy map	-	5350
4250190001	-	1	Plugged - Oil	Commission`s hardcopy map	-	-
4250190002	-	1	Dry - Hole	Commission`s hardcopy map	-	-
4250190003	-	1	Permitted - Location	Commission`s hardcopy map	-	-







KB:	N/A'
BHF:	N/A
GL:	3,768
Spud:	N/A

E-6.1

**LONQUIST & CO. LLC**

PETROLEUM  
ENGINEERS

ENERGY  
ADVISORS

HOUSTON | CALGARY  
AUSTIN | WICHITA | DENVER

Texas License F-9147

12912 Hill Country Blvd. Ste F-200  
Austin, Texas 78738  
Tel: 512.732.9812  
Fax: 512.732.9816

**Cochise 1W**

Country: USA

Location:

API No: 42-501-34081

RRC District No:

Drawn: ASG

Rev No: 1

State/Province: Texas

Site:

Field: BRAHANEY

Project No:

Reviewed: SLP

Notes:

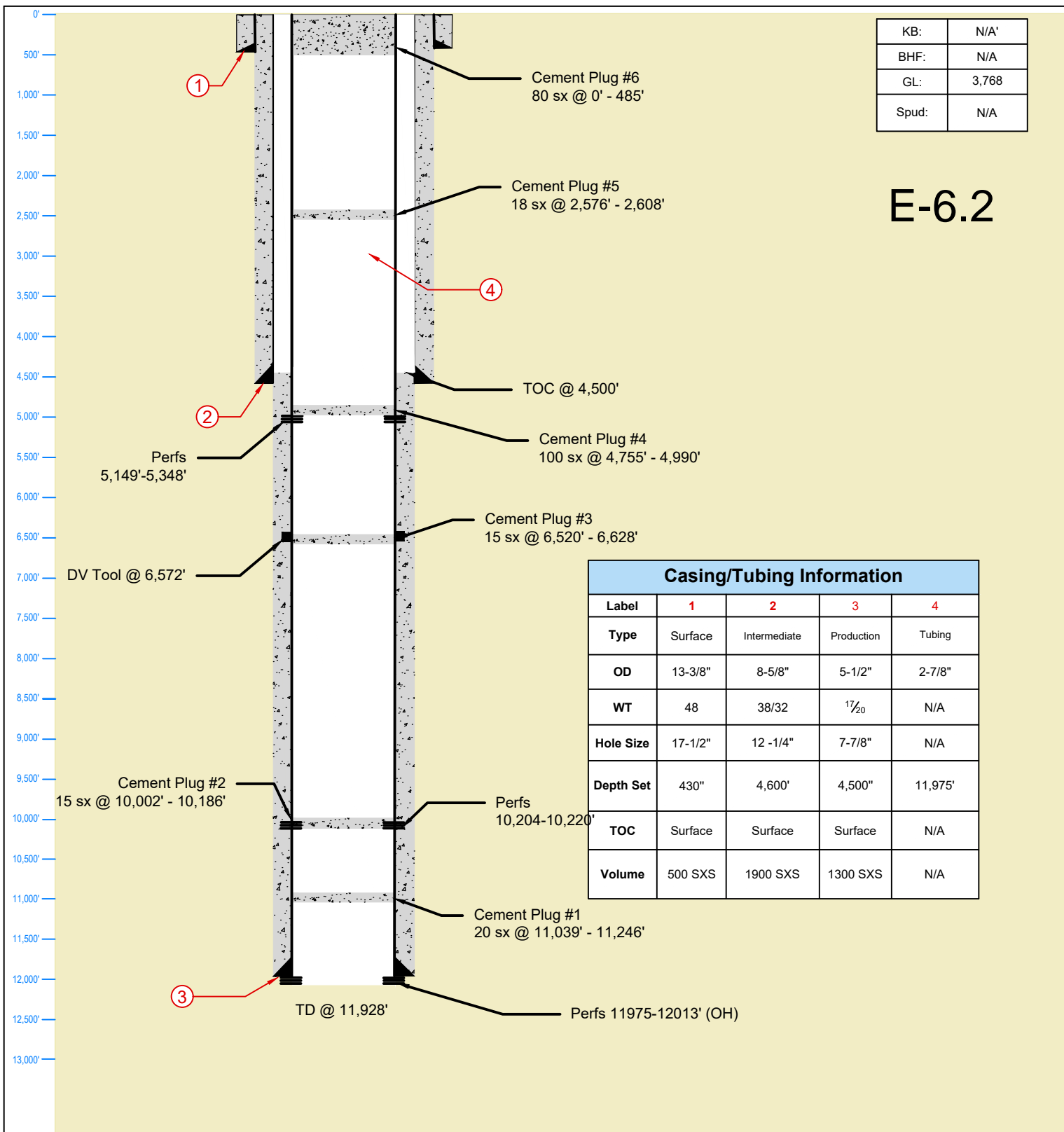
County/Parish: Yoakum

Survey:

Well Type/Status: SWD

Date: 03/14/2022

Approved: SLP



E-6.2

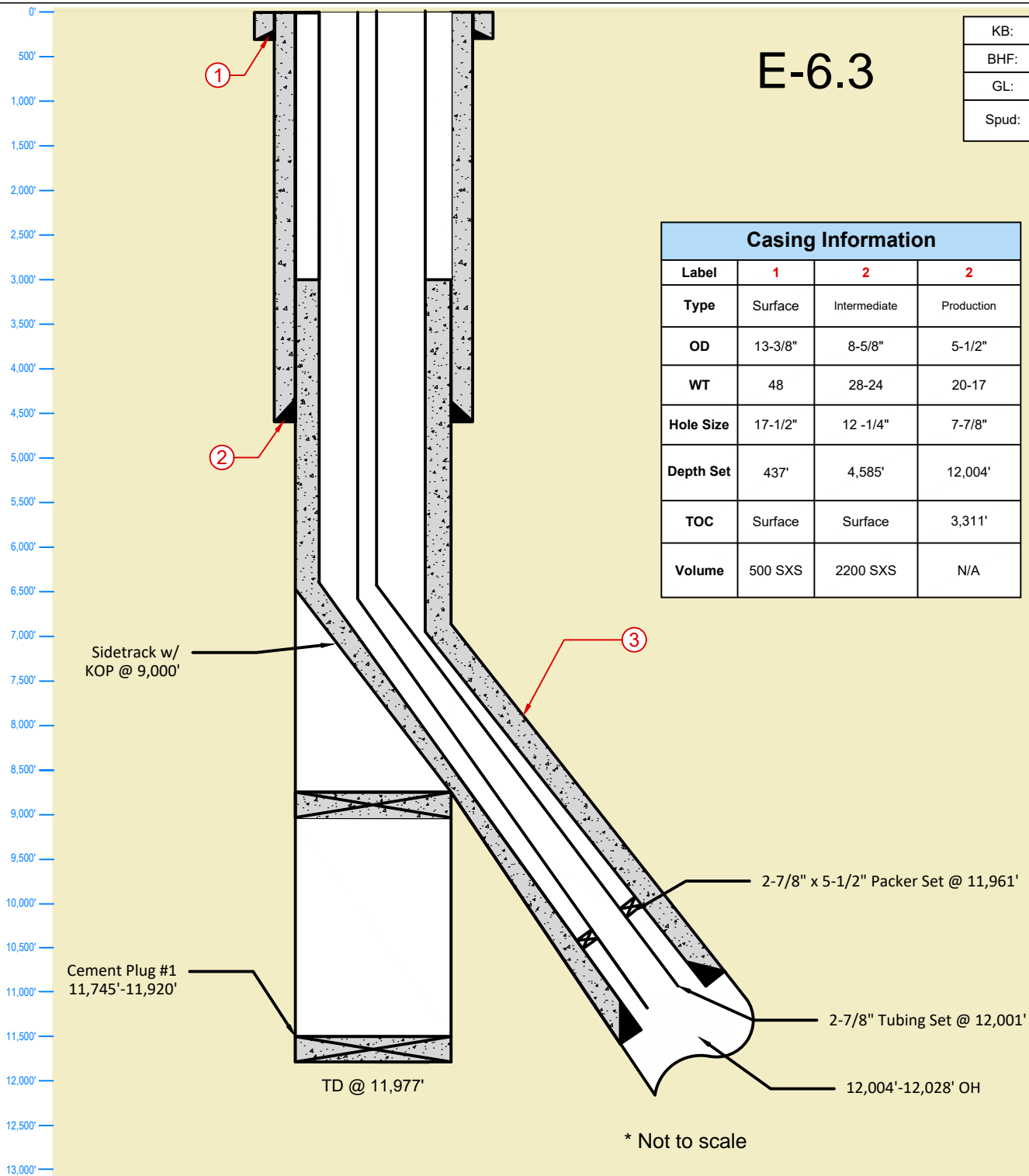
## MCGINTY #1

<b>Country:</b> USA	<b>State/Province:</b> Texas	<b>County/Parish:</b> Yoakum
<b>Location:</b>	<b>Site:</b>	<b>Survey:</b>
<b>API No:</b> 42-501-33849	<b>Field:</b>	<b>Well Type/Status:</b> SWD
<b>Texas License F-9147</b>	<b>RRC District No:</b>	<b>Project No:</b>
<b>Drawn:</b> ASG	<b>Reviewed:</b> SLP	<b>Date:</b> 03/21/2022
<b>Rev No:</b> 1	<b>Notes:</b>	<b>Approved:</b> SLP

# E-6.3

KB:	3,768'
BHF:	N/A
GL:	N/A
Spud:	N/A

Casing Information			
Label	1	2	2
Type	Surface	Intermediate	Production
OD	13-3/8"	8-5/8"	5-1/2"
WT	48	28-24	20-17
Hole Size	17-1/2"	12 -1/4"	7-7/8"
Depth Set	437'	4,585'	12,004'
TOC	Surface	Surface	3,311'
Volume	500 SXS	2200 SXS	N/A



## LONQUIST & CO. LLC

PETROLEUM  
ENGINEERS ENERGY  
ADVISORS

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DENVER • COLLEGE STATION • BATON ROUGE • EDMONTON

Texas License F-9147

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Tel: 512.732.9812  
Fax: 512.732.9816

## McGinty 2 #2

Country: USA

Location:

API No: 42-501-32107

RRC District No:

Drawn: ASG

Rev No: 1

State/Province: Texas

Site:

Field: BRAHANEY

Project No:

Reviewed: SLP

Notes:

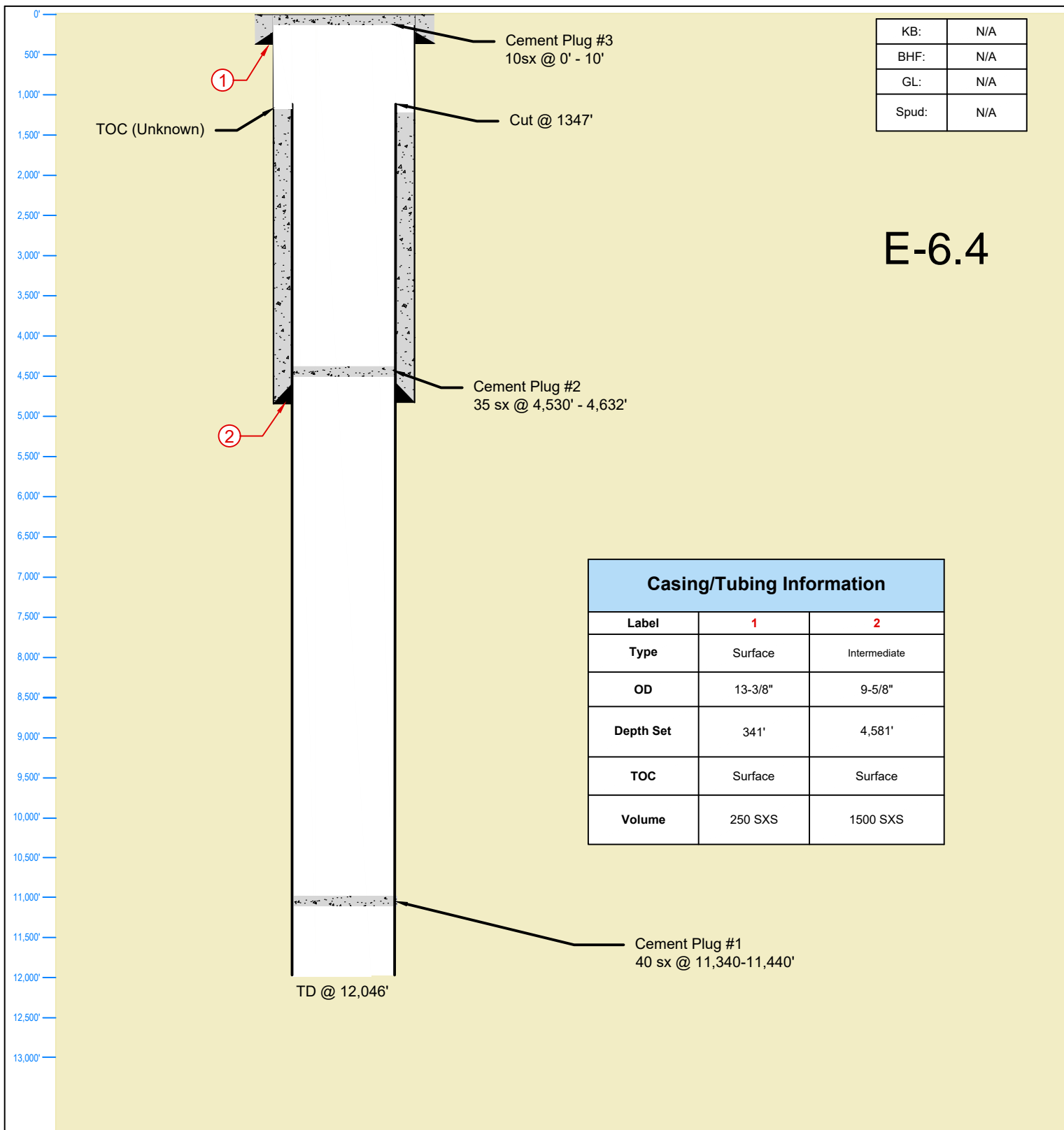
County/Parish: Yoakum

Survey:

Well Type/Status: SWD

Date: 03/15/2022

Approved: SLP



# **LONQUIST & CO. LLC**

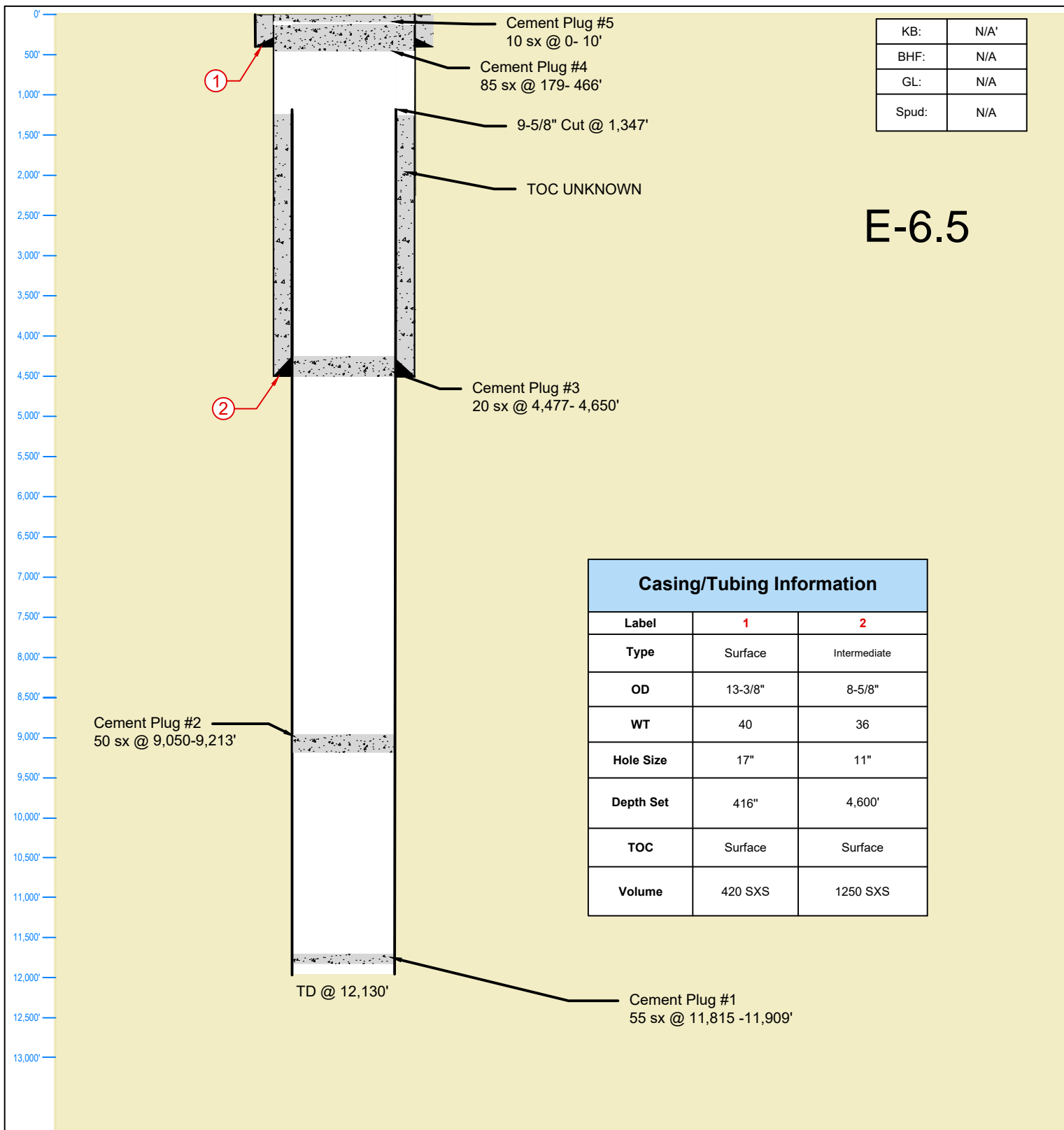
**PETROLEUM  
ENGINEERS**      **ENERGY  
ADVISORS**

HOUSTON | CALGARY  
AUSTIN | WICHITA | DENVER

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Austin, Texas 78738  
Tel: 512.732.9812  
Fax: 512.732.9816

R.N. McGinty #1		
Country: USA	State/Province: Texas	County/Parish: Yoakum
Location:	Site:	Survey:
API No:	Field:	Well Type/Status: SWD
RRC District No:	Project No:	Date: 03/15/2022
Drawn: ASG	Reviewed: SLP	Approved: SLP
Rev No: 1	Notes:	



# LONQUIST & CO. LLC

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ENERGY  
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Austin, Texas 78738  
Tel: 512.732.9812  
Fax: 512.732.9816

## Tenneco Fee #1

Country: USA

Location:

API No: 42-501-32612

RRC District No:

Drawn: ASG

Rev No: 1

State/Province: Texas

Site:

Field: BRAHANEY

Project No:

Reviewed: SLP

Notes:

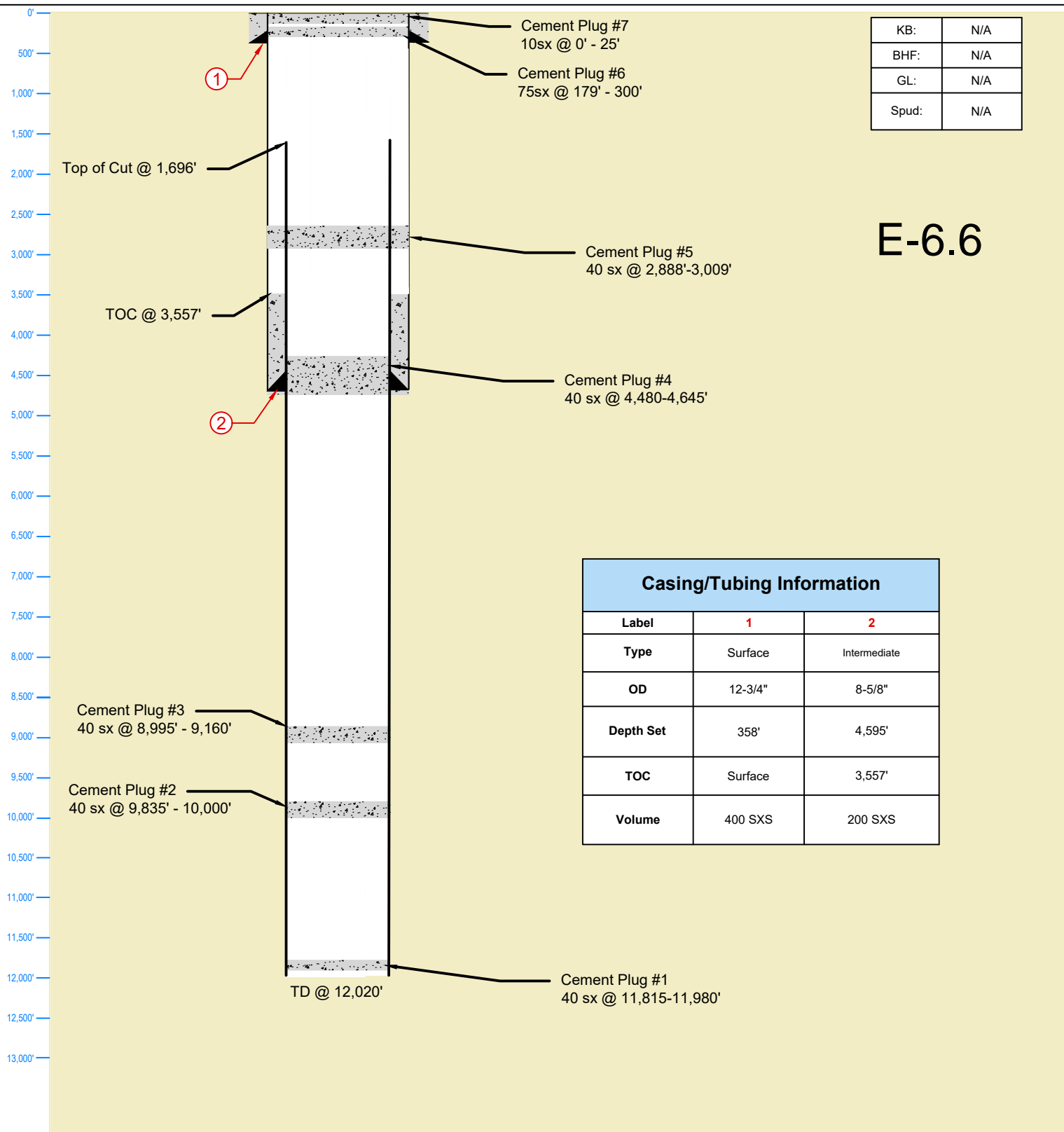
County/Parish: Yoakum

Survey:

Well Type/Status: SWD

Date: 03/14/2022

Approved: SLP



E-6.6

**LONQUIST & CO. LLC**

**PETROLEUM  
ENGINEERS**

**ENERGY  
ADVISORS**

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Texas License F-9147

12912 Hill Country Blvd. Ste F-200  
Austin, Texas 78738  
Tel: 512.732.9812  
Fax: 512.732.9816

## West Plains Unit #1

**Country:** USA

**State/Province:** Texas

**County/Parish:** Yoakum

**Location:**

**Site:**

**Survey:**

**API No:** 4250130981

**Field:**

**Well Type/Status:** SWD

**RRC District No:**

**Project No:**

**Date:** 03/17/2022

**Drawn:** ASG

**Reviewed:** SLP

**Approved:** SLP

**Rev No:** 1

**Notes:**