



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 10-0298168

**THE APPLICATION OF LATIGO PETROLEUM, LLC PURSUANT TO STATEWIDE
RULE 46 FOR A PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE
OF OIL OR GAS, COURSON RANCH 133, LEASE, WELL 4A, ALPAR-PEARSON
(BROWN DOLOMITE) FIELD, ROBERTS COUNTY, TEXAS**

HEARD BY: Karl Caldwell – Technical Examiner
Ryan Lammert – Administrative Law Judge

PROCEDURAL HISTORY:

Application Filed:	June 15, 2015
Protest Received:	June 19, 2015
Request for Hearing Received:	September 15, 2015
Application Amended:	November 10, 2015
Amended Notice of Hearing:	December 11, 2015
Hearing Held:	February 16, 2016
Transcript Received:	March 9, 2016
Proposal for Decision Issued:	July 19, 2016

APPEARANCES:

APPLICANT:

David Nelson
Steve Towns
Kirk Edwards

REPRESENTING:

Latigo Petroleum, LLC

PROTESTANTS:

Mickey Olmstead
Buddy Richter

Courson Family Land Partnership

Brian McWilliams
CC Sysombath

City of Amarillo

C. E. Williams
Bill Mullen

Panhandle Groundwater Conservation District

CASE SUMMARY

The Applicant requested a hearing on its disposal well application pursuant to Statewide Rule 46 to inject fluid into a reservoir productive of oil or gas for the Courson Ranch 133 Lease, Well 4A, Alpar-Pearson (Brown Dolomite) Field, Roberts County, Texas. The application is a non-commercial disposal application, and the subject well is an existing well. If granted, the permit would authorize the injection of 5,000 barrels of salt water per day into the Brown Dolomite Formation between 2,900 feet and 4,450 feet.¹

The application is protested by Courson Family Land Partnership, a protest that is supported by the City of Amarillo, and by the Panhandle Groundwater Conservation District. The Protestants believe the application should be denied due to the potential for pollution of fresh water, the potential for the proposed disposal activities to fracture the formation and be non-compliant with the applicable Statewide Rule, and that the proposed non-commercial disposal well is not in the public interest.

Based on the evidence in the record, the Administrative Law Judge and Technical Examiner (collectively "Examiners"), recommend that the application be approved with a special permit condition. The Examiners recommend that the maximum surface injection pressure be limited to 812 psig. The Applicant would have the opportunity to request a higher surface injection pressure in the future based on the results of a fracture step-rate test performed in accordance with Commission guidelines.²

APPLICABLE LAW

Any person who engages in fluid injection operations in reservoirs productive of oil, gas, or geothermal resources pursuant to 16 Tex. Admin. Code §3.46 must obtain a permit from the Commission. Pursuant to Texas Water Code § 27.051(b), the Commission has authority to permit disposal wells if it finds:

- 1) that the use or installation of the injection well is in the public interest;
- 2) that the use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;
- 3) that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution; and
- 4) that the applicant has made a satisfactory showing of financial responsibility if required by Section 27.073 of this code.

¹ At the hearing, the Applicant offered to reduce the requested maximum injection rate from 20,000 bpd to 5,000 bpd. Tr. pg. 78, ln 3-14.

² <http://www.rrc.state.tx.us/oil-gas/publications-and-notices/manuals/injectiondisposal-well-manual/summary-of-standards-and-procedures/technical-review/step-rate-test-guidelines/>

DISCUSSION OF THE EVIDENCE

Applicant's Evidence (Latigo Petroleum, LLC)

Application

Latigo Petroleum, LLC ("Latigo" or "Applicant") requests disposal authority pursuant to Statewide Rule 46³ for the Courson Ranch 133 Lease, Well 4A, ("CR 133 4A" or "subject well") API No. 393-31219, Alpar-Pearson (Brown Dolomite) Field, Roberts County, Texas. The application is a non-commercial disposal application. The CR 133 4A is a former producing well. The subject well is located in northern Roberts County near the Roberts-Ochiltree county line, approximately 24 miles northwest of Miami, Texas. Notice of the application was published in the *Amarillo Globe News* on July 22, 2015. Notice of the application was mailed to the Courson Ranches, the owner of record of the surface tract on which the well is located, and also mailed to the Roberts County Clerk. Latigo is the only operator within one half-mile of the subject well location. The application is protested by Courson Family Land Partnership ("Courson"). Courson owns the surface acreage and the water rights where the subject well is located, as well as surrounding acreage, which is referred to as the Courson Ranch. In 2007 Courson sold some of its water rights to the city of Amarillo. The City of Amarillo supports Courson's protest. The Panhandle Groundwater Conservation District ("PGCD") also protests the application.

Injection Interval

The proposed disposal interval is in the Brown Dolomite Formation in the depth interval between 2,900 feet and 4,450 feet. Latigo had originally filed the application with a proposed disposal interval between 3,200 feet and 4,450 feet. The CR 133 4A is an existing well, and in preparing the well to be converted to a disposal well, Latigo performed a squeeze job and ran a cement bond log (CBL). The CBL was submitted to the Railroad Commission of Texas (RRC) for evaluation as a component of its application. The Oil and Gas Division sent Latigo a letter regarding the review of the cement bond log, which indicated insufficient cement behind the 5 ½-inch casing to confine injected fluids to the original disposal zone of 3,200 feet to 4,450 feet. The Oil and Gas Division recommended either a cement squeeze immediately above the injection interval with 25 sacks of cement as a condition of the permit. Or, alternatively, Latigo may revise the top of the disposal interval to 2,900 feet at which point there is sufficient cement bonding above the top of the revised disposal interval. As a result, Latigo amended the top of the disposal interval from 3,200 feet to 2,900 feet.

Type(s) and Source of Injection Fluid

The amended application is for the disposal of salt water from only the subject lease. Steve Towns, Latigo's regulatory consultant witness stated that Forms H-1/H-1A were amended prior to the hearing, with only one change to the previous H-1/H-1A application. In the previous H-1/H-1A application, the box indicating disposal of fluids from leases other than the lease

³ 16 Tex. Admin. Code §3.46 (Fluid Injection into Productive Reservoirs).

identified in line item No. 9 (Lease/Gas ID No. 214275) was inadvertently checked. This was corrected in the amended Forms H-1/H-1A to reflect that fluids for disposal would only be from the lease identified in Item 9 (Lease/Gas ID No. 214275).

Mr. Towns states the Courson 133 is identified in the space for the lease name since that is the name of the well that they are requesting a permit for. According to Mr. Towns when you designate on the Forms H-1/H-1A that you will only be disposing of water from your lease, that water will come from whatever lease you have. This is Mr. Towns' understanding of how the Commission processes these applications with respect to what is meant by the lease or the well.

Maximum Requested Injection Volume

The Form H-1 lists a maximum requested injection volume of 20,000 barrels per day (bpd) of salt water, at a maximum surface injection pressure of 1,450 psig. Kirk Edwards, President of Latigo and an engineer with a degree in petroleum engineering, stated that Latigo has no intention of injecting 20,000 bpd. If the RRC were to limit the injection volume to a maximum volume of 5,000 bpd it would be satisfactory to Latigo. In Mr. Edwards' opinion, a 5,000 bpd maximum injection volume would be more than enough volume to efficiently operate the proposed disposal operations.

Maximum Requested Surface Injection Pressure

Mr. Towns stated that the reservoir data section of Form H-1 was provided to him through Hardaway Engineering. Form H-1A lists a maximum surface injection pressure of 1,450 psi. According to Mr. Towns, "As a general rule, every operator seems to want to request the maximum so that they never have to amend the permits...it really doesn't have any technical background. It's just a number that was initially submitted."⁴ The rule of thumb is half a psi (0.5 psi) per foot to the top of the injection interval. In this instance, 0.5 psi per foot to the top of the injection interval at a depth of 2,900 feet is 1,450 psig. The Forms H-1 and H-1A were provided to the Commission in the review of the application.

Fresh Water Formations

A Groundwater Protection Determination letter states that to protect usable-quality groundwater at this location, the Groundwater Advisory Unit (GAU) of the RRC recommends the interval from the land surface to 10 feet into the Permian red beds or to a depth of 550 feet, whichever is deeper, must be protected. The GAU estimates the base of underground sources of drinking water (USDW) occurs at a depth of 650 feet at the site of the referenced well (API No. 393-31219).

The well log for the subject well shows the presence of numerous sections with zero porosity above the injection interval, indicating anhydrite sections. In addition, there are several shale sections, including a shale interval from approximately 1,920 feet to 2,535 feet. In total

⁴ Tr. pg. 18, ln 9-14.

Mr. Edwards estimates the cumulative thickness of the shale and anhydrite sections to be in the range of 220 feet to more than 300 feet.

Productive Formations

The productive formations in the area are all deeper than the disposal interval. Mr. Edwards testified that there is sufficient geological isolation below the injection interval to protect the deeper productive intervals.

History of the Subject Well (CR 133 4A) and Conversion to a Disposal Well

The Form G-1 shows the CR 133 4A was completed on October 1, 2005. The Form G-1 also shows 8 5/8-inch surface casing was set at a depth of 1,150 feet and cemented with cement circulated to surface. 5 1/2-inch intermediate (longstring) casing was set at a depth of 8,260 feet and a multi-stage cementing tool was set at a depth of 5,550 feet. 150 sacks of cement were pumped, with cement behind pipe from the base of the 5 1/2-inch casing at 8,260 feet and the top of cement (TOC) at 7,520 feet. 80 sacks of cement were pumped through the multi-stage tool at 5,550 feet with cement behind the 5 1/2-inch casing from 5,550 feet to 5,470 feet.

According to Mr. Edwards, Latigo selected this particular well due to its advantageous location. In addition, since the well was drilled in 2005 it was deemed to be a good candidate to have very good casing and cement. Mr. Edwards stated that the casing has been tested and has good integrity, which is the main thing Latigo looks for in identifying potential existing wells as candidates for conversion to disposal wells. Mr. Edwards stated that they have an existing injection well on the Courson Ranch Lease ("Latigo 9W disposal well") that is permitted in the Brown Dolomite Formation, and the Brown Dolomite Formation is a good reservoir to inject water into.

Latigo hired a cementing company to perform a squeeze job on June 3, 2015 in preparation of the subject well for use as a disposal well. The Form W-15 Cementing Report shows 475 sacks (820 cubic feet) of cement were pumped at a depth of 2,850 feet. In Mr. Edwards' opinion, the cement squeeze job was successful in isolating a zone in the Brown Dolomite Formation. A CBL was run in June 2015 after the squeeze job that showed cement behind the casing from 2,900 feet to 2,590 feet, which is more than 300 feet of cement above the top of the injection interval. The Commission was provided a copy of the CBL in the technical review of the application.

Nearby Wellbores (Area of Review)

An area of review of all wellbores within a quarter-mile radius shows no other wellbores within a quarter-mile of the CR 133 4A. In addition, there are no other operators other than Latigo within a half-mile of the CR 133 4A.

Nearby Commercial Disposal Wells

Mr. Towns performed a study of available commercial disposal wells (CDW) within a 10-mile radius of the CR 133 4A and found three available CDWs:

- 1) The closest CDW is the Overflow 21 Mile SWD, located approximately 5 miles to the northeast (API No. 357-30158, UIC No. 100631). The maximum permitted surface injection pressure is 1,000 psi, with a permitted injection interval between 3,420 feet to 4,250 feet.
- 2) Wichita Water Waste Disposal operates the McCartor "A" Well No. 1 (API No. 357-30231, UIC No. 64495), located approximately 10 miles to the north of the CR 133 4A. The maximum permitted surface injection pressure is 1,000 psi, with an injection interval between 3,600 feet and 4,250 feet.
- 3) The Overflow S Curve West SWD (API No. 357-33315, UIC No. 108510) is located approximately 10 miles to the west of the CR 133 4A location. The maximum permitted surface injection pressure is 1,600 psi, with a permitted injection interval between 3,200 feet and 5,600 feet.

Although the maximum surface injection pressure for two of three CDWs within a ten-mile radius is less than 0.5 psi per foot to the top of the injection interval, in Mr. Town's opinion, the applicant in each instance did not request a maximum surface injection pressure of 0.5 psi per foot. The one applicant that requested 0.5 psi per foot for its disposal well received 0.5 psi per foot. In Mr. Town's opinion, each applicant was granted the maximum pressure requested, and there was not a pressure limitation placed on the wells by the Commission.

Disposal of Latigo's Produced Water and the Need for Additional Disposal Capacity

Latigo has approximately 8,450 acres leased in the area surrounding the subject well. Latigo currently has one active saltwater disposal well on the lease, referred to as the Latigo 9W disposal well. The 9W disposal well is permitted in the Brown Dolomite Formation between 3,600 feet and 3,700 feet. This disposal well is permitted at maximum surface injection pressure of 1,800 psi and a maximum injection volume of 7,500 bpd. According to Mr. Edwards the well is near capacity because the pump and facility were specifically designed to service one producing well, the Latigo 149-9 well. Mr. Edwards estimates that the injection pressure is 150 to 200 psi below its permitted maximum surface pressure. In Mr. Edwards' opinion, the existing well would not have the capacity for the additional water that will be produced from drilling new wells on the lease. Mr. Edwards is not sure if the tubing in this well is 2 3/8-inch or 2 7/8-inch. If the tubing is 2 3/8-inch, it would be an additional expense to install 2 7/8-inch tubing. If the well is limited by the pump capacity, a bigger pump would cost hundreds of thousands of dollars.

The Latigo 149-9 well is completed in the St. Louis Formation which makes a tremendous amount of water, estimated to be approximately 2,000 barrels (bbl) of water per day. The pump capacity to move water from the producing well to the 9W disposal well is also

approximately 2,000 bpd. The pump does not run 24 hours a day, as 2,000 barrels of water will be injected into the 9W disposal well within a few hours.

Mr. Edwards states that the 149-9 well has its own disposal well to keep the well economic. The 149-9 well is located a few hundred yards from the 9W disposal well. Due to its close proximity, Latigo was able to construct a pipeline to the 9W disposal well. Mr. Edwards states that it would not be economic to dispose of the water in any other manner from the 149-9 well. Since the 9W disposal is near capacity there would be no available capacity for any additional water that may be produced from new wells.

Latigo is seeking the subject application for the CR 133 4A disposal well as it plans to drill additional wells that will produce water on the 8,450 acre lease. Latigo's plan for the proposed CR 133 4A disposal well is to use it to dispose of water from six wells, and possibly more wells that may be drilled in the future. Latigo uses approximately 60,000 to 70,000 bbl of water to drill horizontal wells in the area. Latigo is drilling laterals that are 5,000 to 6,000 feet in length. Latigo currently has three well pad sites built, with plans to build a fourth well pad in the future. Latigo intends to have dual pads constructed such that the wells can be completed at the same time or within the same week. Latigo will then have frac water and produced water from multiple wells to dispose of. In the past, Latigo has had trucks transport the water to third party disposals and all produced water has gone to third party disposals.

Latigo modeled water production from its wells that were drilled in 2014, based on the frac load volume and water production. The model estimated that the maximum volume to be disposed of on any given day is approximately 4,500 bpd. Latigo estimates that 60,000 bbl of water will be produced per well, with a combined savings of \$573,000 over a 2-year period for the 6 wells Latigo has planned to be drilled and completed. With the other wells on the lease, this would add an additional \$350,000 in savings, for a total combined savings of almost \$1,000,000 over a 2-year period with the proposed disposal well.

Mr. Edwards stated that the distance from the existing 9W disposal well to the subject disposal well location "may be a mile-and-a-half as the crow flies."⁵ However, the 9W disposal well is at the top of a cliff and the truck-travel distance is approximately 13 miles. According to Mr. Edwards there is an elevation change of roughly 400 feet from the main road to the mesa tops on the lease; therefore it is difficult for Latigo to construct a roadway up the ravines due to the topography.

In Mr. Edwards' opinion it would be very challenging to get water from other Latigo wells in the area to the 9W disposal well location due to the change in elevation. Latigo hopes to be able to pipe water to the applied-for disposal well. Mr. Edwards stated "...what you want in a disposal and a pipeline system application is you want everything on the same level where you're not having to shoot water up a mountain top to a disposal that's very far...because it can be hydraulically very challenging....which creates another level of uncertainty and another

⁵ Tr. pg. 64, ln 17.

expense...we don't have to deal with when we have the wells on the...level where these wells are to be drilled.”⁶

The 4D is a Latigo well that has been permitted for disposal. The 4D is approximately a half-mile away from the proposed CR 133 4A. Mr. Edwards believes that the permitted capacity for the 4D disposal well is 10,000 bpd. According to Mr. Edwards, the 4D is close to the same elevation as the 9W disposal well as both are on top of the mesas. Mr. Edwards states that depending on future oil prices, Latigo intends to use the 4D for disposal someday to service St. Louis Formation wells which make a lot of water.

If the Commission does not grant the applied-for permit, Mr. Edwards stated that Latigo would still intend to drill six wells, depending on the price of oil. The purpose of the application is to save money. Mr. Edwards re-iterated that Latigo is willing to limit the injection volume of the CR 133 4A to 5,000 bpd.

At the present time, Latigo requests water companies to bid on water hauling. These water companies take the water away for disposal and Latigo does not know which disposal wells the water hauling companies are using. Latigo has used 5 to 10 third party disposal haulers since 2014. The commercial disposal facilities Latigo's water is hauled to by water haulers are supposed to notify Latigo if any is skim oil being allocated back to Latigo's lease. In Mr. Edwards' opinion, some facilities do notify Latigo, and some facilities do not. When Latigo does receive skim oil information they report it on the production reports.

Since the price of oil and gas has declined everything is more cost sensitive and Latigo is trying to get facilities and pipelines in place so wells drilled and completed in the future will be at a lower economic level than in the past. Latigo is trying to lower drilling and production costs. If Latigo does not get approval for the proposed disposal well they will have to continue to utilize commercial facilities in the area for disposal.

Financial Assurance

Latigo (Operator No. 488260) has an active P-5 on file with the Commission with an expiration date of August 1, 2016, and a \$250,000 letter of credit.

Seismic Survey

A review of USGS seismic data within 100 square miles (a radius of 9.08 kilometers) of the subject well location shows that no seismic events have been reported.

⁶ Tr. pg. 64, ln 22 – pg. 65, ln 6.

Protestant's Evidence**Protestant Courson Family Land Partnership**

The Courson Family Land Partnership ("Courson") owns surface acreage and the water rights where the subject well is located, in addition to owning surrounding acreage which is collectively referred to as the Courson Ranch. Courson sold some, but not all, of its water rights to the City of Amarillo in 2007. Courson is protesting the application to protect their fresh groundwater resources. People currently live on the ranch acreage and use groundwater from water wells, and Courson uses groundwater for their irrigation and cattle. Courson is concerned that the requested surface injection pressure of 1,450 psi will fracture the Brown Dolomite Formation and injected fluids will escape the injection interval. Courson is also concerned that wellbores in the area are not cemented across the disposal interval. Lastly, Courson does not believe the proposed disposal well is in the public interest and is not necessary since Latigo already has one active disposal well in this area (Latigo 9W disposal well) and another permitted disposal well (Latigo 4D). The total permitted daily injection volume of these two wells is 17,500 bpd.

Thomas Richter, a professional engineer specializing in petroleum engineering, appeared as a witness on behalf of Courson. Mr. Richter pulled well files for all wells within a two-mile radius of the subject well location and found 30 wells that are not cemented across the proposed disposal interval of 2,900 feet to 4,450 feet. In addition, there is one well, The Unit Petroleum Lips Ranch -A- Lease, Well No. 6, API No. 42-393-00199 ("Well 00199"), located approximately 3,329 feet (0.63 miles) northeast of the subject well location that Mr. Richter believes could act as a conduit for injected fluids to migrate to the BUQW. Mr. Richter stated that Well 00199 is the only well he discovered within a two-mile radius in which there was a possibility that the freshwater could be in danger.

Well 00199 was originally cased and cemented in 1949 and has undergone numerous changes since that time (See Appendix A-D). The only cement listed on the most recent well records filed by Unit Petroleum (Form G-1, received by the Commission on July 31, 2000), lists 16-inch surface casing set at a depth of 484 feet with cement from 484 feet to surface and 5 ½-inch casing set at a depth of 9,544 feet and cemented with 350 sacks of cement with TOC at 4,433 feet. Mr. Richter's analysis indicates the interval from 3,549 feet to 3,575 feet is open in Well 00199 and therefore no cement across the proposed disposal interval. In Mr. Richter's opinion, unless there is evidence to show something different, you go with the worst possible scenario.

On cross-examination Mr. Richter agrees there is cement behind surface casing from 484 feet to surface for Well 00199. The Applicant's representative showed Mr. Richter a copy of a 1957 GWT-1 for Well 00199 which indicated that the freshwater strata is protected in accordance with the Board of Engineer's letter.⁷ Mr. Richter stated that he saw that, but things have changed since 1957. With regards to the depth that surface casing was set and cemented,

⁷ This form was not offered as an exhibit.

Mr. Richter states that the casing depth and cement was appropriate at the time the well was originally drilled.

The GAU letter for the proposed disposal well located 0.63 miles away from Well 00199 estimates freshwater at a depth of 550 feet and USDW at a depth of 650 feet. Mr. Richter looked at four other wells that surround Well 00199 and the BUQW was listed at depths of 600 feet, 550 feet, 500 feet and 525 feet. According to Mr. Richter, all four wells had an exception stamped on the Form W-15 for each well.

Pressure Front Calculations

Mr. Richter performed pressure front calculations using reservoir data provided by the Applicant on their permit application. The Forms H-1/H-1A list an average pay thickness of 63 feet, a current bottom-hole pressure of 840 psi, and an average porosity of 15%. Latigo's previously-approved injection applications contained similar reservoir characteristics:

1. The Forms H-1/H-1A for the Latigo 9W disposal well (Project No. F 17342) listed a permitted interval from 3,600 feet to 3,700 feet, with an average pay thickness of 63 feet, an average porosity of 13%, and a reservoir pressure of 840 psi ; and
2. The Forms H-1/H-1A for Latigo 4D permitted injection well lists a permitted interval between 3,750 feet to 4,000 feet with an average pay thickness of 60 feet and 15% porosity.

The Form H-1 for the subject well lists the average horizontal permeability as na, which Mr. Richter interpreted as either meaning not available or not applicable. As a result, Mr. Richter referred to the Atlas of Major Gas Reservoirs by the Bureau of Economic Geology for all dolomites listed in Roberts County and found the permeability ranged between 1 and 32 millidarcies (md). Mr. Richter used the highest permeability listed (32 md) in the pressure front calculation since the highest permeability will result in the lowest pressure increase.

The Applicant presented Mr. Richter with an SPE paper that referenced the Quinduno Field located in Roberts County. The paper states that the dolomite is vugular with cavities and contains inter-oolitic porosity ranging as high as 33%. The permeability in the lower dolomite ranges as high as 19,500 md, and averages 144 md in the oil zone. Mr. Richter agrees that if the porosity and permeability numbers in his pressure front calculation were increased they would yield different pressures. Mr. Richter does not know if a permeability of 144 md at a maximum injection rate of 5,000 bpd and a water compressibility of 0.000015 would result in a pressure increase at Well 00199 sufficient to raise brine water to the BUQW.

In Mr. Richter's opinion, the SPE paper that the Applicant has referred to is an older paper, October 27-28, 1955, as compared to his Bureau of Economic Geology reference from 1989. Also, the Applicant's SPE paper refers to the Albany dolomite at the southern end of Roberts County and not the Brown Dolomite, which is the injection formation name in the subject well.

Mr. Richter's pressure front calculations using the top of the injection zone at 2,900 feet shows that the pressure required to raise brine water to the BUQW at a depth of 550 feet from surface is 1,093 psi. The Forms H-1/H-1A lists a maximum injection volume of 20,000 bpd and an average daily injection rate of 10,000 bpd. Using the Applicant-provided average daily injection rate of 10,000 bpd shows that at a distance of one mile away, the reservoir pressure would increase by 662 psi to 1,502 psi after one year, which is sufficient pressure in the injection zone to raise brine to the BUQW. According to Mr. Richter, if Latigo agreed to restrict their maximum permitted injection rate to 5,000 bpd it would reduce the pressure increase in half, or 50% of that estimated for an injection rate of 10,000 bpd. With the current reservoir pressure of 840 psi as indicated on the Form H-1, the pressure increase as a result of injecting 5,000 bpd would still be sufficient to raise brine water to the BUQW.

Mr. Richter stated that he did not consider mud weight in his pressure front calculations as he assumed the worst case scenario. In Mr. Richter's opinion, the effect of mud in the hole would depend on the weight of the mud, how long it had been in the hole, etc.

Fracture Information

Mr. Richter reviewed two hydraulic fracture stimulation proposals and one post job report for a hydraulic fracture completion of a Latigo well located approximately 1.5 miles west of the subject well location. Only one of these two wells reviewed was hydraulically fracture stimulated, the Corson Ranch 136-11, API No. 42-393-31483-0002, ("CR 136-11"). The frac report for the CR 136-11 shows the maximum surface treating pressure during the job was 1,389 psi, and the average treating pressure was 1,018 psi. The CR 136-11 was perforated from 3,240 feet to 3,288 feet in the Brown Dolomite Formation and a total of total of 33,000 lb. of sand was pumped.

Based on the proposed well completion reports and the actual completion report for the Corson Ranch 136-11 Mr. Richter arrived at the following conclusions

- 1) Actual maximum surface pressure was 60 psi greater than designed (anticipated), 1,389 psi actual surface pressure versus 1,329 psi estimated;
- 2) Reservoir fracture pressure (bottomhole pressure) was estimated to be 2,350 psi based on the maximum surface pressure of 1,329 psi or 0.72 psi per foot; and
- 3) Actual maximum surface pressure was 4.3% greater than estimated in the proposal. As a result, Mr. Richter estimated the bottomhole fracture pressure required to fracture the reservoir should be 2,451 (4.3% greater than the estimated 2,350 psi) which results in the formation being fractured at a pressure gradient of 0.75 psi per foot.

The top of the proposed injection interval in the subject well is at a depth of 2,900 feet, and the Commission's rule of thumb is typically 0.5 psi per foot to the top of the injection interval. However, in Mr. Richter's opinion, the top of the perforations in the disposal interval will likely be no higher than 3,200 feet. The bottomhole fracture pressure of the Brown

Dolomite Formation according to Mr. Richter's calculations is 2,451 psi. Subtracting the hydrostatic pressure from the bottomhole pressure results in a surface pressure of 979 psi. In Mr. Richter's opinion, surface pressure greater than 979 psi could result in a fracture being created in the Brown Dolomite Formation.

According to Mr. Richter, the Commission uses a 0.5 psi per foot guideline such that the combined hydrostatic head pressure plus the maximum surface injection pressure will be less than the pressure that would fracture a formation. Mr. Richter stated that the Commission uses this general rule of thumb unless data can establish either a greater or lesser frac gradient, or the actual stimulation data. In Mr. Richter's opinion, the maximum allowable surface pressure should be 940 psi rather than 1,450 psi since Courson has the actual frac data. A maximum surface injection pressure of 940 psi would maintain a 4% safety factor assuming a saltwater gradient of 0.46 psi per foot hydrostatic pressure for injected fluids. If Latigo were granted a higher maximum surface injection pressure than 940 psi Mr. Richter believes Latigo would fracture the formation.

Mr. Richter did not utilize a friction number in his calculations. The 940 psi maximum surface pressure he calculated does not take into consideration the friction associated with disposal, but it does consider the friction when the frac job was pumped in determining the pressure at which the formation fractures. In Mr. Richter's opinion, you will have the same type of friction value for the salt water disposal as with the frac job, so those friction numbers would cancel out. Mr. Richter is confident that 2,451 psi bottomhole pressure would be the actual fracture pressure of the formation.

A typical stratigraphic column of the geology in the area of the proposed disposal well shows that at a depth of approximately 3,200 feet and shallower, the lithology is a mixture of limestone, dolomite, and anhydrite directly above the Brown Dolomite Formation. At shallower depths there is a shale interval. Mr. Richter is not too worried about risk to fresh water at the subject well location as there is shale up-hole, and there is a good cement bond between the casing and borehole of the subject well. However, Mr. Richter is concerned that pressures may get above the pressure required to hydraulically fracture the dolomite formation. In Mr. Richter's opinion, the dolomite, limestone, and anhydrite interval directly above the disposal interval probably constitutes impermeable strata under normal pressures, but Mr. Richter does not know what the fracture initiation pressures are of those intervals.

The two closest salt water disposal wells to the proposed disposal well are the Overflow 21 Mile SWD, Well No 1 and the Wichita Water McCartor "A" Well No. 1. The distance from the Overflow 21 Mile SWD, Well No 1 to the proposed disposal well is approximately 5.5 miles "as the crow flies." The permit was granted in October 2013 (UIC No.: 000100631) The permitted maximum surface pressure is 1,000 psi, with a maximum injection volume of 10,000 bpd with an injection interval from 3,420 feet to 4,250 feet. The actual perforations are shown to be from 3,714 feet to 4,240 feet in the Brown Dolomite Formation.

The distance from the Wichita Water disposal well McCartor "A" Well No. 1 to the subject disposal well is approximately 10 miles "as the crow flies." The distance from the Wichita disposal well to the Overflow 21 SWD is approximately 5.5 miles. The Wichita Water

disposal well is a commercial disposal well, with a permitted maximum surface pressure of 1,000 psi and a maximum injection volume of 5,000 bpd. The permitted disposal interval is between 3,600 feet and 4,664 feet. The disposal interval is in a dolomite formation and in the Council Grove formation.

Mr. Richter states that it is true that the Commission approved the 1,000 psi maximum injection pressure that the applicants requested in the Overflow 21 Mile SWD, Well No 1 and the Wichita Water McCartor "A" Well No. 1 applications. However, Mr. Richter questions why the applicants would request a maximum surface injection pressure lower than 0.5 psi per foot. Based on using a maximum surface injection pressure of 1,000 psi and the top of the injection interval for each of the two wells, and assuming a hydrostatic gradient of a column of salt water of 0.46 psi per foot, Mr. Richter estimates a pressure gradient of 0.752 psi per foot for the Overflow disposal well and pressure gradient of 0.738 psi per foot for the Wichita Water disposal well. In Mr. Richter's opinion "...there's got to be some reason why they only asked for a thousand when they could have asked for more."⁸ Mr. Richter speculates that asking for a maximum surface injection pressure of 1,000 psi may have been due to a protest, or the result of an agreement with the operators. Mr. Richter stated "I think there is a real problem if you fracture the dolomite. I don't see how you can abide by the rule that it is confined because you fracked it...if my numbers are correct...and at least two other commercial operators for whatever reason limited it to a thousand and we don't have that information why they limited it to a thousand, short of getting on the phone and calling them and asking them."⁹

Mr. Richter agrees that the Commission generally adopts a maximum surface injection pressure of 0.5 psi per foot to the top of the injection interval. Unless, the Applicant performs a step rate test, or you present some information to show that the pressure would be less. In Mr. Richter's opinion, the BJ Services frac data for the CR 136-11 is typical data that is relied upon to come up with a more accurate fracture initiation pressure. Mr. Richter agrees that a step-rate test is required for an Applicant to request an increase in the maximum surface injection pressure. Courson has relied upon actual hydraulic fracture stimulation data for an offset well. In Mr. Richter's opinion the permit should be denied. If granted, the permit should to be restricted to 940 psi maximum surface injection pressure.

Public Interest

Courson questions whether the proposed disposal well is in the public interest, in terms of the need for additional disposal capacity. Latigo is currently injecting fluid into its 9W disposal well. In addition, Latigo has another disposal well, Well 4D permitted, and according to Mr. Richter all Latigo needs to do is equip this well and run an MIT test.

The H-10 filed by Latigo for April 2014 through March 2015 for its 9W disposal well shows that for every month during that period the average injection pressure was 1,300 psi, and the maximum injection pressure each month was 1,400 psi. The daily injection volume for each

⁸ Tr. pg. 173, ln1-2.

⁹ Tr. pg. 185, ln 1-8.

day during this period was also the same, 1,383 bwpd. In Mr. Richter's opinion, this indicates that the numbers are fabricated.

Mr. Richter researched completions of horizontal wells in the San Pedro (Cleveland) Field from January 1, 2013, through January 27, 2016. The Form W-1 information shows nine wells have been completed during this time period. The average frac volumes for these nine well completions was 44,600 bbl. Mr. Richter estimated the typical recovery of load water is 35% to 65%, and the typical recovery time ranged from two to five months. As a result, Mr. Richter believes the H-10 volumes reported by Latigo are fabricated at 1,383 bpd. Based on Mr. Richter's research, water production from well completions declines 95% in the first five to seven months after completion.

City of Amarillo

Bryan McWilliams, Assistant City Attorney, stated that the City of Amarillo is in support of Courson's protest of the subject application. Alternatively, the city would request that measures be implemented to protect the aquifer. The City of Amarillo owns approximately 80,000 acres of water in Roberts County, and approximately 40,000 acres in Abletree. The City of Amarillo purchased, or acquired the water rights from Courson in 2007.

Protestant Panhandle Groundwater Conservation District

C. E. Williams, General Manager, Panhandle Groundwater Conservation District ("PGCD"), stated that the PGCD is protesting the application for similar reasons as the City of Amarillo. Mr. Williams stated that the PGCD is charged with conserving and preserving the aquifer. In Mr. Williams' opinion, the maximum pressure in this application seems to be extremely high and seems to be a danger to the aquifer.

William F. Mullen, III is a professional geoscientist in the state of Texas and serves as a consultant to the PGCD as their district hydrogeologist. According to Mr. Mullen, Roberts County has the largest volume of fresh Ogallala groundwater remaining in Texas, estimated at over 30 million acre-feet. Mr. Mullen stated that the PGCD has concerns with the requested maximum surface injection pressure. In Mr. Mullen's opinion, one must take a very conservative look at preventing the potential for fractures being developed or creating any sort of potential contamination of the Ogallala. Mr. Mullen looked at the frac job that was pumped on a well in the area and thinks it would be prudent to use a pressure gradient closer to 0.70 psi per foot to be more conservative rather than the 0.75 psi per foot that Mr. Richter suggested. As a result Mr. Mullen recommends a maximum surface injection pressure of 776 psi for the subject application.

Objected to Evidence

At hearing, Protestant presented its Exhibits 18 – 24, which were objected to by the Applicant on the grounds that the proffered Exhibits were irrelevant to the call of the hearing. A brief description of each objected to Exhibit follows:

Exhibit 18 – Commission online records reflecting production data for Applicant's Courson Ranch 148 Lease, Well No. 9W, Wildcat Field, offered for the purposes of demonstrating that Well No. 9W had, at the time of hearing, zero (0) reported production;

Exhibit 19 – Blank copy of a Commission Form P-18 *Skim Oil/Condensate Report* offered for the purposes of demonstrating the entity responsible for filing, procedures for filing, and accounting procedures associated with allocations of skim oil back to the lease of origin;

Exhibit 20 – Excel spreadsheet composed of information relating to Overflow Energy, LLC's, 21 Mile SWD Lease, Well No. 1, offered for the purposes of demonstrating that Overland Energy, LLC, as the recipient of Applicant's produced saltwater, has filed with the Commission a Form P-18 *Skim Oil/Condensate Report* allocating skim oil production back to Applicant's Courson Ranch 148 Lease;

Exhibit 21 – Excel spreadsheet composed of information relating to Overflow Energy, LLC's, 21 Mile SWD Lease, Well No. 1, offered for the purposes of demonstrating that Overland Energy, LLC, as the recipient of Applicant's produced saltwater, has filed with the Commission a Form P-18 *Skim Oil/Condensate Report* allocating skim oil production back to Applicant's Courson Ranch 135 Lease and Courson Ranch 135-5 Lease;

Exhibit 22 – Excel spreadsheet composed of information relating to Overflow Energy, LLC's, 21 Mile SWD Lease, Well No. 1, offered for the purposes of demonstrating that Overland Energy, LLC, as the recipient of Applicant's produced saltwater, has filed with the Commission a Form P-18 *Skim Oil/Condensate Report* allocating skim oil production back to Applicant's Courson Ranch 139 Lease;

Exhibit 23 – Excel spreadsheet composed of information relating to Overflow Energy, LLC's, 21 Mile SWD Lease, Well No. 1, offered for the purposes of demonstrating that Overland Energy, LLC, as the recipient of Applicant's produced saltwater, has filed with the Commission a Form P-18 *Skim Oil/Condensate Report* allocating skim oil production back to Applicant's Courson Ranch 136-4 Lease; and

Exhibit 24 – Excel spreadsheet composed of information relating to Overflow Energy, LLC's, 21 Mile SWD Lease, Well No. 1, offered for the purposes of demonstrating that Overland Energy, LLC, as the recipient of Applicant's produced saltwater, has filed with the Commission a Form P-18 *Skim Oil/Condensate Report* allocating skim oil production back to sixty-one (61) leases operated by Applicant.

Determinative of the objection, Rule 401 of the Texas Rules of Evidence provides that:¹⁰

Evidence is relevant if:

- (a) it has any tendency to make a fact more or less probable than it would be without the evidence; and
- (b) *the fact is of consequence in determining the action.*

It is well settled that, pursuant to Texas Water Code § 27.051(b), the Commission has the authority to approve an application for a disposal well if it finds:

1. that the use or installation of the injection well is in the public interest;
2. that the use or installation of the injection well will not endanger or injure any oil, gas, or other mineral formation;
3. that, with proper safeguards, both ground and surface water can be adequately protected from pollution; and
4. that the applicant has made a financial a satisfactory showing of financial responsibility if required by Section 27.073 of this code.

Applicant's objections to Exhibits 18 – 24 are hereby sustained. As part of an application to inject fluid into a reservoir productive of oil or gas, an applicant must furnish to the Commission a Form H-1 *Application to Inject Fluid into a Reservoir Productive of Oil & Gas* and a Form H1-A *Injection Well Data for H-1 Application*. Those Forms largely require information relevant to reservoir data, injection project data, and injection well engineering data. Worthy of note, neither the Form H-1 nor H1-A contemplates or requires an applicant to furnish information germane to accounting procedures for skim oil production from saltwater to be received at the applied-for well.

The Examiners are of the opinion that, while Protestant's Exhibits 18-24 *may* be relevant to *violations of permit conditions on the leases and wells specified therein*, the Exhibits are not relevant to the call of hearing in the instant Docket, being an *application for a permit* to inject fluid into a reservoir productive of oil or gas. Thus, the facts alleged in the objected to Exhibits are of no consequence in determining the action. Alleged violations of permit conditions are more appropriate for an enforcement action or complaint filed with the Commission's Hearings Division. To that end, the Examiners have not relied on those Exhibits in the preparation or presentation of this Proposal for Decision.

EXAMINERS' ANALYSIS OF THE EVIDENCE

Based on the evidence in the record, the Examiners recommend approval of the application, but with a special permit condition limiting the maximum surface injection pressure in the absence of a step-rate test.

¹⁰ Tex.R. Evid. 401 (emphasis added).

Maximum Surface Injection Pressure

The Examiners' recommend that the maximum surface injection pressure be limited to 812 psig, or 0.28 psi per foot to the top of the injection interval, as opposed to the 0.5 psi per foot to the top of the injection interval requested, pending the results of a step-rate test. This recommendation is based on the maximum surface injection pressure of two of the three commercial disposal wells within a 10-mile radius injecting into a similar depth interval as the subject application and nearby hydraulic fracture stimulation data of the Brown Dolomite Formation. The hydraulic fracture stimulation data of the CR 136-11, located 1.5 miles from the subject well location showed that the maximum surface injection pressure was 1,389 psi, with the top of the perforated interval in the well at 3,240 feet, (0.43 psi per foot to the top of the perforated interval) which is lower than the Applicant's requested maximum surface injection pressure of 1,450 psi (0.50 psi per foot to the top of the permitted injection interval). Courson's engineering witness stated that the hydrostatic pressure of the fluid and friction pressures would be similar for the frac job and injection operations. The Applicant's witnesses did not rebut this testimony or provide any contradicting evidence.

The Applicant provided no evidence to support its request for a maximum surface injection pressure of 1,450 psig other than a statement that the typical Commission guideline is 0.5 psi per foot to the top of the injection interval. The Applicant's regulatory witness stated that there was no technical background for the requested maximum injection pressure of 1,450 psig, other than as a general rule every operator typically requests the maximum value allowed by the Commission. However, the maximum surface injection pressure of two of the three commercial disposal wells within a 10-mile radius contradict this statement. The maximum surface injection pressure for the Overflow 21 Mile SWD, Well No 1 is 1,000 psi, with an injection interval from 3,420 feet to 4,250 feet, which equates to a maximum surface injection pressure of 0.29 psi per foot to the top of the injection interval. The maximum permitted surface injection pressure for the Wichita Water McCartor "A" Well No. 1. is also 1,000 psi. The permitted injection interval is from 3,600 feet to 4,664 feet, which equates to a maximum surface injection pressure of 0.28 psi per foot to the top of the injection interval.

The Examiners' recommendation of a maximum surface injection pressure of 812 psi is less than that suggested by Protestant Courson of 940 psi, which only provided a safety factor of 4%. 812 psi is greater than the maximum injection pressure suggested by Protestant PGCD's value of 776 psi which was not supported by any evidence, other than being a more conservative number. The Examiners' recommendation of 812 psi is less than the surface injection pressure shown to fracture the Brown Dolomite Formation. The basis for this recommendation is consistent with the maximum surface pressure injection pressure gradient (0.28 psi per foot) of two-nearby injection wells with a similar injection interval.

Public Interest

The Examiners conclude that the proposed non-commercial disposal well is in the public interest in terms of a need for additional disposal capacity, provided the maximum surface injection pressure does not initiate fractures in the formation. The Applicant's evidence showed

that on-lease disposal would reduce operating costs of producing wells on the Courson Ranch Lease. Reducing operating costs should extend the economic life of wells, resulting in the recovery of additional reserves.

The existing Latigo 9W disposal well is near capacity as the pump and facility were specifically designed to service one producing well, the Latigo 149-9 well. As such, this disposal well would not have the capacity for any additional water produced from drilling new wells on the lease. Since the price of oil and gas has declined Latigo is trying to get facilities and pipelines in place so wells drilled and completed in the future will be at a lower economic level than in the past. Latigo has permitted the 4D well for disposal, however, the 4D is located at a similar elevation as the 9W disposal well, as both are higher elevations. Latigo intends to use the 4D for disposal of water produced from future St. Louis Formation wells. The Examiners considered the Applicant's evidence to be more compelling to support the need for the proposed disposal well than the Protestants assertion that the proposed well was not in the public interest. The Protestants evidence was based on the fact that Latigo already has the 9W disposal well in operation, the 4D disposal well is permitted, and all other water produced by Latigo was currently being disposed of at third party disposal wells.

Any Injury to Any Oil, Gas, or Other Mineral Formation

Based on the evidence in the record, the Examiners conclude the proposed disposal well will not harm or injure productive formations in the area provided the maximum permitted surface injection pressure does not initiate fractures. The subject well is an existing well that Latigo proposes to convert from a former producing well to a disposal well. As a result, this well has recovered reserves and has reached its economic limit. Therefore, injection operations will not harm productive formations in the immediate area of the wellbore.

The productive formations in the area are all deeper than the disposal interval. Latigo's engineering witness testified that there is sufficient geological isolation below the injection interval to protect the deeper productive intervals. No Protestant disputed the testimony of the Applicant's engineering witness and no evidence to the contrary was presented.

With Proper Safeguards, Both Ground and Surface Fresh Water Will Be Protected

Based on the evidence in the record the Examiners conclude that the disposal formation is adequately separated from freshwater formations by impervious beds which will provide protection to freshwater formations. Also, the manner in which the subject well is cased and cemented will also protect ground and surface fresh water. The GAU identifies the BUQW at the subject well location to occur either 10 feet below the Permian red beds or at a depth of 550 feet, whichever is deeper. The GAU estimates the base of USDW to occur at a depth of 650 feet at the site of the referenced well. The injection interval is in the Brown Dolomite Formation in the depth interval from 2,900 feet to 4,450 feet. The well log for the subject well shows numerous intervals with zero porosity above the injection interval, including anhydrite sections in addition to several shale sections. The cumulative thickness of the shale and anhydrite sections is estimated to be in the range of 220 feet to more than 300 feet.

The Examiners conclude that with proper safeguards, both ground and surface water will be protected from pollution. The Protestant identified Well 00199, located approximately 0.63 miles from the subject well, which may be a conduit for injected fluids to migrate to the BUQW. Protestants' evidence shows the well is not cemented across the disposal interval. Protestants are also concerned that surface casing in Well 00199 is set at a shallower depth (484 feet) than the estimated BUQW in surrounding wells. Although Well 00199 was originally drilled in 1949, it is a currently producing well as evidenced by Protestant Courson's Exhibit Nos. 6 and 27. Well 00199 was drilled in compliance with Commission rules at the time of completion to protect fresh water. The Applicant showed a 1957 Board of Engineer's letter to the Protestant's engineering witness that indicated that the freshwater strata is protected, and the Protestant's engineering witness acknowledged that the Board of Engineer's letter stated that fresh water was protected when the letter was issued in 1957.

Courson's engineering witness testified that pressure front calculations show the pressure build up after one year at Well 00199 would raise brine water to the BUQW at 550 feet. However, safeguards are in place to prevent this from occurring. Since Well 00199 is a producing well, the operator, Unit Petroleum, must notify the district office immediately whenever pressure develops between any two strings of casing pursuant to Statewide Rule 17 *Pressure on Bradenhead*. In addition, the pressure front calculation used a worst case scenario with the top of injection zone at 2,900 feet, which is the top of the proposed injection interval. However The Protestants' engineering witness who performed the calculations stated that the top of the perforations in the disposal interval will likely be no higher than 3,200 feet, which would decrease the estimated pressure increase.

Additionally, the Examiners conclude that there is reason to expect less pressure build-up at Well 00199 than estimated by the Protestants' pressure front calculation. The calculation used a worst-case scenario in using a net injection zone of 63 feet, based on the value listed on Applicant's Form H-1 for average pay thickness, with an average porosity of 15%. The proposed disposal interval is from 2,900 feet to 4,450 feet, a gross interval of 1,550 feet. Therefore the pressure front calculation does not consider whether any of the remaining 1,487 gross feet within the injection interval will accept any injected fluids. The Examiners note that the Applicant also reported an average pay thickness of 63 feet in its application for the Latigo 9W disposal well, which has a permitted interval of only 100 gross feet (permitted injection interval from 3,600 feet to 3,700 feet).

Financial Assurance

Latigo had an active P-5 on file with the Commission at the time of the hearing with an expiration date of August 1, 2016, and a \$250,000 letter of credit. Latigo would be required to maintain its P-5 and sufficient financial assurance in order for a permit to be granted.

Additional Information

A review of USGS seismic data within 100 square miles (a radius of 9.08 kilometers) of the subject well location shows no seismic events have been reported.

FINDINGS OF FACT

1. Latigo Petroleum, LLC seeks a permit authorizing disposal operations pursuant to 16 Tex. Admin. Code § 3.46 for the Courson Ranch 133 Lease, Well 4A, Alpar-Pearson (Brown Dolomite) Field, Roberts County, Texas
 - a. The application for the Courson Ranch 133 Lease, Well 4A, was mailed to Courson Family Land Partnership which is the surface owner of the tract where the well is located, and to the Roberts County Clerk. No operators were given notice, as the Applicant is the only operator within a half-mile. 16 Tex. Admin. Code § 3.46(c)(1),(2).
 - b. Notice of the Courson Ranch 133 Lease, Well 4A disposal well application was published in the *Amarillo Globe News* on July 22, 2015.
 - c. The application is protested by the surface owner (Courson Family Land Partnership), a protest that is supported by the City of Amarillo, and the application is also protested by the Panhandle Groundwater Conservation District.
 - d. At least 10 days' notice of the hearing was provided to the surface owner, to the Roberts County Clerk, and to the Panhandle Groundwater Conservation District. 16 Tex. Admin. Code § 3.46(c)(5)(A).
2. The requested maximum surface injection pressure of 1,450 psi (0.5 psi per foot to the top of the injection interval) is greater than the maximum surface pressure encountered during a hydraulic fracture stimulation job performed in the Brown Dolomite Formation 1.5 miles to the west of the subject well location.
 - a. The hydraulic fracture stimulation report for the Corson Ranch 136-11, API No. 42-393-31483-0002 shows the maximum surface treating pressure during the frac job was 1,389 psi;
 - b. The Corson Ranch 136-11 was perforated from 3,240 feet to 3,288 feet in the Brown Dolomite Formation. A total of total of 33,000 pounds of sand was placed into the fracture; and
 - c. The ratio of the maximum surface injection pressure during the frac job to the depth of top perforation was 0.43 psi per foot (1,389 psi maximum surface pressure at perforation depth of 3,240 feet.
3. The maximum surface injection pressure is limited to 1,000 psi for two of the three commercial disposal wells within a 10-mile radius of the proposed disposal well location.
 - a. The permitted maximum surface pressure for the Overflow 21 Mile SWD, Well No 1 is 1,000 psi with a permitted injection interval from 3,420 feet to 4,250 feet (0.29 psi per foot maximum surface pressure to the top of the permitted injection interval); and

- b. The permitted maximum surface pressure for the McCartor "A" Well No. 1 is 1,000 psi with a permitted disposal interval between 3,600 feet and 4,664 feet (0.28 psi per foot maximum surface pressure to the top of the permitted injection interval).
- 4. The proposed non-commercial disposal well is in the public interest in terms of a need for additional disposal capacity, provided the maximum surface injection pressure does not initiate fractures in the formation.
 - a. On lease disposal reduces operating costs of producing wells on the Courson Ranch Lease;
 - b. The existing Latigo 9W disposal well is near capacity;
 - i. The pump and facility were specifically designed to service one producing well, the Latigo 149-9 well;
 - ii. This disposal well is not equipped to handle any additional water produced from drilling new wells on the lease; and
 - iii. Latigo has permitted the 4D well for disposal; however, the 4D is located at a similar elevation as the 9W disposal well as both are higher elevations than the elevation of the six planned new well completions.
- 5. The proposed disposal well will not harm or injure productive formations in the area provided the maximum permitted surface injection pressure does not initiate fractures.
 - a. The subject well is a former producing well that will be converted from a former producing well to a disposal well;
 - b. The subject well no longer produces hydrocarbons;
 - c. Productive formations in the area are all deeper than the disposal interval in the Brown Dolomite Formation; and
 - d. There is sufficient geological isolation below the injection interval to protect the deeper productive intervals in the area.
- 6. With proper safeguards, both ground and surface fresh water can be protected from pollution.
 - a. The base of usable quality water at the subject well location (Courson Ranch 133 Lease, Well 4A) is 550 feet;
 - b. The base of USDW occurs at a depth of 650 feet at the subject well location;

- c. The Courson Ranch 133 Lease, Well 4A was completed on October 1, 2005 with 8 5/8-inch surface casing set at a depth of 1,150 feet and cemented with cement circulated to surface;
 - d. The disposal formation is adequately separated from freshwater formations by impervious beds which will provide protection to freshwater formations:
 - i. The injection interval is in the Brown Dolomite Formation from 2,900 feet to 4,450 feet;
 - ii. The well log for the subject well shows numerous intervals with zero porosity above the injection interval, including anhydrite sections in addition to several shale sections;
 - iii. The cumulative thickness of the shale and anhydrite sections ranges from a minimum of 220 feet to more than 300 feet;
 - e. There are no wellbores within a quarter-mile radius;
 - f. A well (API No. 42-393-00199) located approximately 3,329 feet (0.63 miles) northeast of the subject well location has surface casing set at a depth of 484 feet and cemented to surface;
 - i. This well is not cemented across the disposal interval;
 - ii. This is a producing well;
 - iii. Since this is a producing well, the operator of the well, Unit Petroleum, must notify the district office immediately if pressure were to develop between any two strings of casing pursuant to Statewide Rule 17 *Pressure on Bradenhead*.
 - iv. Proper safeguards are in place to ensure injection operations will not cause this well to act as a conduit for fluids to migrate to the base of usable-quality water.
7. Latigo had an active P-5 on file with the Commission at the time of the hearing with an expiration date of August 1, 2016, and a \$250,000 letter of credit. Latigo would be required to maintain its P-5 and adequate financial assurance in order for a permit to be granted.
8. No seismic events have been reported within 100 square miles of the proposed disposal well location.

CONCLUSIONS OF LAW

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. TEX. NAT. RES. CODE § 81.051.
2. Findings of fact may be based only on the evidence and on matters that are officially noticed. TEX. GOV'T CODE §2001.141 (b).
3. The proposed fluid disposal operations will not endanger oil, gas or geothermal resources. Texas Water Code § 27.051(b)(2).
4. Injection operations will not cause the pollution of freshwater strata. Texas Water Code § 27.051(b)(3), 16 Tex. Admin. Code § 3.46 (a).
5. Latigo Petroleum, LLC has met its burden of proof and the application for the Courson Ranch 133 Lease, Well 4A, Alpar-Pearson (Brown Dolomite) Field, Roberts County, Texas satisfies the requirements of Chapter 27 of the Texas Water Code and the Railroad Commission's Statewide Rule 46.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend that the application of Latigo Petroleum, LLC for disposal authority pursuant to Statewide Rule 46 for the Courson Ranch 133 Lease, Well 4A, Alpar-Pearson (Brown Dolomite) Field, Roberts County, Texas, be approved, as set out in the attached Final Order.

Respectfully submitted,

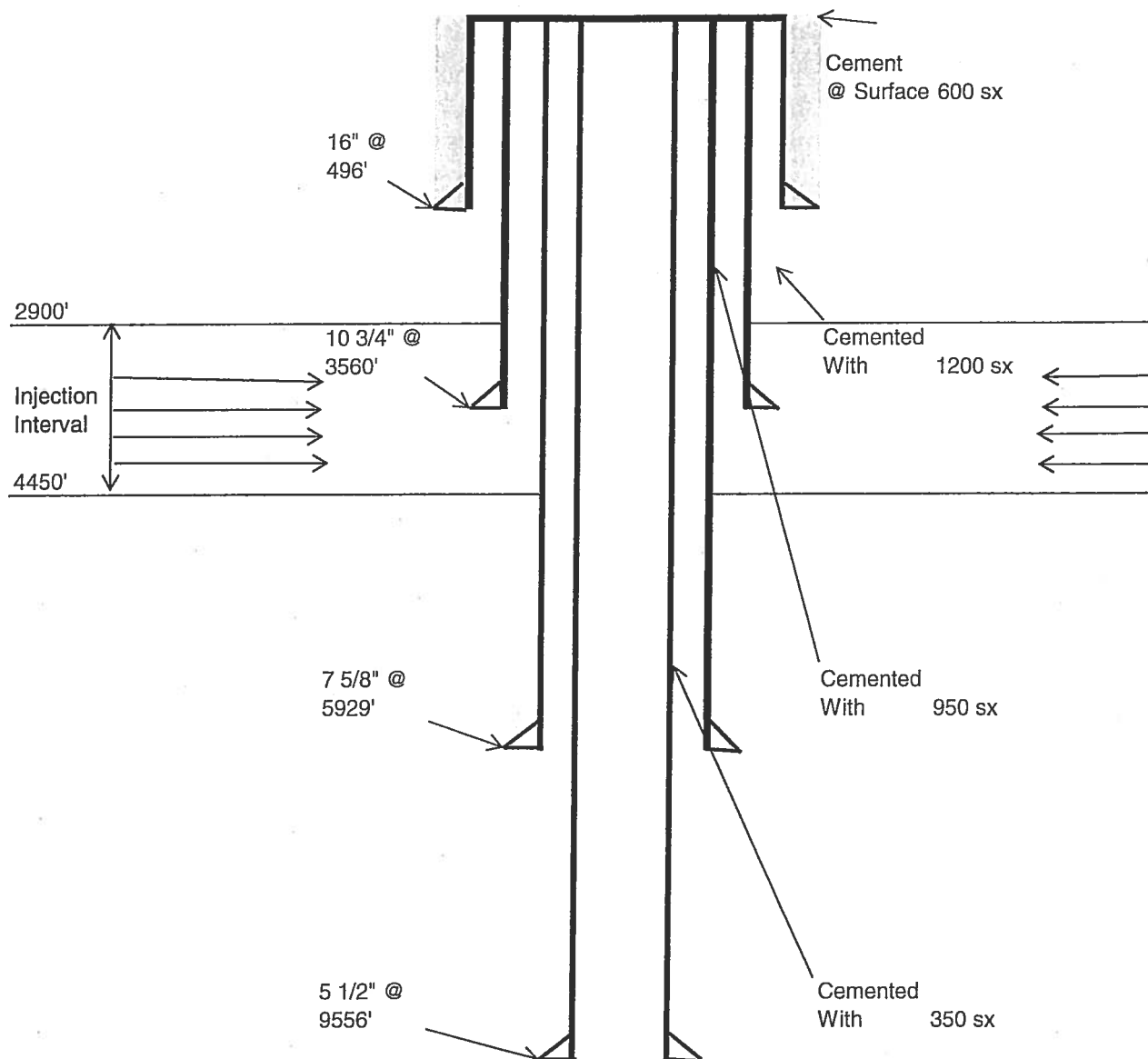


Karl Caldwell
Technical Examiner



Ryan Lammert
Administrative Law Judge

Sinclair Prairie Oil Company
Chas. Lips - Tract "A" #1
Unit Petroleum, Lips Ranch -A- Well No. 6 (Section 135)
API No. 42-393-00199
Undesignated Field
Roberts County
"1949"

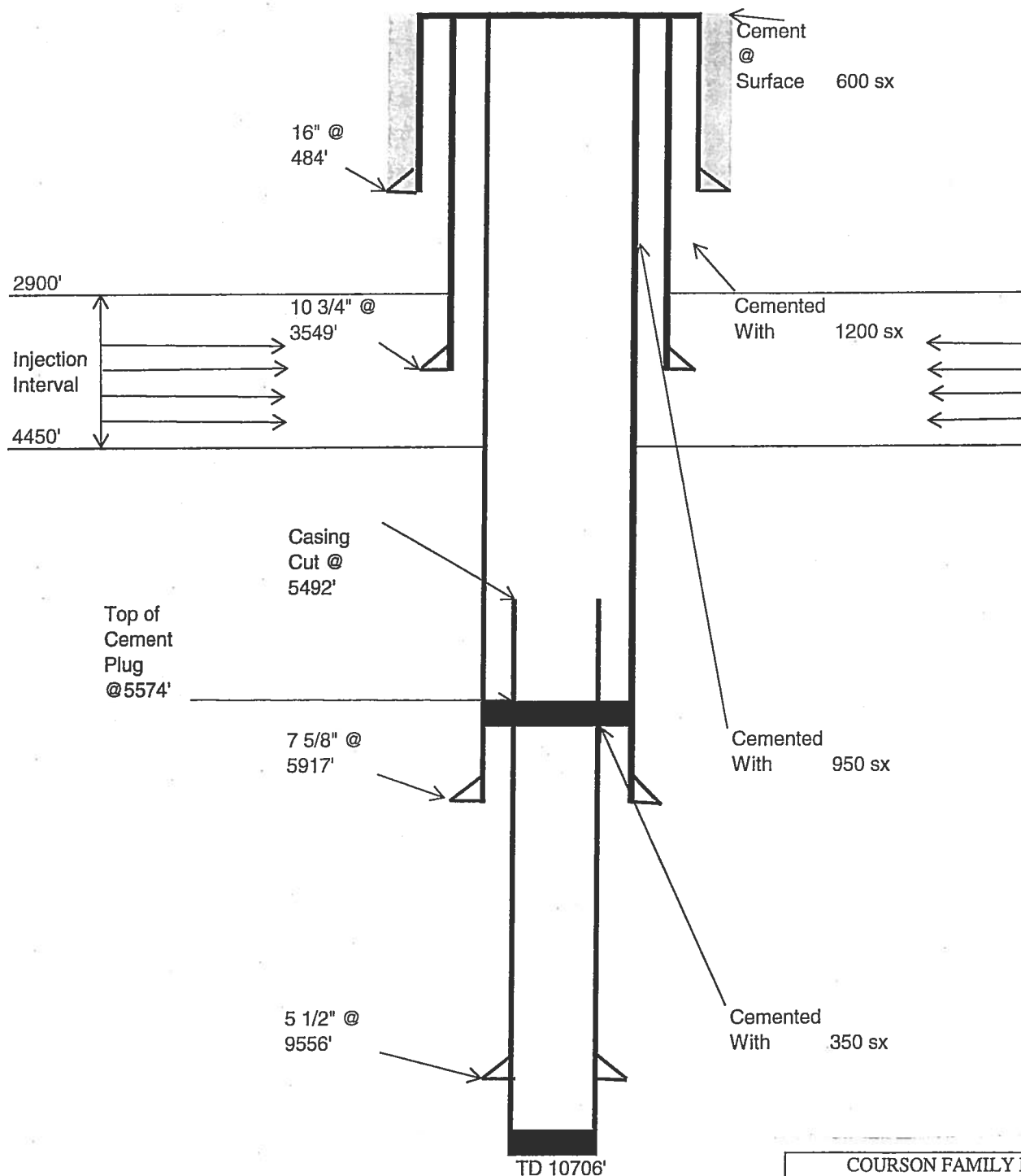


COURSON FAMILY LAND

Docket No.: 10-0298168
Date: February 16, 2016

Ex. 7

Sinclair Prairie Oil Company
Chas. Lips - Tract "A" #1
Unit Petroleum, Lips Ranch -A- Well No. 6 (Section 135)
API No. 42-393-00199
Lips Field
Roberts County
"1950"

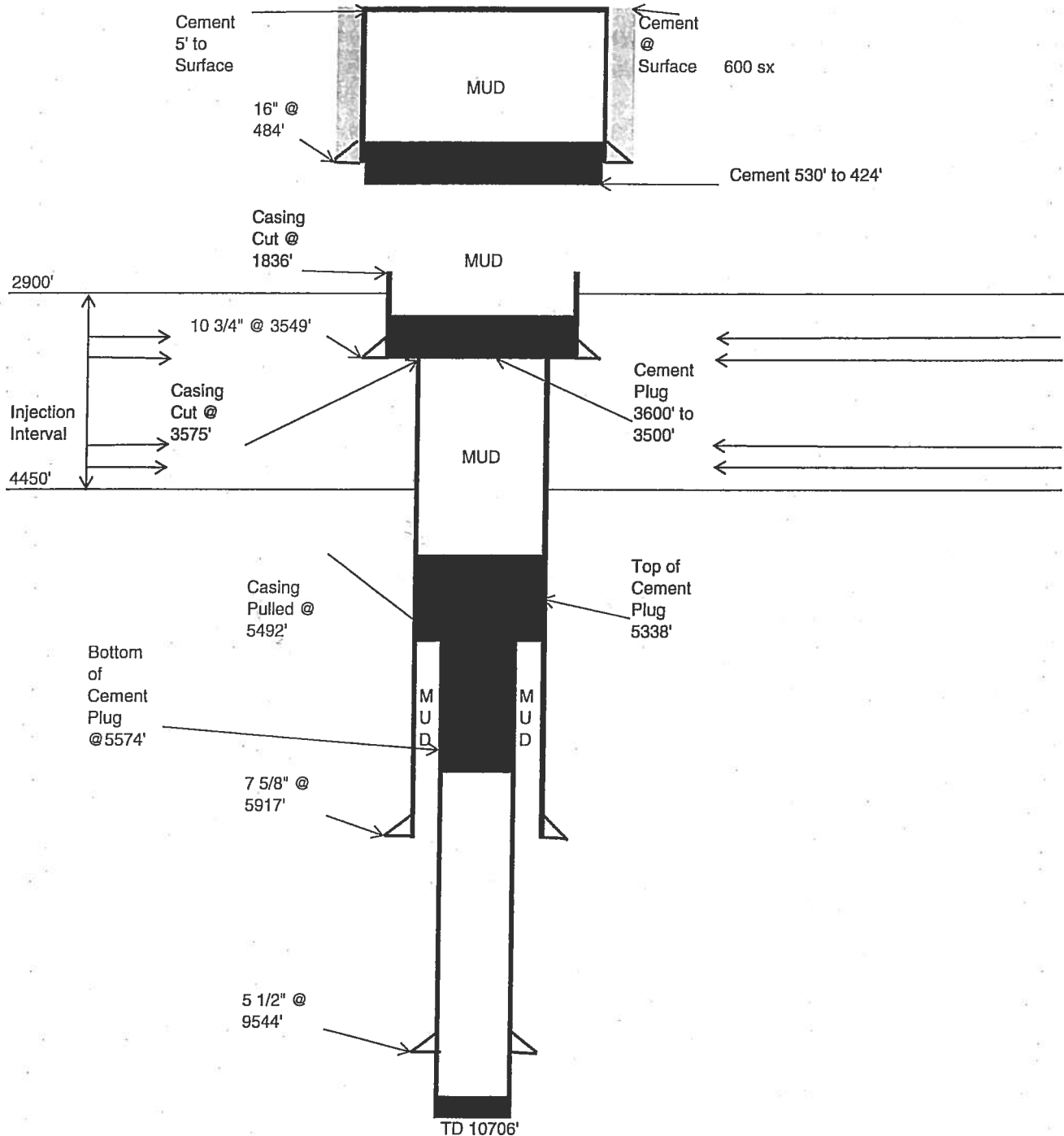


COURSON FAMILY LAND

Docket No.: 10-0298168
Date: February 16, 2016

Ex. 3

Sinclair Prairie Oil Company
Chas. Lips - Tract "A" #1
Unit Petroleum, Lips Ranch -A- Well No. 6 (Section 135)
API No. 42-393-00199
Lips Field
Roberts County
"1954"

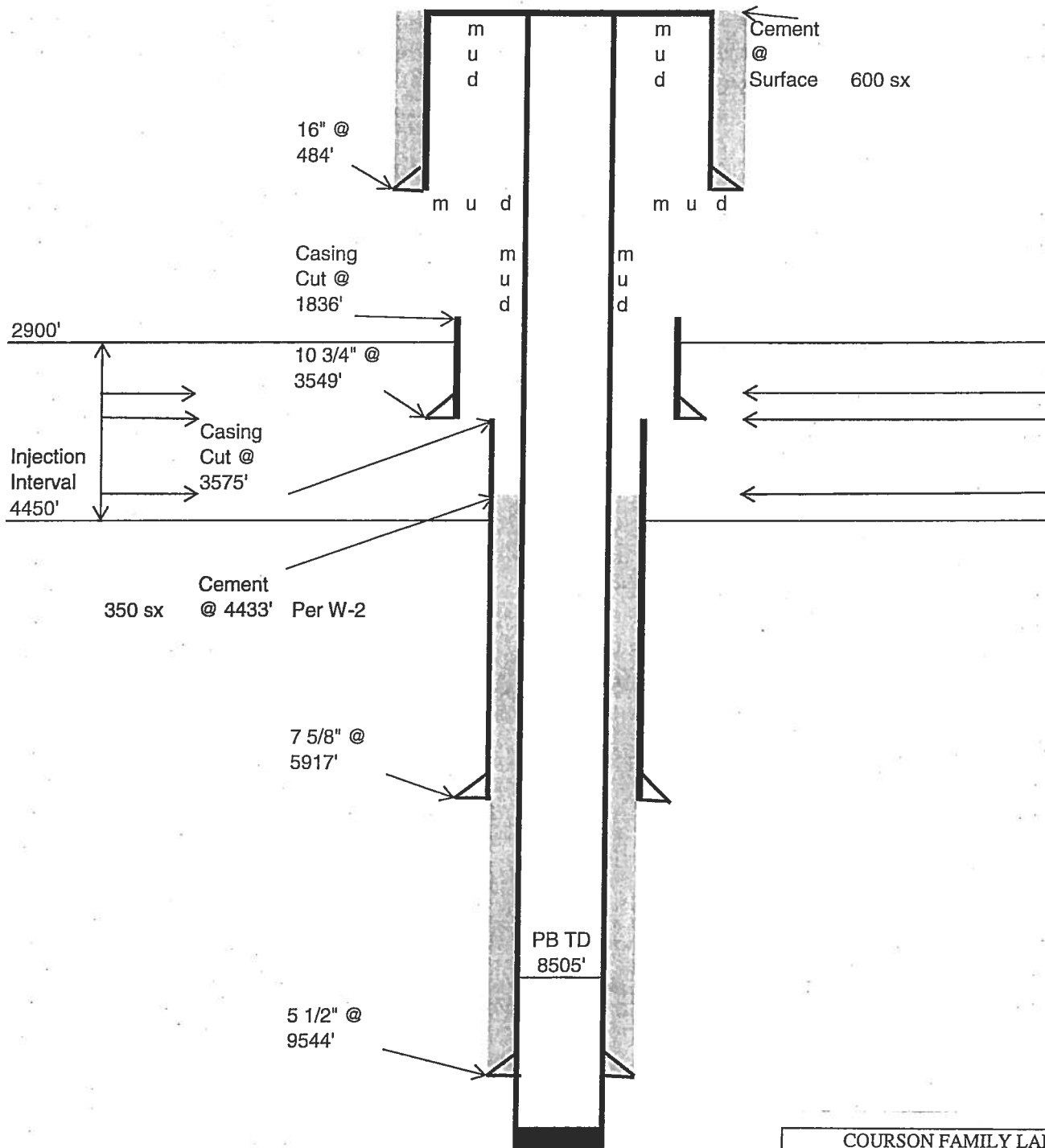


COURSON FAMILY LAND

Docket No.: 10-0298168
Date: February 16, 2016

Ex. 4

Sinclair Prairie Oil Company
Chas. Lips - Tract "A" #1
Unit Petroleum, Lips Ranch -A- Well No. 6 (Section 135)
API No. 42-393-00199
Alpar-Lips (Atoka) and Lips (Morrow) Field
Roberts County
"1957 - 2000"



COURSON FAMILY LAND

Docket No.: 10-0298168
 Date: February 16, 2016

Ex. 10