



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 06-0287587

THE APPLICATION OF SAMSON LONE STAR, LLC PURSUANT TO STATEWIDE RULE 46, FOR AN ADMINISTRATIVELY DENIED PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS, POWELL BOTTOM LEASE, WELL NO. 2, CARTHAGE (RODESSA) FIELD, PANOLA COUNTY, TEXAS

PROPOSAL FOR DECISION

HEARD BY: Paul Dubois – Technical Examiner
Terry Johnson – Hearings Examiner

APPEARANCES:

APPLICANT:

Glenn Johnson
James Clark

REPRESENTING:

Samson Lone Star, LLC

PROTESTANT:

Joe Sanders
Keith Masters

O'Benco, Inc.

INTERVENOR:

Kathy Keils
Adam Goodlett

Oil & Gas Division Staff

PROCEDURAL HISTORY

Application Filed:	March 13, 2014
Protest Received:	March 18, 2014
Request for Hearing:	April 22, 2014
Notice of Hearing:	May 29, 2014
Date of Hearing:	August 19, 2014
Transcript Received:	September 2, 2014
Proposal For Decision Issued:	October 31, 2014

STATEMENT OF THE CASE

Pursuant to Statewide Rule 46¹, Samson Lone Star, LLC, ("Samson")(P-5 Operator No. 744737) is applying for Disposal Authority for the Powell Bottom Lease, Well No. 2 (API No. pending), Carthage (Rodessa) Field, Panola County, Texas (the "Powell Bottom Well No. 2"). Samson proposes to drill a new well to inject saltwater and Resource Conservation and Recovery Act (RCRA) exempt waste into the Rodessa and Pettit Formations. Samson will use the well for disposal of fluids generated by its own exploration and production activities in Panola and surrounding counties; it will not be a commercial disposal well.

The initial application (Form H-1/H-1A and supporting material) for the Powell Bottom Well No. 2 was received by the Commission's Oil & Gas Division on October 14, 2013. The initial application was for injection into the Rodessa Formation only. On November 13, 2013, the application was administratively denied by staff based on the potential for pollution of useable quality water and/or waste of otherwise recoverable hydrocarbon resources due to the proliferation of wells injecting at high rates resulting in possible over-pressurization of the Rodessa, Fredericksburg, Duck Creek, Mooringsport, Nacatoch and/or Goodland Lime Formations in Panola and surrounding counties. Samson requested a hearing on the application. On July 9, 2014, following discussions with Commission staff, Samson submitted a complete revised application for injection into both the Rodessa and Pettit Formations.

At the beginning of the August 19, 2014 hearing, Samson and the Oil & Gas Division entered copies of an agreed draft permit into evidence, which incorporated the revised Forms H-1/H-1A submitted on July 9, 2014 and special permit conditions requiring pressure testing of the Rodessa Formation². Subsequently, the Oil & Gas Division withdrew its protest.

Notice of the revised application was published in the *Panola Watchman*, a newspaper of general circulation in Panola County, on July 27, 2014. Notice of the application was mailed on July 23, 2014 to the Panola County Clerk, to the City of Carthage, and to the surface owners of the disposal tract. There are no offset operators within one-half mile.

¹ 16 Tex. Admin Code § 3.46

² Applicant's Exh. No. 1, Staff's Exh. No. 1.

The revised application is protested by O'Benco, Inc., an offset operator of wells that are beyond the one-half mile area of review.³

DISCUSSION OF THE EVIDENCE

Applicant's Evidence

Samson proposes to drill and complete a new injection well for the disposal of saltwater and RCRA-exempt waste generated by its own activities in the area, which are focused on the Cotton Valley Formation. The well will not be a commercial disposal well. Samson is seeking an injection interval from 4,950 feet to 6,055 feet. This interval includes the Rodessa, James and Pettit Formations. Within this large interval, Samson is targeting the Hill and Gloyd members of the Rodessa Formation, at depths of about 5,000 and 5,100 feet, respectively, as well as permeable zones within the Pettit—especially the depleted lower Pettit.

Hydrocarbons have been produced from the Hill and Pettit Formations in Panola and surrounding counties. Samson's expert engineering witness, James Clark, P. E., testified that these two zones are depleted, and he expects formation pressures in these two zones to be about 500 pounds per square inch gauge (psig). The Gloyd Formation is not productive in the area, and Mr. Clark expects that formation to exhibit virgin formation pressure of about 2,365 psig. Mr. Clark stated that Commission staff has expressed concern with the potential for over-pressuring the virgin Gloyd Formation. Within the entire interval, the injection horizons exhibit a cumulative injectable pay thickness of about 100 feet with an average horizontal permeability of 50 millidarcies and an average porosity of 18 percent.⁴

The Commission's Groundwater Advisory Unit (GAU) determined the base of usable quality water (BUQW) to be at a depth of 450 feet at the proposed well location, and the base of underground sources of drinking water (USDW) is also at 450 feet.⁵

Samson proposes to drill and complete the subject well as follows:⁶

- Drill to a total depth of 6,150 feet;

³ See 16 Tex. Admin Code § 3.46(c)(1) (notice and opportunity for hearing)

⁴ Applicant's Exh. No. 2.

⁵ Applicant's Exh. No. 5.

⁶ Applicant's Exh. No. 2.

- Set 9 5/8-inch surface casing to 500 feet and circulate 320 bags of cement to the surface;
- Set 7-inch surface casing to a depth of 6,150 feet and circulate 1,385 bags of cement to the surface; and
- Set 3 1/2-inch injection tubing on a packer at a depth of 4,850 feet.

A wellbore schematic is attached as Exhibit A. Samson proposes to operate the subject well at a maximum surface injection pressure of 2,475 psig. The maximum daily injection volume will be 12,000 bbl, with an estimated average injection rate of 10,000 bbl per day.⁷

Mr. Clark stated that Samson does not plan on perforating the entire injection interval requested in the application. Instead, Mr. Clark stated, "They intend to go down, try the lower Pettit first; continue to use it until basically it won't take any more water, if that ever happens. Then come up hole to the Rodessa and then Gloyd and then further come up hole to the Rodessa Hill ... we wouldn't necessarily be perforated from 4,950 to 6,055 at any one time."⁸ Samson does not intend to attempt injection into the James Lime Formation.

The injection interval is overlain by a 200-foot thick anhydrite stratum that acts as a seal to prevent vertical migration of fluids above the injection interval.⁹ The Pettit Formation itself is underlain by the Travis Peak Formation, which is in turn underlain by the Cotton Valley Formation. The Cotton Valley Formation is currently the target for much of the gas development in the area, including Samson's.

There are five (5) existing or plugged wellbores within a one-half mile radius of the proposed well:¹⁰

- O'Benco's Mrs. W. E. Biggs Lease, Well No. 1 (API No. 42-365-01281), located about 100 feet to the east, was a dual-completed gas well that produced from the Hill and Pettit Formations. The well was drilled in 1948 and plugged in 2012. The casing completion last produced gas in 1998 and produced 7 thousand cubic feet of gas per day (MCFD) prior to abandonment. The tubing completion last produced in 2012, was unproductive from 1965 through 1999, and produced 6 MCFD prior to

⁷ Applicant's Exh. No. 2.

⁸ Tr. pg. 18, lns 3-10.

⁹ Tr. pg. 26, lns 16-18; Applicant's Exh. No. 11.

¹⁰ Applicant's Exh. No. 2.

abandonment. The wellbore contains two plugs between the top of the injection interval and the BUQW, as well as a third plug across the BUQW. A fourth plug is within the injection interval. When setting the plugs identified above, the casing was perforated to allow cement to be squeezed behind it.

- Samson's Biggs Lease, Well No. 1 (API No. 42-365-31212), located about 200 feet to the northwest, was a gas well that produced from the Cotton Valley Formation. The well was drilled in 1981 to a depth of 9,750 feet and plugged in 2011. The wellbore contains two plugs between the top of the injection interval and the BUQW, as well as a third plug across the BUQW. A fourth plug is within the injection interval, and two plugs are below the injection interval. When setting the plugs identified above, the casing was perforated to allow cement to be squeezed behind it.
- Samson's Biggs Lease, Well Nos. 3H (API No. 42-365-37839) and 5H (API No. 42-365-37839) are horizontal wells whose laterals and terminus locations are within a one-half mile area of review, but the surface locations are a mile to the northwest. These two wells produce from the Carthage, S.E. (Cotton Valley) Field, which is more than 2,000 feet below the proposed injection interval.

The fifth well within a one-half mile radius is Samson's Powell Bottom SWD Lease, Well No. 1 (API No. 42-365-38039), Carthage (Rodessa) Field, Panola County, Texas (the "Powell Bottom Well No. 1"), located 337 feet to the east of the subject Powell Bottom Lease, Well No. 2. On February 26, 2013, the Commission entered an order authorizing Samson to use the Powell Bottom SWD Well No. 1 for injection into the Goodland Lime Formation (Permit No. 13983). The Goodland Lime Formation is shallower than the Rodessa Formation. The Powell Bottom SWD Well No. 1 is 2,890 feet deep, about 2,000 feet above the top of the proposed injection interval for the Powell Bottom Well No. 2. In October and November 2013, Samson injected about 3,600 barrels per day into the Powell Bottom SWD Well No. 1.¹¹ The permit required regular pressure fall-off testing and included a provision for termination of the permit if the average reservoir pressure exceeded 250 psi/foot or greater than the normal gradient pressure.¹² On April 29, 2014, Commission staff cancelled the permit for exceeding the permitted reservoir pressure limit.¹³

As a result of losing the Powell Bottom SWD Well No. 1, Samson asserts that it needs additional disposal capacity for the waste fluids generated by its exploration and

¹¹ O'Benco's Exh. No. 6.

¹² O'Benco's Exh. No. 2.

¹³ O'Benco's Exh. No. 7.

production activities in the area. Samson is currently spending \$6,000 to \$8,000 per day for fluid disposal by commercial vendors.

Samson asserts that its disposal options are currently limited and the proposed disposal well is necessary and in the public interest. Samson currently utilizes four commercial disposal wells in Panola and Shelby Counties:¹⁴

- The Heckmann Water Resources Deadwood SWD Lease, Well No. 1 (API No. 42-365-36412) is 4.1 miles to the southeast and injects into the Rodessa Formation;
- The Longbranch Energy Longbranch Disposal, Well No. 1 (API No. 42-365-37016) is 5.3 miles to the southeast and injects into the Rodessa Formation;
- The Basic Energy Services Woods Lease, Well No. 1 (API No. 42-419-30914) is 9 miles to the southwest and injects into the Duck Creek Formation; and,
- The Basic Energy Services Tenaha Lease, Well No. 1 (API No. 42-419-30818) is 9.6 miles to the southwest and injects into the Duck Creek Formation.

All of these wells have shown reservoir pressure increases of 745 psi to 1,426 psi in excess of the initial pressure prior to injection. In addition, Samson operates another disposal well (Knight Strong Unit Well No. 1, API No. 42-365-30079) that is located about 4 miles to the southwest, but its capacity is not sufficient to meet all of Samson's needs in Panola and surrounding counties. There is one other disposal well 3.4 miles north of the proposed well, but it is proprietary and not available to Samson.¹⁵ Thus, Mr. Clark stated the proposed well is a significant distance from other commercial injection wells in the area, and those wells are already pressured significantly above initial formation pressure.

O'Benco is the record operator of several wellbores in the vicinity of the proposed well. Ranging between 1.2 and 4.6 miles away, all are beyond the half-mile area of review. Four wells are dual completions. Seven are completed in the same stratigraphic interval as the proposed well. Only one of these wells has reported production in 2014, some 268 MCF to date. Another well reported nominal production in 2013. The remainder have not produced since 2011. The latest production data for all of these wells indicated very

¹⁴ Applicant's Exh. No. 12 (demonstrating mileages are straight-line; roadway travel miles are greater).

¹⁵ Applicant's Exh. No. 14.

marginal gas production; the best well at abandonment sporadically produced less than 10 MCFD.¹⁶ Mr. Clark did not review cementing details of the O'Benco wells.¹⁷

Mr. Clark was challenged based on his participation in a 2008 docket in which he testified in support of a protest to a Rusk County injection well targeted for the Rodessa and Pettit Formations, some 60 miles away from the location in the case at hand. Mr. Clark stated that, while the proposed injection intervals for the two wells are roughly equivalent, the similarities end there. In the Rusk County case, the targeted formations were significantly overpressured because another injection well was in operation 8,000 feet away. Mr. Clark also noted that the evidence in the prior case showed saltwater breakouts on the surface and elevated areal Bradenhead pressures. The proof also showed that abnormal mudweights were required to drill through the Rodessa Formation. Whereas, the interval in the case at hand, the Rodessa and Pettit Formations, are subject to normal pressure gradients and are being drilled with standard mud weights.¹⁸

Protestant's Evidence

O'Benco is protesting Samson's application because it believes there is a significant risk that disposal into the Rodessa and Pettit Formations at the proposed Powell Bottom Well No. 2 will result in pollution of groundwater in the area. O'Benco also believes injection will harm remaining producible resources in the Hill and Pettit Formations, in addition to increasing risks and costs of producing deeper resources. Mr. Keith Masters, P. E., provided expert engineering testimony on behalf of O'Benco.

Mr. Masters cited a paper prepared by Fred McDougal of Anadarko Petroleum and presented at the American Association of Drilling Engineers National Technical Conference in 2005, which assessed drilling practices in the nearby Carthage (Cotton Valley) Field.¹⁹ Mr. Masters testified that the McDougal paper included the following conclusions:

- Elevated reservoir formation pressures exist in the Rodessa & Duck Creek Formations as a result of fluid injection into these zones.
- Higher than normal mud weight is necessary for well control when drilling into and through the Rodessa and Duck Creek Formations.

¹⁶ Applicant's Exh. Nos. 14-23.

¹⁷ Tr. pg. 58, Ins. 7-12.

¹⁸ Tr. pg. 78, Ins 1-8.

¹⁹ O'Benco's Exh. No. 3.

- The Travis Peak Formation, which underlies the Pettit, has very low frac gradient (11.5 lbs/gal).
- High mud weights needed to control the Rodessa and Duck Creek Formations can fracture the Travis Peak Formation.
- Low fracture gradient in the Travis Peak Formation can cause loss of cement circulation uphole, and cement tops being significantly lower than calculated or estimated.
- Anadarko Petroleum experienced loss of cement circulation on production casing in 50 percent of its wells drilled in 2000 and 2001.
- Loss of cement circulation uphole may result in no, or incomplete, cement coverage across Rodessa, Duck Creek, or even Pettit injection intervals, exposing steel casing to corrosive fluids.
- In 2000 and 2001, 15 percent of Anadarko Petroleum's new wells developed casing leaks within two years of spud date due to exposure to highly corrosive SWD zones.

With current drilling activity in the area targeting the Cotton Valley Formation, O'Bencho is concerned about similar well completion and integrity issues in the subject area. Mr. Masters also referenced a letter from Commission Staff on April 23, 2012, directing operators of injection wells into the Rodessa, Fredericksburg, Duck Creek, Mooringsport, Nacatoch, and Goodland Lime Formations in Harrison, Panola and Shelby Counties, to conduct formation-specific bottom-hole pressure fall-off tests on their wells.²⁰ The purpose of this directive was to assess the potential and/or extent of overpressuring in these formations in the three-county area, and the results indicated "alarmingly high bottom hole pressures."²¹

Mr. Masters expressed concern with the agreement between Samson and Commission Staff to conduct periodic pressure testing of the disposal intervals. He stated the permit provisions were not clear and should require the various injection intervals to be tested independently of one another, not in the aggregate.²² Using parameters provided by Samson, Mr. Masters testified that the proposed well will only be able to dispose of

²⁰ O'Bencho's Exh. No. 4.

²¹ Tr. pg. 93, ln. 2, referencing O'Bencho's Exh. No. 5.

²² Tr. pg. 133, lns. 15-19.

6,000 bbl per day into the depleted Pettit and Hill zones, and 2,000 bbl per day into the Gloyd.²³

Mr. Masters stated that the one-quarter mile area of review required by Statewide Rule 46 is not adequate in this area, and available information indicates injection into the Pettit Formation may cause excessive pressures more than 8,000 feet away.²⁴ Also, the Agreed Order between Samson and the Commission to permit the Powell Bottom Well No. 1 included a staff evaluation of wells up to two miles away.²⁵ Within a one-mile radius of the proposed disposal well, O'Benco identified three wellbores that were not cemented across the proposed injection interval, the closest of which is 3,000 feet from the proposed disposal well. O'Benco also identified six wells for which it was not able to determine the top of cement.²⁶ Consequently, Mr. Masters sees no reason why the injection into the Pettit Formation should not be subjected to the same testing requirements as injection into the Rodessa Formation. He believes the lower Pettit, which is Samson's initial target for injection, is depleted, but permeable zones in the upper Pettit may still be at virgin pressures.²⁷

O'Benco is an operator of wells in the area. O'Benco believes that its potential resources may be harmed by disposal into the Rodessa and Pettit Formations. In May 2003, O'Benco recompleted its Twomey Lease, Well No. 1 (API No. 42-365-30591) (located about 3.5 miles southwest of the proposed disposal well), to produce from the lower Pettit Formation, Samson's initial target for disposal. O'Benco believes the recompletion of this well demonstrates that resources remain in the depleted Pettit zones in the area, possibly in economic quantities, but injection into the lower Pettit will cause the waste of these resources.²⁸

Mr. Masters reviewed data on commercial disposal wells to demonstrate that excess disposal capacity exists in the area and is available to Samson and other operators. Mr. Masters identified 14 active commercial disposal wells within a 10-mile radius of the proposed well. Eleven of these wells exhibit excess disposal capacity, which Mr. Masters

²³ O'Benco's Exh. Nos. 9-10.

²⁴ Tr. pg. 62, Ins. 13-18, referencing O'Benco's Exh. No. 1.

²⁵ O'Benco's Exh. No. 2.

²⁶ O'Benco's Exh. Nos. 11-12.

²⁷ Tr. pg. 100, Ins. 1-20.

²⁸ Tr. pg. 124, Ins. 2-15.

defined as a maximum permitted injection pressure of at least 500 psig more than the average of reported Form H-10 injection pressures.²⁹

On cross-examination, Mr. Masters acknowledged that the nearby Deadwood SWD Lease, Well No. 1, which is located 4.1 miles to the southeast and injects into the Rodessa Formation, was permitted as a commercial disposal well by O'Benco in 2006.³⁰ O'Benco no longer operates the well; it is now operated by Heckman Water Resources.

EXAMINERS' OPINION

The Railroad Commission may grant an application for a disposal well permit under Texas Water Code § 27.051(b) and may issue a permit if it finds:

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

The examiners recommend the Application be approved with an added permit condition that requires initial bottom hole pressure testing of any Pettit Formation interval selected for injection. As discussed below, the examiners believe this is a proper safeguard for the protection of hydrocarbon and fresh groundwater resources outside of the injection interval. With this provision, the application meets the requirements of the Texas Water Code and Statewide Rule 46.

General

The oil and gas industry in and around Panola County relies heavily on the Rodessa Formation and, to a lesser degree, the Pettit Formation for liquid waste disposal. The

²⁹ O'Benco's Exh. Nos. 18-19.

³⁰ Applicant's Exh. No. 25.

examiners acknowledge the general concerns O'Benco has raised.³¹ In some areas, these formations have experienced higher than anticipated reservoir pressure due to injection activities, and some adverse outcomes have been observed. Commission staff has taken at least two courses of action, which are documented in the record for this application, in order to respond to this situation.

First, on April 23, 2012, Commission staff issued a notice to operators of commercial disposal wells in the area, requiring them to perform bottom-hole pressure fall-off tests and report the results to the Commission. This action was part of a broad-based effort to quantify the extent to which oil and gas waste disposal operations can, or cannot, be continued in the Rodessa Formation and other horizons in the area.

Second, the Commission has required additional pressure testing for at least some disposal wells permitted in these areas. In fact, following a routine pressure test required by its special permit conditions, Samson's Powell Bottom Well No. 1, located a few hundred feet from the proposed disposal well, reported reservoir pressures exceeding its permitted levels. Consequently, the Commission terminated the permit on April 29, 2014. The Powell Bottom Well No. 1 was permitted to inject waste fluids into the Goodland Lime Formation, which is shallower than the Rodessa. The Goodland Lime was also the subject of the April 23, 2012 Commission pressure testing initiative. Similarly, Commission staff initially opposed the permitting of the subject Powell Bottom Well No. 2 to inject fluids into the Rodessa Formation and sought to impose pressure testing requirements in the permit. Ultimately, Samson and Commission staff came to an agreement on a pressure testing regimen³². In addition, Samson now seeks additional authority to inject into the Pettit Formation, specifically the lower Pettit interval that has been depleted by production.

The examiners note that Commission staff has: (1) become aware of the potential for overpressure in the subject zones; (2) acted to further study the issue; (3) implemented additional permit conditions to protect these zones; and (4) acted to terminate permits when the pressure limitations have been exceeded. The examiners conclude that these efforts combined with the proposed permit conditions are sufficient to protect hydrocarbon and freshwater resources from Rodessa Formation disposal activities.

However, the Pettit Formation was not included in the pressure testing regimen agreed to by staff and Samson. The examiners believe, however, that the initial bottom hole pressure for any Pettit Formation interval should be measured and reported to the Commission prior to injection. This measurement is necessary to confirm Samson's estimation of initial bottom hole pressure and to establish a baseline for future evaluation

³¹ O'Benco's Exh. No. 3. The examiners also recognize the 2005 McDougal paper was available to O'Benco when it applied for and received a commercial disposal permit for its Deadwood SWD Well in 2006, and yet it still sought and obtained the permit.

³² Applicant's Exh. No. 1 and Staff's Exh. No. 1.

of reservoir pressure, if necessary. As such, the examiners recommend, as a special permit condition, that Samson also test the initial bottom hole pressure of Pettit injection interval(s) and report that information to the Commission prior to injection therein. Samson stated its belief that the lower Pettit has been depleted and estimates the residual formation pressure to be about 500 psi. Initial testing the interval will confirm this condition and help to assess the extent to which the interval will remain suitable for injection into the future. The examiners decline to recommend annual pressure fall-off testing or a pressure gradient limitation for the Pettit Formation, however. Commission staff are better able to assess the continued need and significance of pressure test data, and Statewide Rule 46 (d)(1) provides the Commission with a basis for action, if warranted.

Samson has identified three targeted injection zones within its requested permitted interval: Rodessa Hill; Rodessa Gloyd; and lower Pettit Formations. Other sufficiently porous and permeable zones may also be utilized. The examiners understand the agreed permit language requires testing of each and every Rodessa zone that Samson selects for injection, and that such testing will be conducted by independently isolating and testing each zone. Samson indicated this was its interpretation of the permit language, and that it intends to test the various zones in this manner.

Samson has demonstrated that the Rodessa and Pettit Formations are not currently overpressured in the location of the proposed well. In February 2012, Samson drilled its Biggs Lease, Well No. 3H (API No. 42-365-37839), the lateral of which crosses into the one-quarter mile area of review. The drilling mud weight was 10.0 lbs/gallon or less through the setting of the intermediate casing at a depth of 9,338 feet, which is in the Cotton Valley Formation.³³ Heavier mud weights were not needed to control Rodessa or Pettit zones, indicating these Formations were not overpressured at the time and location of drilling the Biggs Lease, Well No. 3H. Samson believes the Rodessa Hill and lower Pettit Formations are depleted and may exhibit current reservoir pressures of about 500 psig. The Rodessa Gloyd Formation, which has not been shown to be productive in the area, may exhibit higher virgin reservoir pressure.

Public Interest

There is no dispute that the disposal of saltwater and other waste fluids is a necessary aspect of hydrocarbon production. Samson and other operators are vigorously developing the Cotton Valley Formation in the area. O'Benco argues there is sufficient existing commercial disposal capacity in the area, specifically identifying 19 commercial disposal wells within a 10-mile radius. According to O'Benco, eleven of these wells have

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Applicant's Exh. No. 26.

excess capacity.³⁴ The examiners are not convinced that significant excess capacity truly exists. The examiners note that eight of the 11 wells were also identified on O'Benco's Exhibit No. 5 as having "alarmingly high bottom hole pressures," based on testing mandated by Commission staff in 2012.³⁵ The evidence in the record supports Samson's contention that the proposed disposal well is in the public interest.

Endanger or Injure Any Oil, Gas or Other Mineral Formation

The Rodessa Hill and Pettit Formations are historically productive within a two and one-half mile radius of the proposed disposal well. However, there is no current production from these zones within at least a one-half mile radius of the proposed well. The only producing wells within a one-half mile radius of the proposed are Samson's Biggs Lease, Well Nos. 3H and 5H, which are targeting the Cotton Valley Formation more than 2,000 below the base of the proposed disposal interval.

Samson demonstrated that the nearby Rodessa and Pettit producing intervals are depleted. O'Benco's representatives made indirect statements about owning minerals at the location of the proposed disposal well, but did not support these statements with evidence. O'Benco argues that the potential for economic resources exists in the Rodessa Formation near the proposed disposal well, but it has not attempted to either quantify or prove their existence, apart from a successful 2003 recompletion of the O'Benco Twomey Lease, Well No. 1, located 3.5 miles to the southeast; that well has not reported production since February 2013. O'Benco's nearest production from the Rodessa Formation is about 1.2 miles from the proposed well. O'Benco offered no evidence, such as development plans or drilling permits, for future development in the area. O'Benco did not refute Samson's evidence that the formerly productive zones within the disposal interval are depleted of hydrocarbons.

Protect Fresh Groundwater and Surface Water from Pollution

With proper safeguards, both ground and surface fresh water can be adequately protected from pollution. The proposed disposal well will include two casing strings fully cemented back to the ground surface to isolate the injection interval from the overlying fresh water zones. In addition, the injection interval is capped by an impermeable massive anhydrite stratum. A review of wellbores within a one-quarter mile area of review indicates two plugged and abandoned wells within a few hundred feet of the proposed well. Well plugging records indicates these wells contain multiple cement plugs isolating the disposal interval from the BUQW.

³⁴ O'Benco's Exh. Nos. 18 and 19. "Excess capacity" is defined as a permitted maximum injection pressure that is at least 500 psi higher than the average injection pressure reported on Forms H-10.

³⁵ Tr. pg. 93, ln. 2.

O'Benco argues that the one-quarter mile area of review is not sufficient, and that instead a 2-mile area of review should be considered. The examiners disagree. As has been explained above, Commission staff is fully aware of the potential for harm in the area and has acted to monitor the proposed disposal activities, placing permit conditions on disposal wells when it deems necessary to protect hydrocarbon and freshwater resources.

Financial Responsibility

Samson has made a satisfactory showing of financial responsibility as required by the Texas Water Code §27.073. Railroad Commission records indicate Samson has an active Organization Report (Form P-5) on file, and Samson has filed a blanket financial assurance bond in the amount of \$310,000.

FINDINGS OF FACT

1. Notice of the application was published in the *Panola Watchman*, a newspaper of general circulation in Panola County, on July 27, 2014.
2. Notice of the application was mailed on July 23, 2014, to the Panola County Clerk, to the City of Carthage, and to the surface owners of the disposal tract. There are no offset operators within one-half mile.
3. The application was protested by O'Benco, Inc., a nearby operator.
4. Samson Lone Star, LLC proposes a newly-drilled non-commercial disposal well to inject fluids into an interval that includes the Rodessa, James Lime and Pettit Formations.
5. Samson Lone Star, LLC's proposed Powell Bottom Well No. 2 will be constructed with two strings of casing both of which will be cemented to the surface. Injection tubing will be set on a packer less than 100 feet from the top of the disposal interval.
6. The base of usable quality water is at 450 feet and will be protected by two casing strings both of which will be cemented to the surface.
7. Five wellbores were identified within a one-half mile radius of the proposed well. Two of the wells were plugged and abandoned in 2012 and include multiple plugs separating the injection interval from the base of usable quality water. One well does not penetrate the disposal interval. Two wells are the laterals of horizontal wells completed in the Cotton Valley Formation 2,000

feet below the injection interval. The surface locations for these two wells is more than a mile to the northwest.

8. Samson Lone Star, LLC and Commission staff have agreed to permit provisions regarding pressure testing of individual disposal intervals within the Rodessa Formation, and criteria for termination of the permit if so required by the pressure testing provisions.
9. Commission staff is aware of the potential for overpressure due to injection activities in the area, has acted to further study the issue, has implemented additional permit conditions to protect certain zones, and has acted to terminate permits when the pressure limitations have been exceeded.
10. Conducting an initial bottom hole pressure test for Pettit Formation intervals targeted for injection will provide important pressure data to establish a baseline point of reference for future monitoring.
11. The evidence in the record supports Samson's contention that the proposed disposal well is in the public interest.
12. Samson Lone Star, LLC has made a satisfactory showing of financial responsibility as required by the Texas Water Code §27.073.

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. All notice requirements have been satisfied. 16 Tex. Admin. Code § 3.46(c)
3. The use or installation of the proposed injection well is in the public interest. Texas Water Code §27.051(b)(1)
4. The use or installation of the proposed injection well will not endanger or injure any oil, gas, or other mineral formation. Texas Water Code §27.051(b)(2)
5. With proper safeguards, as provided by terms and conditions in the attached final order, which are incorporated herein by reference, both ground and surface fresh water can be adequately protected from pollution. Texas Water Code §27.051(b)(3)

6. Samson Lone Star, LLC, has made a satisfactory showing of financial responsibility to the extent required by Section 27.073 of the Texas Water Code. Texas Water Code §27.051(b)(4)
7. Samson Lone Star, LLC, has met its burden of proof and satisfied 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 and conclusions, the examiners recommend that the application be approved as set out in the attached Final Order.

Respectfully submitted,

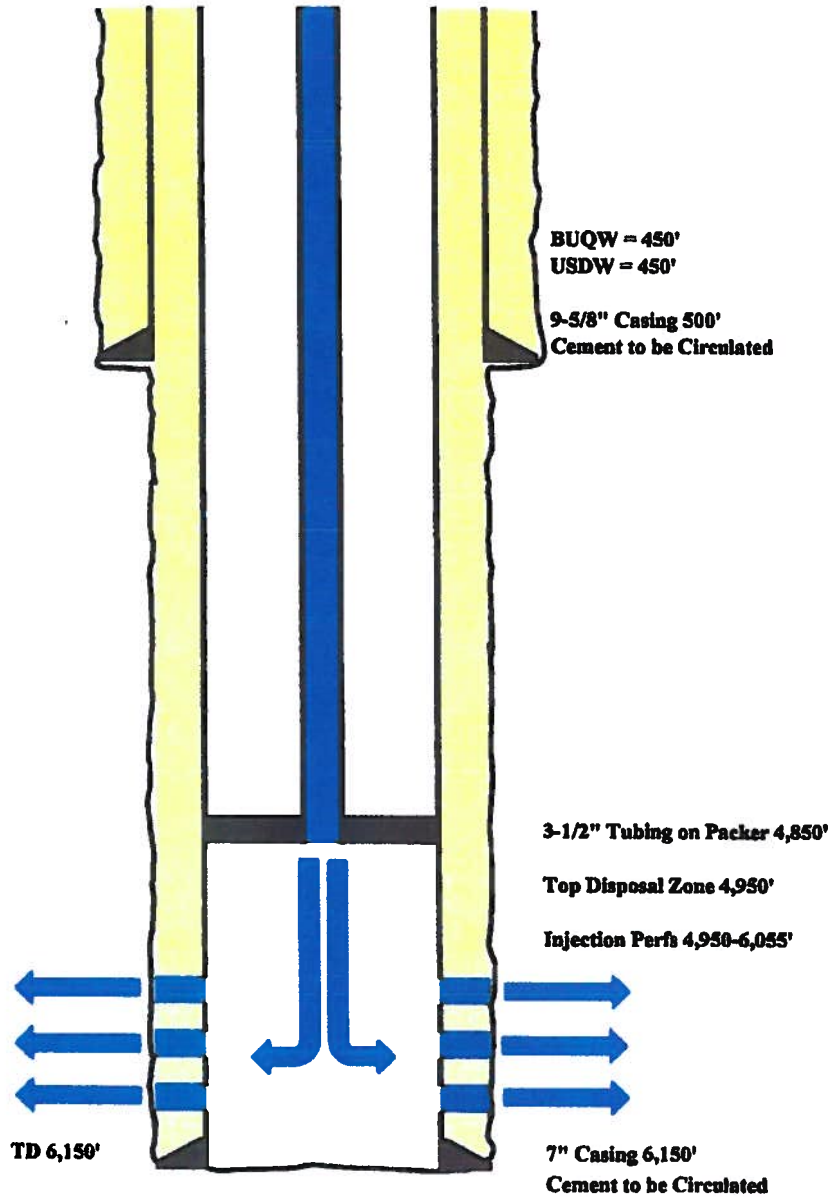


Paul Dubois
Technical Examiner



Terry Johnson
Hearings Examiner

**Powell Bottom SWD No. 2
Proposed Pettit / Rodessa Disposal Well**



06-0287587
PFD EXHIBIT A—Wellbore Schematic
Applicant's Exhibit No. 10

Exhibit No. 10
SAMSON LONE STAR LLC
Oil & Gas Docket No. 06-0287587
August 29, 2014