



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL & GAS DOCKET NO. 8A-0310710

THE APPLICATION OF STAKEHOLDER GAS SERVICES, LLC (811207) PURSUANT TO SWR 46 AND 36 INJECTION PERMIT FOR A PERMIT TO INJECT FLUID CONTAINING HYDROGEN SULFIDE INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS FOR THE POZO ACIDO VIEJO LEASE, WELL NO. 1, BRONCO (SILURO-DEVONIAN) FIELD, YOAKUM COUNTY, TEXAS

HEARD BY: Richard Eyster, P. G. – Technical Examiner
Clayton J. Hoover – Administrative Law Judge

HEARING DATE: June 29, 2018

CONFERENCE DATE: August 21, 2018

APPEARANCES:

Paul Tough	Stakeholder Gas Services, LLC
Thomas Weber	
Stephen Pattee	
Jerry D. ferguson	
Peter W. Jordan	
Jacob Mezey	
Ted Lilly	
Durell Johnson	
Gaylon Gray	
Roger Liddell	
Michael Gray	

EXAMINERS' REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Stakeholder Gas Services, LLC ("Stakeholder") requests authority to inject acid gas into its Pozo Acido Viejo Lease, Well No. 1. The injection well will be carried in the Bronco

(Siluro-Devonian) Field, which is a Commission-listed hydrogen sulfide (“H₂S” or “sour gas”) field.

Statewide Rule 36(c)(10)(A) requires that a public hearing be held before the injection of fluid containing H₂S is permitted, when “injection fluid is a gaseous mixture...where the 100 ppm radius of exposure is in excess of 50 feet and includes any part of a public area except a public road; or, if the 500 ppm radius of exposure is in excess of 50 feet and includes any part of a public road; or, if the 100 ppm radius of exposure is 3,000 feet or greater.” In this case, the 100 ppm radius of exposure (“ROE”) is 3,000 feet or greater.

The Commission’s District Office has reviewed the application and has approved Stakeholder’s contingency plan which incorporates the injection well. The Commission’s Technical Permitting staff recommends approval of the application. Stakeholders unprotested application pursuant to Rule 46 will be administratively approved by Technical Permitting upon approval of this Rule 36 application.

To satisfy Statewide Rule 46, notice of the subject application was published in *The Denver City Press*, a newspaper of general circulation in Yoakum County, on January 7, 2018. To satisfy Statewide Rule 36, notice of the hearing was published in *The Denver City Press*, a newspaper of general circulation in Yoakum County, on May 3, 2018. Additionally, notice of the application was sent to the Yoakum County Clerk, offset operators within ½ mile of the proposed well, and all surface owners of each tract which adjoins the tract where the proposed well is located on January 4, 2018. Notice of the application was sent to all surface owners of tracts located within the 100 ppm ROE and the Yoakum County Sheriff Department on May 25, 2018. That notice of application was also sent again to the adjoining surface owners, offset operators, and the Yoakum County Clerk. Notice of hearing was sent to the adjoining surface owners, offset operators, Yoakum County Clerk, surface owners of tracts located within the 100 ppm ROE, and the Yoakum County Sheriff Department on May 25, 2018.

This Rule 36 application was unprotested and the Technical Examiner and the Administrative Law Judge (collectively the Examiners) recommend the application be approved.

DISCUSSION OF THE EVIDENCE

Stakeholder presented testimony from five (5) witnesses and offered thirty-five (35) exhibits covering regulatory compliance, wellbore design and engineering, regional and local geology, underground plume modeling, air dispersion modeling, and safety. Stakeholder plans to use the Pozo Acido Viejo Lease, Well No. 1 with the Campo Viejo Plant, its gas processing plant in Yoakum County. Gas produced from the nearby San Andres fields contains levels of H₂S and carbon dioxide (“CO₂”) that require treatment before the gas goes to sales. Without treatment, the produced gas is typically flared. Stakeholder proposes to inject the waste gas (acid gas), from the treatment process into

the Pozo Acido Viejo Lease, Well No. 1. The well has been drilled, and it is located on a 200-acre tract, approximately 10.3 miles west of Plains, Texas.

Stakeholder requests authority to dispose of a maximum of 6.9 MMscfd of compressed acid gas. The requested maximum surface injection pressure is 6,010 psig. The Pozo Acido Viejo Lease, Well No. 1 was drilled to a total depth of 12,349 feet. The well has 13 5/8" surface casing set at 2,402 feet and cemented to surface. The 9 5/8" intermediate casing was set at 6,421 feet and cemented to 5,000 feet. Using a DV tool, the 9 5/8" intermediate casing was also cemented from 4,440 feet to surface. The 7" long string casing was set at 12,026 feet and cemented to 7,503 feet. Then, using a DV tool set at 7,503 feet, the 7" casing was cemented to surface. The Railroad Commission's Groundwater Advisory Unit recommends that useable quality water be protected to a depth of 375 feet. The base of underground sources of drinking water ("USDW") is estimated to occur at a depth of 2,250 feet. Injection will be through tubing set on a packer at approximately 12,000 feet. All of the tubular equipment which may come in contact with CO₂ and H₂S are corrosion resistant steels and alloys that meet all Commission and industry standards for handling CO₂ and H₂S.

The proposed disposal interval is into the open-hole Siluro-Devonian formation between 12,020 feet and 12,349 feet based on the TD of the well. The Devonian formation appears at approximately 12,020 feet in the Pozo Acido Viejo Lease, Well No. 1. Within 2 miles of the Pozo Acido Viejo Lease, Well No. 1, the Siluro-Devonian formation had past Devonian production. It was appropriate for Stakeholder to file its application on forms H-1 and H-1A. The Commission has listed the Bronco (Siluro-Devonian) Field as an H₂S field, which information is publicly available. As a result, any operators drilling in the area should be aware of the potential for H₂S in this field.

There are no wellbores within ½ mile of the proposed well that penetrate the proposed disposal interval. The active wells within ½ mile are targeting the shallower San Andres formation at approximately 5,600 feet.

In the area where the Pozo Acido Viejo Lease, Well No. 1 is located, the Siluro-Devonian formation is structurally low. The area is between two anticlines and away from any faults or existing Devonian production. Structurally, the proposed location is appropriate for disposal. Log analysis of the Pozo Acido Viejo Lease, Well No. 1, and other nearby wells, indicates that the Woodford shale lies above the proposed disposal interval and is laterally extensive. This shale will act as an upper confining interval for the proposed disposal interval. Log analyses also indicates that the upper Siluro-Devonian formation has good porosity and permeability, but becomes tighter and less porous deeper in the formation. The deeper Siluro-Devonian formation will act as a lower confining interval for the proposed disposal interval. A seismic search did not identify any seismic events within a 9.08 km radius of the proposed injection well.

Computer simulations of fluid migration were performed to predict the maximum probable extent of underground waste migration. The numerical model SWIFT was used for the plume migration predictions. Input data included a net pay thickness of 101 feet,

a porosity of 7%, and a permeability of 20 md. This input data is conservative and results in an over-prediction of the maximum probable extent of waste migration. The model assumed injection at the maximum permitted rate for 25 years and then 25 years of drift. The model also accounted for the injection of operations of Devonian disposal wells located more than 1 ¼ miles to the east of the proposed injector. The SWIFT model has been accepted nationally for hazardous waste disposal wells by the EPA and has been previously accepted by the Railroad Commission.

Acid gas concentrations were calculated and mapped based on the modeling. The outer edge of the underground injection plume is represented by a 1% contour line, where the fluid is 99% formation and 1% acid gas. The maximum extent of the 1% line is less than 12,000 feet from the injection well after 25 years of injection. After 50 years, allowing for 25 years of drift, the maximum extent of the 1% line is less than 17,000 feet from the injection well. There are no existing wells within the modeled injection plume that penetrate the disposal interval. The nearest fault is more than 10,000 feet from the maximum extent of the modeled injection plume. Therefore, there will not be a conduit for the migration of the injected fluid outside the disposal interval.

The maximum escape rate is estimated to be 102.6 MMscfd (more than 14 times the maximum injection rate), which assumes worst-case conditions with escape through the 7" casing rather than the tubing. Stakeholder performed gas dispersion modeling based on these worst-case conditions using a dispersion model called CANARY. CANARY is a conservative modeling-tool used to determine the ROE for H₂S. This model calculates release conditions, initial dilution of the vapor, and subsequent vapor dispersion. The model accounts for thermodynamics, mixture behavior, transient release rates, gas cloud density, the initial velocity of the gas, wind speed, and heat transfer effects. This model has been previously accepted by the Railroad Commission for acid gas injection applications. The initial calculated ROE for the 100 ppm H₂S, due to the maximum catastrophic release at the proposed injection well, is 4,373 feet. For 500 ppm H₂S, the initial calculated ROE is 2,088 feet. There are no residences located within the 500 ppm ROE. Part of County Road 165 is located within the 100 ppm ROE. Stakeholder ran the CANARY model again based on the as-drilled conditions of the injection well. The ROE for the 100 pm H₂S is 4,436 feet. For 500 ppm H₂S, the ROE is 2,128 feet. No additional surface owners were included within the as-drilled ROEs.

Stakeholder submitted a contingency plan to the Commission's District Office for its gas processing plant and injection well. The contingency plan for the gas processing plant includes a 100 ppm ROE of 7,935 feet and a 500 ppm ROE of 3,626 feet. Since the ROEs for the gas processing plant are greater than those for the injection well, Stakeholder will use the greater ROEs for implementing the contingency plan. The Railroad Commission's District Office approved the contingency plan for the gas processing plant and the proposed injection well. The Railroad Commission has also approved the H-9s associated with the gas processing plant and injection well operations (both drilling and injection).

The proposed injection well is designed to meet all safety requirements of Rule 36. The wellhead will be equipped with emergency shut-down controls, self-contained breathing apparatus ("SCBA") equipment, H₂S monitors, and a fire extinguisher. Similarly, the gas processing plant, which includes the injection well, will utilize emergency shut-down controls, SCBA equipment, H₂S monitors, windsocks, and fire extinguishers. The Pozo Acido Viejo Lease, Well No. 1 will be monitored daily by trained field personnel. Each employee is equipped with personal H₂S monitors. The onsite safety system will have real-time data monitoring and notification devices. The proposed gas processing plant will be a full-time manned installation which has been Rule 36 certified.

FINDINGS OF FACT

1. Notice of this hearing was provided to all persons entitled to notice at least ten (10) days prior to the date of the hearing.
2. Notice of the application was published in *The Denver City Press*, a newspaper of general circulation in Yoakum County, Texas, on January 7, 2018.
3. Notice of application was sent to the Yoakum County Clerk, offset operators within ½ mile of the proposed injection well, and surface owners of each tract that adjoins the injection tract on January 4, 2018.
4. Notice of application was sent to the Yoakum County Clerk, the Yoakum County Sheriff Department, offset operators within ½ mile of the proposed injection well, surface owners of each tract that adjoins the injection tract, and to the surface owners of all tracts located within the 100 ppm ROE on May 25, 2018.
5. Notice of the hearing was published in *The Denver City Press*, a newspaper of general circulation in Yoakum County, Texas, on May 3, 2018. Notice of hearing was sent to adjoining surface owners, offset operators, the Yoakum County Clerk, surface owners of tracts locate within the 100 ppm ROE, and the Yoakum County Sheriff Department on May 25, 2018.
6. The subject application was unopposed.
7. The proposed injection well, the Pozo Acido Viejo Lease, Well No. 1, will be used to dispose of waste gas containing CO₂, H₂S, and other RCRA exempt waste. This waste is removed from hydrocarbon gas at Stakeholder's gas processing plant. The San Andres formation produces gas that requires treatment before going to sales. Currently the gas is flared by producers.
8. The Pozo Acido Viejo Lease, Well No. 1, will inject at rates up to 6.9 MMscfd of compressed acid gas.

9. The Pozo Acido Viejo Lease, Well No. 1, was drilled, cased and cemented to confine the injected fluid to the proposed Siluro-Devonian disposal zone.
 - a. The proposed disposal interval is into the open-hole Siluro-Devonian formation between 12,020 feet and 12,349 feet.
 - b. In the area where the Pozo Acido Viejo Lease, Well No. 1 is located, the Siluro-Devonian formation is structurally low. The area is between two anticlines and away from any faults or existing Devonian production. Structurally, the proposed location is appropriate for disposal. The Woodford shale lies above the proposed disposal interval and will act as an upper confining interval for the injected fluid. The deeper Siluro-Devonian formation will act as a lower confining interval for the injected fluid.
 - c. The Railroad Commission's Groundwater Advisory Unit recommends that usable-quality groundwater be protected down to a depth of 375 feet. The base of the underground sources of drinking water (USDW) is estimated to occur at a depth of 2,250 feet.
 - d. The well has 13 5/8" surface casing set at 2,402 feet and cemented to surface. The 9 5/8" intermediate casing was set at 6,421 feet and cemented to 5,000 feet. Using a DV tool the 9 5/8" intermediate casing was also cemented from 4,440 feet to surface. The 7" long string casing was set at 12,026 feet and cemented to 7,503 feet. Then, using a DV tool set at 7,503 feet, the 7" casing was cemented to surface.
 - e. Injection will be through tubing set on a packer at approximately 12,000 feet.
 - f. All of the tubular equipment that might come in contact with CO₂ and H₂S will be corrosion resistant steels and alloys that meet all Commission and industry safety standards.
 - g. If the injection fluid is not confined to the approved interval, then the disposal well permit will be suspended and disposal will cease until the fluid migration from such interval is eliminated.
10. The Bronco (Siluro-Devonian) Field is an H₂S listed field and carrying the injection well in that field will alert any operators drilling in the area of the potential of H₂S.

11. The proposed injection well is located on a 200-acre tract containing Stakeholder's proposed gas processing plant, approximately 10.3 miles west of Plains, Texas.
12. The requested maximum surface injection pressure is 6,010 psig.
13. The injection well, compressor and flow lines transmitting sour gas, will be designed to contain the sour gas, and monitoring devices will immediately shut down the system if any leakage of sour gas is detected.
14. Stakeholder has an approved contingency plan for its proposed gas processing plant and injection well. The Railroad Commission has approved the H-9s for the gas processing plant and injection well operations.
15. The calculated ROE for 100 ppm H₂S due to maximum catastrophic release at the proposed injection well is 4,436 feet. For 500 ppm H₂S, the ROE is 2,128 feet.
16. There are no residences located within the 500 ppm ROE. Part of County Road 165 is located within the 100 ppm ROE. Stakeholder's approved contingency plan for the gas processing plant has larger ROEs that will be implemented for the injection well operations.
17. Computer simulations of fluid migration were performed to predict the maximum extent of the injection plume. The outer edge of the underground injection plume is represented by a 1% contour line, where the fluid is 99% formation and 1% acid gas. The maximum extent of the 1% line is less than 12,000 feet from the injection well after 25 years of injection. After 50 years, allowing for 25 years of drift, the maximum extent of the 1% line is less than 17,000 feet from the injection well.
18. Because no existing well within the injection plume penetrated the injection interval, there will not be a conduit for the migration of the injected fluid outside the injection interval.
19. Stakeholder has met the conditions for approval set forth by the Field Operations and Technical Permitting sections of the Railroad Commission.

CONCLUSIONS OF LAW

1. Proper notice was issued as required by Statewide Rule 46 and Statewide Rule 36.

2. All things have occurred and have been accomplished to give the Commission jurisdiction in this matter.
3. The application of Stakeholder Gas Services, LLC to inject CO₂, H₂S, and other RCRA exempt waste into the Pozo Acido Viejo Lease, Well No. 1, Bronco (Siluro-Devonian) Field, Yoakum County, complies with the applicable provisions of Statewide Rule 46 and Statewide Rule 36.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend the Commission enter an order approving the application as requested by Stakeholder Gas Services, LLC.

Respectfully submitted,



Richard Eyster, P. G.
Technical Examiner



Clayton J. Hoover
Administrative Law Judge