

THE APPLICATION OF MOBEETIE RESOURCE DEV LLC FOR A PERMIT TO DISPOSE OF FLUID CONTAINING HYDROGEN SULFIDE INTO A RESERVOIR NOT PRODUCTIVE OF OIL OR GAS, BUD HOGAN SWD 44 WELL NO. 2, (PROPOSED) MOBEETIE (BR DOLO H₂S DISPOSAL) FIELD, WHEELER COUNTY, TEXAS

Heard by: Donna Chandler on October 19, 2009

Appearances:

Tom Weber
Martin Thalken
Kerry Pollard

Representing:

Mobeetie Resource Dev LLC

EXAMINER'S REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Mobeetie Resource Dev LLC ("Mobeetie") requests authority to inject acid gas in its Bud Hogan SWD 44 lease Well No. 2. Mobeetie also requests that a new field, the Mobeetie (Br Dolo H₂S Disposal) Field, be set up for this disposal well.

Statewide Rule 36(c)(10)(A) requires that a public hearing be held before the injection of fluid containing hydrogen sulfide ("H₂S" or "sour gas"), 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 500 ppm radius of exposure ("ROE") is greater than 50 feet and includes part of a public road.

Mobeetie has initially requested a disposal interval in the Brown Dolomite from 4,350 feet to 6,100 feet, with a maximum injection pressure of 2000 psig. The Commission's Field Operations section reviewed the application and has no objection to approval, with the following amendments:

1. The injection interval is deepened to 4,650-6,100 feet;

2. The maximum surface injection pressure is reduced to 1,200 psig;
3. The Patterson No. 4508 well is used as a monitoring well, with quarterly testing for the presence of H₂S.

The Commission's Technical Permitting staff recommends approval of the application contingent on a showing by applicant that the proposed disposal will not cause acid gas migration into productive horizons not known to contain hydrogen sulfide.

This hearing was unopposed and the examiner recommends approval of the Rule 36 and Rule 9 authority, with the suggested additional requirements. Mobeetie did not object to any of the proposed requirements.

DISCUSSION OF THE EVIDENCE

Gas produced from the Mobeetie (Ellenburger) Field contains H₂S. There are only two wells on the current proration schedule, both operated by Mobeetie. Both wells are currently shut-in waiting on the completion of the Mobeetie Central Facility and the proposed acid gas disposal well. The produced gas will flow to the Mobeetie Central Facility, where carbon dioxide ("CO₂") and H₂S will be removed. Mobeetie is proposing that this waste gas, or acid gas, be compressed and dissolved into produced salt water and disposed into the proposed Bud Hogan SWD 44 No. 2. The Bud Hogan SWD 44 No. 2 has not yet been drilled, but is proposed to be located approximately 1,000 feet east of the processing plant.

Mobeetie requests authority to dispose of a maximum of 500 MCFD of compressed acid gas and 3,000 BPD of produced water. This is the equivalent of approximately 3,082 BPD. The requested maximum surface injection pressure is 1,200 psig.

The Bud Hogan SWD 44 Well No. 2 will be drilled to a total depth of approximately 6,100 feet. The well will have 9 5/8" surface casing set at 1,500 feet and cemented to surface. The 7" long string will be set at approximately 4,650 feet, also cemented to surface. The TCEQ recommends that useable quality water be protected to a depth of 350. Injection will be through tubing set on a packer at approximately 4,550 feet. All of the tubular equipment which may come in contact with H₂S are corrosion resistant fiberglass or H₂S-resistant stainless steels and alloys that meet all Commission and industry standards for handling H₂S.

The proposed disposal interval is into the open hole Brown Dolomite between 4,650 feet and 6,100 feet. Establishing a new field designation called Mobeetie (Br Dolo H₂S Disposal) Field will identify the proposed disposal zone as a formation now containing hydrogen sulfide. Any operators drilling in the area will be aware of the potential of H₂S existing in an otherwise non-sour formation. The Brown Dolomite is productive approximately 1½ miles away in the Allen Engler (Brown Dolomite) Field. Mobeetie's

Patterson No. 4508, the closest of three wells completed in this Allen Engler (Brown Dolomite) field, produces from the upper portion of the Brown Dolomite between 4,050 and 4,068 feet. The other two wells in the field are more than 2 miles from the Bud Hogan SWD 44 No. 2. The portion of the Brown Dolomite into which disposal will occur is about 600 feet below the interval from which the Patterson No. 4508 produces. Mobeetie has agreed to a provision in its permit which requires Mobeetie to monitor the H₂S content from the Patterson 4508 well on a quarterly basis. Mobeetie will collect produced gas samples and have them analyzed for any increase in H₂S concentration. If the H₂S concentration increases, the RRC District Office will be notified immediately upon verification. If there is no increase, Mobeetie will keep the records in their offices for viewing by the RRC on request.

The Brown Dolomite interval proposed for disposal is wet. The log analyses for two nearby wells, the O. V. Scribner R/A -C- No. 2 and the Patterson 45 No. 9, indicated water saturations of 100% in the disposal interval. Log analyses of wells further away which produced from the Gill Ranch (Brown Dolomite) Field, indicate a residual water saturation of 53.2% in the Brown Dolomite. Additionally, a core analysis of the Patterson 4508 was available to estimate porosity and permeability of each of the various zones to be used for disposal in the Brown Dolomite. This data is used for predicting the amount of waste which would go into each individual zone.

Computer simulations were performed to predict the maximum probable extent underground of waste migrations. The simulation includes disposal of another operator's water. Blue Dolphin Production LLC operates wells in the area and may use the proposed disposal well. The maximum total volume of waste to be injected is estimated to be 6 million barrels. The simulation indicates that almost 5 million barrels will go into the 134 feet thick uppermost Brown Dolomite 3 interval, which was determined to have the highest permeability and porosity. The maximum disposal plume radius is estimated to be 815 feet based on the simulation.

There are no wellbores within ¼ mile (1,320 feet) of the proposed well. There are three wellbores within ½ mile of the proposed well. Two of these wells, the O. V. Scribner R/A -C- No. 2 and the Scribner Op. Unit R/A -B- No. 1, were plugged in 1981. Both wells have plugs set above the Brown Dolomite and cemented casing across the Brown Dolomite, preventing any migration of fluids out of the disposal interval in the wells. The third well within ½ mile, the Lohberger 44 No. 1, is a producing well operated by Mobeetie. This well is completed in the Mobeetie (Ellenburger) Field at approximately 11,850 feet. The top of cement behind the production casing in this well is 5,196 feet. The proposed Brown Dolomite disposal interval is behind uncemented casing.

The maximum escape rate of any portion of the facility is estimated to be 15 MMCFD. Mobeetie employed Quest Consultants, Inc. to perform gas dispersion modeling based on the results of the 15 MMCFD maximum escape rate. Quest used a dispersion model called CANARY to determine the ROE to 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, initial velocity of the gas and heat transfer effects. This model has been previously accepted by the Railroad Commission. The calculated ROE for 100 ppm H₂S, due to the maximum catastrophic release at the proposed disposal well, is 885 feet. For 500 ppm, the calculated ROE is 475 feet. Mobeetie has submitted a contingency plan covering the proposed Central Facility, the disposal well, and the two shut-in Ellenburger completions. There are no public areas within the 100 ppm ROE or 500 ppm ROE for the disposal well. A portion of State Highway 152 is within the 500 ppm ROE. There are no residences or public roads within the 500 ppm ROE for the well. The contingency plan has been submitted to the Commission's Field Operations section.

The injection system is designed with numerous safeguards. The wellhead will be equipped with emergency shut-down controls. Pressures, flow rates and H₂S detection equipment will be continuously monitored. The gas processing plant is monitored 24 hours per day and is manned 8 hours per day with personnel trained in the recognition of and response to H₂S alarms.

FINDINGS OF FACT

1. Notice of the application and the hearing was issued to all persons entitled to notice. No protest was received.
2. Notice of the application was published in *County Star-News*, a newspaper of general circulation in Wheeler County, Texas, on July 16, 2009. Notice of the hearing was published in *County Star-News*, on October 1, 2009.
3. The proposed injection well, the Bud Hogan 44 SWD No. 2, will be used to dispose of waste gas containing H₂S. This waste gas is removed from hydrocarbon gas at Mobeetie's Central Facility.
4. The maximum injection rate for the Bud Hogan SWD 44 No. 2 is 3,000 BPD of produced water and 500 MCFD of acid gas compressed and dissolved into the produced water.
5. The proposed Bud Hogan 44 SWD Well No. 2 will be drilled, cased and cemented to confine the injected fluid to the proposed Brown Dolomite disposal zone.
 - a. The requested injection interval is the non-productive lower Brown Dolomite section between 4,650 and 6,100 feet.
 - b. The TCEQ recommends that useable quality water be protected to a depth of 350 feet.
 - c. The well is proposed to have 9 5/8" surface casing set at 1,500 feet and cemented to surface, and 4,650 feet of 7" casing, also cemented to surface.

The proposed disposal interval is open hole.

- d. Injection will be through tubing set on a packer set at 4,550 feet.
 - e. All of the equipment installed that might come in contact with H₂S will be corrosion resistant fiberglass or H₂S-resistant stainless steel and alloys that meet all Commission and industry safety standards.
 - f. If the injection fluid is not confined to the approved strata, then the disposal well permit will be suspended and disposal cease until the fluid migration from such strata is eliminated.
6. The field name of Mobeetie (Br Dolo H₂S Disposal) should be approved for the disposal interval to alert other operators in the area to the possibility of encountering sour gas in this otherwise non-sour formation.
 7. The disposal well is located approximately 1,000 feet east of the Mobeetie Central Facility which will process sour gas produced from the Mobeetie (Ellenburger) Field.
 8. The requested maximum surface injection pressure is 1,200 psig.
 9. The injection well, compressor and flow lines transmitting sour gas, will be designed to contain the sour gas/produced water mixture, and monitoring devices will immediately shut down the system if any leakage of sour gas is detected.
 10. The proposed disposal well is within the area which will be covered by the contingency plan for the Central Facility and the producing Ellenburger wells which are currently shut-in.
 11. The calculated ROE for 100 ppm H₂S due to a catastrophic release from the disposal well is 885 feet. The calculated exposure radius ROE for 500 ppm H₂S due to a catastrophic release from the well is 475 feet.
 12. There are no public areas within the 100 ppm or 500 ppm ROE. A portion of State Highway 152 is within the 500 ppm ROE.
 13. No existing well will be a conduit for migration of injected fluid outside the disposal interval because there are no wells within ¼ mile of the proposed disposal well.
 14. Mobeetie has met the conditions for approval set forth by the Field Operations section of the Railroad Commission.

CONCLUSIONS OF LAW

1. Proper notice was issued as applicable in all statutes and regulatory codes.

2. All things have occurred and been accomplished to give the Commission jurisdiction in this matter.
3. The application of Mobeetie Resources Dev LLC to inject hydrogen sulfide gas into the Bud Hogan SWD 44 Well No. 2, Mobeetie (Br Dolo H₂S Disposal) Field, Wheeler County, complies with the applicable provisions of Statewide Rules 36 and 9.

EXAMINER'S RECOMMENDATION

Based on the above findings and conclusions, the examiner recommends that the application of Mobeetie Resource Dev LLC be approved. A new field designation of Mobeetie (Brown Dolo H₂S Disposal) Field should be approved for the disposal well and the well should be transferred from the Allen-Engler (Br Dolomite) Field.

Respectfully submitted,

Donna K. Chandler
Technical Examiner