

**OIL AND GAS DOCKET NO. 10-0225440**

---

**THE APPLICATION OF GPM GAS COMPANY LLC. TO INJECT HYDROGEN SULFIDE GAS INTO THE SNEED PLANT H<sub>2</sub>S INJECTION WELL NO. 1, IN THE PANHANDLE (GR.WASH-H<sub>2</sub>S DISPL) FIELD, MOORE COUNTY, TEXAS**

---

**Heard by:** Margaret Allen, Technical Hearings Examiner

**Procedural history**

Hearing requested: March 8, 2000

Hearing held: October 18, 2000

**Appearances**

Applicant

Tim George  
Laurie Whatley  
Keith Selinger  
W.A. "Bill" Scott

Ana Maria Marsland

Representing

GPM Gas Company LLC.

Anadarko Petroleum Company

**EXAMINER'S REPORT AND PROPOSAL FOR DECISION**

**STATEMENT OF THE CASE**

GPM Gas Company LLC. ("GPM") is seeking to inject sour gas in its Sneed Plant H<sub>2</sub>S Injection Well No. 1, Panhandle (Gr.Wash-H<sub>2</sub>S Displ) Field, Moore County. Statewide Rule 36(c)(10) requires that a public hearing be held before the injection of fluid containing hydrogen sulfide, 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." The proposed operations require a public hearing.

The application was initially protested by Anadarko Petroleum who operates an offsetting salt water disposal well. Anadarko withdrew its protest at the hearing, based on amendments GPM made to its application. GPM Gas Company LLC changed its name to Duke Energy Field Services, LP prior to the date of the Final Order and the Final Order approving this application was granted to Duke Energy Field Services.

### DISCUSSION OF THE EVIDENCE

GPM is seeking to dispose of up to 1500 MCF per day of sour gas (hydrogen sulfide, or H<sub>2</sub>S) produced by its Sneed booster facility. This plant 'sweetens' gas produced from numerous wells in the Panhandle by removing H<sub>2</sub>S and other waste gases. GPM has 'grandfathered' authority to flare the equivalent of 212 MCF per day of sour gas and intends to retain the capability to use that permit during an emergency. GPM has installed a similar H<sub>2</sub>S injection well at its Dumas Plant where the special field name, Panhandle (Gr. Wash-H<sub>2</sub>S Displ), was established for this disposal interval.

This application is for an injection well to be drilled that will penetrate the entire Granite Wash formation which is expected to be present from 3500 feet to 4200 feet. The base of usable-quality water was determined to be 750 feet. GPM plans to set surface casing at 450 feet and cement an intermediate string of casing from 3500 feet to the surface. The production casing will be set to 4200 feet and cemented from 4200 feet back to 3000 feet. Injection will be through tubing set on a packer at 3475 feet and the fluid injected will be a mixture of CO<sub>2</sub> and H<sub>2</sub>S. All of the equipment installed in the wellbore and well head that might come in contact with H<sub>2</sub>S will be stainless steel, and will meet all Commission standards.

There are numerous wells within two miles of the new injection well but none are within 1/4 mile of GPM's proposed injection well. Only nine of these wells have reached as deep as the Granite Wash formation and only two were drilled all the way through the formation. None of the tests in the beds underneath the Granite Wash found any indication of hydrocarbons. Four of the wells that penetrated the top of the Granite Wash dispose of saltwater into that formation. One of these wells has injected almost 10,000,000 barrels of waste water, and Anadarko's offsetting injection well has already injected 5,000,000 barrels of water into the Granite Wash.

The Granite Wash formation can accept very large amounts of fluid. There are at least 194 feet with an average porosity of 20%, and the permeability is 420 md. Current formation pressure is 557 psi, which is essentially unchanged since disposal began 18 years ago. GPM calculated that the underground radius of a plume created by the daily injection of 1500 MCF for 50 years would be only about 2100 feet. All of the production in the area is from shallower formations than the Granite Wash, primarily from the Brown Dolomite. The Moore County Limestone overlies the Granite Wash and contains thick beds of limestone with essentially no vertical permeability.

The maximum surface injection pressure will be 1300 psi through a closed injection system. The calculated injection pressure gradient to the top of the Granite Wash is 0.1545 psi/ foot while the estimated fracture pressure gradient in the area is 0.47 to 0.52 psi per foot of depth. The calculated exposure radius ("ROE") of 100 ppm H<sub>2</sub>S due to a catastrophic release from the proposed injection well is 7113 feet. This radius intersects County Roads 1913 and 1319. There are also several businesses and houses within the 7113 foot ROE.

The calculated 500 ppm ROE from a catastrophic release of H<sub>2</sub>S is 3250 feet and includes portions of the county roads. The only structures within this 3250 foot radius of exposure are the plant facilities of GPM and Anadarko. GPM's new injection well will be about 1800 feet from Anadarko's injection well. GPM has agreed to discuss and co-ordinate its facilities and safety

measures with Anadarko's personnel. Anadarko will be informed of GPM's safety presentations and drills and may choose to participate.

GPM has drawn up an emergency response plan and informed the part time and full time occupants of all structures within the 7113 foot ROE of the evacuation routes and procedures. The structures within the 500 ppm ROE of the proposed injection well are already within the 500 ppm ROE of the Sneed booster facility. Signs advising of potential hydrogen sulfide hazards are posted along the public highways that cross the ROE. All of the Sneed facility is already fenced and access is fully controlled. There will be a separate fence installed around the disposal well.

The system is designed with numerous safeguards and the injection well compressor will be shut-down if any of the monitors detect any number of unusual conditions such as abnormally low or high pressure to or from the compressor and wellhead. The Sneed facility is already equipped with a number of monitors and has stations with available self-contained breathing apparatus ("SCBA"). Six additional monitors will be installed around the injection well along with three new SCBA stations and a new emergency shut-down switch. The Sneed facility is attended 24 hours a day and the facility is also monitored automatically by the attendants at other GPM facilities. All GPM personnel who work at or near the Sneed facility are already being trained in H<sub>2</sub>S safety and safety drills will continue to be performed four times per year.

The District 10 Director has approved the Form H-9 which is required for approval of the injection of sour gas. This indicates that GPM's contingency plan satisfies the requirements of Statewide Rule 36.

### **FINDINGS OF FACT**

1. Notice of this application to inject fluid containing hydrogen sulfide was issued to all surface owners, residents, offset operators, and the Moore County Clerk on September 8, 2000.
2. The proposed injection well will dispose of sour gas (hydrogen sulfide, or H<sub>2</sub>S) that has previously been flared at GPM's Sneed booster facility.
3. GPM's current permit allows it to flare up to 212 MCF of sour gas per day and GPM will retain the permit to allow it to flare sour gas during an emergency.
4. The H<sub>2</sub>S to be disposed of is removed from the natural gas, produced by numerous wells in various Panhandle fields, that is treated at GPM's Sneed booster facility.
5. The proposed H<sub>2</sub>S Injection Well No. 1 will be drilled, cased and cemented to confine the injected fluid to the Granite Wash formation.
  - a. The perforations into the Granite Wash formation are expected to be between 3500 and 4200 feet.
  - b. The base of usable-quality water has been determined to be at 750 feet
  - c. Surface casing will be set to 450 feet, and an intermediate string of casing will be set

- at 3500 feet and cemented to the surface.
- d. The production casing will be set to 4200 feet and cemented from 4200 feet back to 3000 feet.
  - e. Injection will be through tubing set on a packer at 3475 feet and the fluid injected will be a mixture of CO<sub>2</sub> and H<sub>2</sub>S.
  - f. All of the equipment installed that might come in contact with H<sub>2</sub>S will be stainless steel, and will meet all Commission safety standards.
6. The Granite Wash formation has been used to dispose of over 15,000,000 barrels of water and is suitable for the injection of more fluid.
- a. The porous section is about 200 feet thick and has 20% porosity and 420 md of permeability.
  - b. Current reservoir pressure is 557 psi, essentially unchanged since disposal into it began 18 years ago.
  - c. Even if 1500 MCF are injected daily for 50 years, the injected fluid plume will extend only about 2100 feet.
  - d. All of the production in the area is from shallower formations than the Granite Wash, particularly from the Brown Dolomite.
  - e. The Moore County Limestone overlies the Granite Wash and contains thick beds of limestone with essentially no vertical permeability.
  - f. The few wells in the area that have been drilled to the strata below the Granite Wash had no shows of hydrocarbons.
10. The maximum daily injection rate will be 1500 MMCF, at a maximum injection pressure of 1300 psi which is less than the fracture pressure of the Granite Wash.
11. During a catastrophic failure of the injection line and/or the injection well, portions of public highways (County Roads 1913 and 1319) will be within the radius of exposure to gas that is at least 500 ppm H<sub>2</sub>S.
12. 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.
13. A contingency plan has been devised to warn residents, county officials, and law enforcement immediately if there is any hazardous release of sour gas and the District Office has approved this plan.

14. The Sneed booster facility and most of the surrounding area are already within a 500 ppm ROE for the H<sub>2</sub>S which the Sneed booster facility generates.
15. Personnel at the Sneed booster facility undergo periodic safety training and Anadarko personnel at its injection well 1800 feet from the proposed injection well will be made aware of GPM's safety procedures and training.

#### 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 GPM Gas Company (Duke Energy) to inject hydrogen sulfide containing gas into the Sneed H<sub>2</sub>S Injection Well No. 1 in the Panhandle (Gr. Wash-H<sub>2</sub>S Displ) Field, Moore County, substantially complies with the applicable provisions of Statewide Rule 36, 16 T.A.C. §3.36.

#### EXAMINER'S RECOMMENDATION

Based on the above findings and conclusions, the examiner recommends that the application of GPM Gas Company (Duke Energy) be **APPROVED**.

Respectfully submitted,

Margaret Allen  
Technical Hearings Examiner

Date of Commission Action: November 9, 2000

**EXHIBITS**

1. Resume of Keith Selinger
2. Location map
3. Stratigraphic log
4. Type log
5. Map showing cross section
6. Cross section
7. Structure map of Moore Co. lime
8. Structure map of Granite Wash
9. Data on wells within 2 miles
10. Map of wells within 2 miles
11. List of injection wells within 2 miles
12. Map of injection wells within 2 miles
13. List of deep penetrations
14. List of tests in deep penetration wells
15. Reservoir data sheet
16. Net injection pay in Anadarko type well
17. Radius of injection invasion
18. Table of injection radii under different conditions
19. Range of surface injection pressures
20. Resume of Bill Scott
21. Drilling program
22. Well completion program
23. Proposed wellbore diagram
24. Wellhead schematic
25. Schematic of sour gas facility
26. Schematic of injection well location and safety features
27. Equipment, operation and safety features
28. Schematic of entire plant
29. Safety training procedures
30. Safety pamphlet
31. Contingency plan