

THE APPLICATION OF ENERGEN RESOURCES CORPORATION FOR AUTHORIZATION PURSUANT TO STATEWIDE RULE 36 TO INJECT FLUIDS CONTAINING HYDROGEN SULFIDE IN THE PENWELL FIELD, ECTOR COUNTY, TEXAS

HEARD BY: Andres J. Trevino, P.E.

DATE OF HEARING: April 14, 2010

APPEARANCES:

Andy Cobb

REPRESENTING:

Energen Resources Corporation

EXAMINER'S REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Energen Resources Corporation requests authority pursuant to Statewide Rule 36 to inject fluids containing hydrogen sulfide in 10 wells on its East Penwell San Andres Unit in the Penwell Field. Energen is making separate application with the Commission's Technical Permitting section for authority pursuant to Rule 46.

Statewide Rule 36(c)(10)(A)(i) states that injection of fluids containing hydrogen sulfide will be allowed only after public hearing when "... injection fluid is a gaseous mixture, or would be a gaseous mixture in the event of a release to the atmosphere, and 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."

This application was unopposed and the examiner recommends approval.

DISCUSSION OF THE EVIDENCE

The Penwell Field was discovered in 1926. The Penwell Field has been subject to waterflooding and carbon dioxide (CO₂) injection for many years. Production from the Penwell Field is from the San Andres at an average depth of 3,500 feet. The crude oil produced from the San Andres in the Penwell Field contains H₂S at an average concentration of 15,000 ppm.

Energen is expanding the CO₂ flood within the Unit. The first Phase began in 1996

OIL AND GAS DOCKET NO. 08-0264911

and included seven wells to inject CO₂. Phase II began in 1998 and added six CO₂ injection wells. Phase III began in 2001 and added an additional six CO₂ injection wells. Phase IV began in 2008 and added five CO₂ injection wells. The current expansion in 2010 will add ten CO₂ injection wells. The ten new CO₂ injection wells could potentially have a public impact should there be a release. Currently, pure CO₂ is purchased and mixed with produced casinghead gas which contains carbon dioxide and hydrogen sulfide gas and is injected into the Unit in the Penwell Field for its water-alternating gas tertiary project. Energen is constructing the associated flow lines required for the CO₂ injection.

The Commission's District Office has approved Form H-9 (Certificate of Compliance Statewide Rule 36) and the Contingency Plan submitted by Energen. The Contingency Plan includes all operations associated with the proposed injection, including the wells, re-injection facility, gathering lines and distribution lines. For each injection well, the 500 part per million (ppm) radius of exposure (ROE) is 562 feet and the 100 ppm ROE is 1,229 feet. These calculations are based on a maximum release of 3,628 MCFD and 15,000 ppm H₂S. The majority of the injection wells run along Ranch Road 1601. Approximately two miles of RR 1601 is within the of the injection wells' 100 ppm ROE and approximately one mile of RR1601 is within the wells' 500 ppm ROE.

The 100 ppm ROE for the re-injection facility includes the Schlumberger West Ranch Office and a 3,500 foot portion of Ranch Road 1601. The Schlumberger West Ranch Office is located within the 500 ppm ROE of Well Nos. 1226W and 1221W.

Signs are posted at each entrance to each lease and at the gas re-injection facility. Each lease entrance to a well site off a public road will also be marked. The gas re-injection facility is fenced and isolated from the public.

All equipment associated with the injection program satisfies the requirements in the latest editions of NACE Standard MR1075 and API RP-55. Emergency flare systems are located at all five production satellites and at the gas re-injection facility. In the event of a compressor failure or system upset sour CO₂. Gas will be diverted to the flares. Each wellhead of an injection well will have high and low pressure shutdowns set at approximately 1,800 psig and 900 psig. All sour CO₂. Injection wells with 100 and 500 ppm ROE's impacting RR 1601 and Schlumberger's West Ranch Field Office are equipped with fixed H₂S monitors. Monitor readings are sent continuously via the radio communication system to the Penwell Field office.

All Energen employees associated with the East Penwell San Andres Unit area receive hydrogen sulfide safety training regarding the proper response to an H₂S release. Each employee is trained on proper notification procedures in case of a release and are required to be familiar with the contingency plan. Employees also receive periodic training in hazardous material operations, respiratory equipment use, well control procedures and first aid.

FINDINGS OF FACT

1. Notice of this hearing was given to all persons entitled to notice at least ten (10) days prior to the subject hearing.
2. The Penwell Field was discovered in 1926. The Penwell Field has been subject to waterflooding and carbon dioxide (CO₂) injection since 1996.
3. Crude oil production from the Penwell Field is from the San Andres. The crude oil in the field contains H₂S at an average concentration of 15,000 ppm.
4. Energen is expanding their CO₂ flood in the East Penwell San Andres Unit in stages. The current expansion seeks to add sour CO₂ injection into Well Nos. 1011W, 1119W, 1221W, 1223W, 1226W, 419W, 823W, 1318W, 1320W and 1421W.
5. Under current operations in the Penwell Field, pure CO₂ is purchased and injected with produced casinghead gas into the Unit. Energen is constructing flowlines for the new CO₂ injection wells. The sour CO₂ gas will be distributed back to the Unit for injection as part of the WAG projects in the two fields.
6. The Commission's District Office has approved Form H-9 (Certificate of Compliance Statewide Rule 36) and the Contingency Plan submitted by Energen. The Contingency Plan includes all operations associated with the proposed injection, including the wells, gas re-injection facility, gathering lines and distribution lines.
7. For each injection well, the 500 part per million (ppm) radius of exposure (ROE) is 562 feet and the 100 ppm ROE is 1,229 feet. These calculations are based on a maximum release of 3,628 MCFD and 15,000 ppm H₂S.
 - a. For the sour CO₂ injection wells, the 500 ppm ROE includes Schlumberger's West Ranch Field Office and one mile portion of Ranch Road 1601. The 100 ppm ROE includes Schlumberger's West Ranch Field Office and a two mile portion of Ranch Road 1601.
 - b. For the gas re-injection facility, the 100 ppm ROE includes 3,500 foot portion of Ranch Road 1601 and Schlumberger's West Ranch Field Office. The 500 ppm ROE do not include any public places where people may congregate.
8. All sour CO₂ Injection wells with 100 and 500 ppm ROE's impacting RR 1601 and Schlumberger's West Ranch Field Office are equipped with fixed H₂S monitors. Monitor readings are sent continuously via the radio communication system to the Penwell Field office.

OIL AND GAS DOCKET NO. 08-0264911

9. The proposed injection meets the safety requirements of Rule 36 regarding warning and marker provisions, security provisions and materials and equipment.

CONCLUSIONS OF LAW

1. Proper notice was timely given to all parties entitled to be noticed pursuant to applicable statutes and rules.
2. All things have occurred and have been accomplished to give the Commission jurisdiction in this case.
3. Energen Resources Corporation has complied with the safety provisions of Statewide Rule 36 for injection of fluid containing hydrogen sulfide.

EXAMINER'S RECOMMENDATION

The examiner recommends approval of the application of Energen Resources Corporation to inject fluid containing hydrogen sulfide into ten injection wells on its East Penwell San Andres Unit lease in the Penwell Field.

Respectfully submitted,

Andres J. Trevino, P.E.
Technical Examiner