



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

OIL AND GAS DOCKET NO. 08-0293362

THE APPLICATION OF TABULA RASA ENERGY, LLC PURSUANT TO STATEWIDE RULE 36 TO OBTAIN A PERMIT FOR THE INJECTION OF SALT WATER, NATURAL GAS, CARBON DIOXIDE GAS AND HYDROGEN SULFIDE GAS INTO THE SAN ANDRES FORMATION IN THE EMMA/SAN ANDRES UNIT, FOR VARIOUS WELLS AND FOR THE APPROVAL OF THE SECONDARY/TERTIARY RECOVERY OPERATIONS IN THE EMMA (SAN ANDRES) UNIT, EMMA FIELD, ANDREWS COUNTY, TEXAS

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

HEARING DATE: December 12, 2014

CONFERENCE DATE: March 24, 2015

APPEARANCES:

John Soule
Dale Miller
Jim Skurner
Brady McConaty

REPRESENTING:

Tabula Rasa Energy, LLC

EXAMINER'S REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Tabula Rasa Energy, LLC ("TRE") requests authority pursuant to Statewide Rule 36 to inject fluids containing hydrogen sulfide (H₂S) into Wells No. 504, 701, 705, 706, 707W, 708W, 710W, 904, 908, 1004W, 1006, 1007W, 1009W, 1011, 1014, 1021, 1038, 1049W, 1050, 1061, 1064, 1065, 1070, 1102, 1103, 1104, 1105, 1107, 1114, 1115, EM 1, EM 15 and EM 16 on its Emma (San Andres) Unit ("the Unit"), Emma Field, Andrews County, Texas.

Statewide Rule 36(c)(10)(A)(i) states that injection of fluids containing H₂S will be allowed only after a public hearing if:

"...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."

The application is not protested. The Examiners recommend approval.

DISCUSSION OF EVIDENCE

The Emma Field was discovered in 1939 and produces from the San Andres formation at an average depth of approximately 3,950 feet. The field produces casinghead gas with an H₂S concentration of 110,000 ppm and is therefore subject to the requirements of Statewide Rule 36. The Commission approved unitization and secondary recovery on the Unit in 1965. Waterflood operations began that same year. Through August 2014, cumulative production from the 2,390-acre Unit has been approximately 18 million barrels of oil, of which more than 9 million barrels have been produced since secondary recovery operations began.

TRE plans to implement a CO₂ tertiary recovery project on the Emma (San Andres) Unit, using water-alternating-gas (WAG) and water injection wells. Injection fluids for the WAG injection wells will include natural gas, CO₂, sour CO₂ (resulting from reinjection of produced gas after CO₂ injection begins) and water. With this application, TRE requests authority to inject H₂S (mostly produced sour CO₂) at 33 locations on the Emma (San Andres) Unit, 30 of which are existing wells and 3 of which will be new wells. TRE also requests authority to inject H₂S in any replacement well permitted and drilled within 200 feet of the 33 locations identified in the application.

TRE has filed separate applications for injection permits for the first five wells that will be used for CO₂ injection. Those applications are pending with the Underground Injection Control ("UIC") Section of the Oil & Gas Division. UIC has advised TRE it cannot approve the injection-well applications until a final order is issued approving the injection of H₂S, as requested in this application.

TRE operates a CO₂ flood on two units in the Seminole, East (San Andres) Field in Gaines County. Like the proposed application, operation of the Seminole, East (San Andres) Field CO₂ flood involves injection of sour CO₂. TRE experienced a positive response to CO₂ injection in the Seminole, East (San Andres) Field within six months of initiating CO₂ injection.

TRE will implement its CO₂ flood on the Emma (San Andres) Unit in five phases over a period of approximately five years. The first phase will begin in the central part of

the Unit. Later phases will result in CO₂ injection throughout the Unit. The project will involve installation of a new production gathering system, a water and sour CO₂ injection distribution system, upgrades to production facilities and construction of a new central recycling/compression facility. After full development, TRE expects to have 62 producers, 33 WAG injection wells and 11 water injection wells. The peak injection volume of recycled CO₂ and sweet CO₂ is projected to be 43 mmcf/d, occurring in year 6 of the project.

TRE estimates that the Expanded Secondary Recovery Operations will recover an additional 12 million barrels of oil

The calculated H₂S concentration at the recycling compressor is 360 ppm. The calculated H₂S concentration after mixing native gas with purchased sweet CO₂ is 244 ppm. For purposes of making its ROE calculations, TRE used an H₂S concentration of 2,500 ppm, providing an order of magnitude margin of safety. The maximum 100 ppm ROE is 1,654 feet (recycling compressor and CO₂ distribution system). The maximum 500 ppm ROE is 756 feet (again the recycling compressor and CO₂ distribution system). TRE has added 200 feet to the calculated ROE for its planned injection wells to account for any replacement well that might be drilled pursuant to authority granted in this proceeding. Replacement injection wells may be required where older wells are being converted to injection and mechanical problems are encountered. There are no Public Areas within the 100 ppm ROE. The nearest occupied dwelling is approximately 1.5 miles from the Unit. There are two Public Roads within the 100 and 500 ppm ROE, County Roads 4001 and 7000, both of which are lightly traveled.

The Commission's District Office has approved Form H-9 (Certification of Compliance with Statewide Rule 36) and the Contingency Plan submitted by TRE. Both the Form H-9 and Contingency Plan are modifications of existing documents relating to current operations. The Contingency Plan complies with all requirements of Statewide Rule 36, including safeguards to protect the general public from the harmful effects of any H₂S release. All TRE employees associated with operations at the Emma (San Andres) Unit receive H₂S safety training, including instructions on how to respond to any release of H₂S to ensure their own and public safety.

FINDINGS OF FACT

1. Notice of this hearing was sent to all persons identified as potentially affected persons in guidance provided by the Commission, including all offset operators and the Sheriff's department. There are no affected surface owners. Although not required for this application, notice was also published in the Midland Reporter-Telegram, a newspaper of general circulation in Andrews County for four consecutive weeks beginning on November 14, 2014.
2. The Emma Field was discovered in 1939 and produces from an average

depth of approximately 3,950 feet. The Emma (San Andres) Unit was approved and secondary recovery waterflood operations began on the Unit in 1965.

3. The Emma Field produces from the San Andres formation. Produced native gas has an H₂S concentration of 110,000 ppm. The calculated H₂S concentration after mixing native gas with purchased sweet CO₂ is 244 ppm. The highest H₂S concentration calculated for the proposed operations is 360 ppm at the recycling compressor station. An H₂S concentration of 2,500 was used for all radius of exposure (ROE) calculations, providing an order of magnitude safety factor.
4. TRE plans to implement a CO₂ flood on the Emma (San Andres) Unit in the Emma Field. TRE will permit 33 WAG (water-alternating-gas) injection wells that will inject sour CO₂ (H₂S), together with sweet CO₂, natural gas and water, specifically Wells Nos. 504, 701, 705, 706, 707W, 708W, 710W, 904, 908, 1004W, 1006, 1007W, 1009W, 1011, 1014, 1021, 1038, 1049W, 1050, 1061, 1064, 1065, 1070, 1102, 1103, 1104, 1105, 1107, 1114, 1115, EM 1, EM 15 and EM 16.
5. The CO₂ flood will be implemented in five phases. During Phase 1, there will be 13 producers and 5 WAG injection wells. Applications have been filed with UIC for the 5 WAG injection well permits. At full development (five phases), there will be 62 producers, 33 WAG injection wells and 11 water injection wells.
 - a. TRE will inject all of produced water and, when required, will continue to use makeup saltwater from four water supply wells.
 - b. Sweet CO₂ (98% pure) will be purchased from Kinder Morgan CO₂ Company and will be delivered to the Emma (San Andres) Unit via TRE's newly constructed 2 mile 6 inch CO₂ pipeline.
 - c. The peak injection volume of recycled sour CO₂ and sweet CO₂ is projected to be 43 mmcf, in year 6 of the project.
6. After the injection of CO₂ is initiated, produced gas will be recycled for reinjection, resulting in the injection of sour CO₂. The Commission's District Office has approved Form H-9 (Certificate of Compliance with Statewide Rule 36) and the Contingency Plan submitted by TRE. The Contingency Plan includes all current and planned operations and provides for protection of the general public from the harmful effects of any H₂S releases.
 - a. There are no Public Areas within the 100 or 500 ppm ROE. The

nearest occupied dwelling is approximately 1.5 miles away.

- b. There are two Public Roads (CR 4001 and CR 7000) within the 100 and 500 ppm ROE. Both roads are lightly traveled.
 - c. Markers, check valves, emergency shut-down valves, detectors and alarms will be installed as reflected in the approved Contingency Plan.
7. The planned CO2 flood will result in the recovery of approximately 12 million barrels of incremental oil.

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 § 1.45
- 3. TRE has complied with the safety provisions of Statewide Rule 36 for injection of fluids containing H2S.

RECOMMENDATION

The examiners recommend approval of the application of Tabula Rasa Energy, L.L.C. to inject fluids containing hydrogen sulfide into the 33 WAG injection wells or replacement wells within a 200' radius on its Emma (San Andres) Field, Emma Field, Andrews County, Texas.

Respectfully submitted,



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Technical Examiner



Terry Johnson
Hearings Examiner