

THE APPLICATION OF OCCIDENTAL PERMIAN LTD. UNDER RULE 36 TO INJECT FLUID CONTAINING HYDROGEN SULFIDE GAS INTO VARIOUS WELLS ON ITS DENVER UNIT, WASSON FIELD, GAINES COUNTY, TEXAS

Heard by: Margaret Allen, Technical Hearings Examiner

Procedural history

Applicant received: March 1, 2006

Hearing held: May 23, 2006

Appearances

Applicant

John Soule
Mark Andersen
Jason Sevin
Elizabeth Bush

Representing

Occidental Permian Ltd.

EXAMINER'S REPORT AND PROPOSAL FOR DECISION

STATEMENT OF THE CASE

Occidental Permian Ltd. ("Oxy") is seeking to inject sour gas in the following Denver Unit Wells in the Wasson Field: 7414WC, 7421WC, 7509WC, 7510WC, 7511WC, 7513WC, 7514WC, 7515WC, 7521WC, 7530WC, 7535WC and 7536WC. Disposal permits have been issued administratively under Statewide Rule 46. However, Statewide Rule 36(c)(10) 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."

DISCUSSION OF THE EVIDENCE

The Denver Unit began producing from the San Andres formation in the Wasson Field in the late 1930's. Waterflooding began in 1964 and successfully increased oil recovery. Carbon dioxide flooding began in 1984 and increased the estimated ultimate recovery to 40% of the original oil in place. The maximum oil rate of 40,000 barrels per day was reached in June, 1997 and rates have been declining since. In November, 1999, Oxy began blowing down the gas cap. During 2001 and again in 2005, the amount of CO₂ injection was increased.

There are about 100 producing wells on the Denver Unit and 50 injection wells. Gas from the gas cap wells is now received at a production satellite on the south side of the field. An average daily

rate of 42 MMCF, containing 8% CO₂ and 0.15% H₂S, is piped to the Antelope Gas Cap Plant. From the Antelope Gas Cap Plant, about 30 MMCFD of natural gas is sent to sales and the remaining 11 MMCFD, containing 97% CO₂ and 1.92% H₂S, is sent to the Denver Unit CO₂ Reduction Plant (“DUCRP”). DUCRP removes the H₂S, and the CO₂ which now contains less than 100 ppm H₂S, is combined with casinghead gas and reinjected into wells throughout the unit.

Because of the increased amount of CO₂ now being injected, more CO₂ is being recovered than can be processed at DUCRP. Oxy wants to use DUCRP to process only casinghead gas. Rather than processing the gas cap gas to remove H₂S, Oxy wants to reinject the entire gas cap stream after removal of the natural gas component. If approved, the 11 MMCFD of gas from the Antelope Gas Cap Plant that is 97% CO₂ and 1.902% H₂S will be dried, compressed and reinjected into the subject twelve wells which will be sour CO₂ injection wells.

All of the equipment installed in the injection wellbores and well heads, and all flowlines to them, that might come in contact with H₂S will be designed to be of H₂S-resistant stainless steels and alloys that meet all Commission and industry standards for handling H₂S. All flow lines are equipped with high pressure shut down switches.

The hydrocarbons produced from the Denver Unit naturally contain a small amount of H₂S. All of the proposed sour CO₂ injection wells are within previous H₂S producing areas and therefore already covered by a contingency plan. The area where the sour CO₂ wells will be located is in the southern part of the Denver Unit, as far as possible from residences and from Denver City. They are also close to the Antelope Gas Cap Plant to reduce the length of flow lines. The maximum allowable operating pressure will be 2800 psi, while normal operating pressure will be 2000 to 2200 psi.

According to the Form H-9 submitted by Oxy, the maximum escape rate during normal operations at each well is 17 MMCF of gas containing 19,020 ppm H₂S. The calculated exposure radius (“roe”) to 100 ppm H₂S, due to a catastrophic release from any of the proposed sour CO₂ injection wells, is 3748' and to 500 ppm is 1713', assuming unfavorable weather conditions. The maximum release from the sour gas flow lines and compressor is based on a maximum escape volume of 11 MMCF of 19,020 ppm H₂S. The 100 ppm roe from the flow lines and compressor is 1292', while the 500 ppm roe is 2825'. The District Office has reviewed the Form H-9 and has no objection to approval.

There are two roads within the 100 ppm roe, FM 2055 and FM 2056. There are two houses on lots on the southern end of the 100 ppm roe; Oxy owns the rest of the surface. All part time and full time occupants of all structures within the radii of exposure will be notified about emergency procedures and evacuation routes. Oxy drew up an emergency response plan for the sour gas injection wells, dated December 1, 2005. Because produced hydrocarbons from the Denver Unit contain H₂S, residents are already familiar with H₂S safety procedures.

A list of telephone numbers and other notification requirements for the residents of the two houses and for first responders will be maintained and updated annually or more frequently if necessary. A flyer will be sent annually to the residents reminding them of the hazards and safety procedures necessary for an accidental release of H₂S.

The system is designed with numerous safeguards and the injection well compressors will shut-down if a monitors detects any of a number of unusual conditions, such as abnormally low or high pressure to or from the compressor or wellheads. The tubing, casing, surface and line pressure and temperature will be monitored at all times. There will be equipment to detect immediately any release of H₂S. All personnel who will work at or near the facility will be trained in H₂S safety and safety drills will be performed frequently. Oxy's contingency plan, as proposed, satisfies the requirements of Statewide Rule 36.

FINDINGS OF FACT

1. Notice of this hearing on the application to inject fluid containing hydrogen sulfide was issued to all surface owners, offset operators, persons within the 100 ppm radius of exposure, first responders and the Gaines County Clerk on May 2, 2006.
2. Notice of the disposal application to include hydrogen sulfide was published on February 12, 2006, in *The Denver City Press*, a newspaper of general circulation in this part of Gaines County.
3. The proposed sour gas injection wells will inject carbon dioxide containing up to 19,200 ppm hydrogen sulfide (sour gas or H₂S) that is produced along with hydrocarbon gas from the Occidental Permian Ltd. Denver Unit in the Wasson Field.
4. Occidental Permian Ltd. will inject about 11 MMCFD of gas from the Antelope Gas Cap Plant into the following wells on the Denver Unit: 7414WC, 7421WC, 7509WC, 7510WC, 7511WC, 7513WC, 7514WC, 7515WC, 7521WC, 7530WC, 7535WC and 7536WC.
5. These wells, that will be injecting carbon dioxide that includes H₂S, will have well heads and all flowlines to them, that might come in contact with H₂S, designed with H₂S-resistant stainless steels and alloys that meet all Commission and industry standards for handling H₂S.
6. The maximum daily volume of gas that could be released due to a catastrophic failure would be 17 MMCF from each injection well and 11 MMCF from each flowline.
7. During a catastrophic failure of the flow lines and/or an injection well, portions of two public highways will be within the radius of exposure to gas that is at least 100 ppm H₂S.
8. The injection wells, compressor and flow lines transmitting sour gas, will be designed to contain the sour gas, and monitoring devises will immediately shut down the system if any leakage of sour gas is detected.
9. A contingency plan has been devised to warn residents, county officials, and law enforcement immediately if there is any hazardous release of sour gas.
10. The calculated exposure radius ("ROE") to 100 ppm H₂S due to a catastrophic release is 3748' and to 500 ppm is 1713', assuming unfavorable weather conditions.
11. There are two residences within 3748' of a sour gas injection well.

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 Occidental Permian Ltd. to inject gas containing hydrogen sulfide (sour gas) into various wells on the Denver Unit, in the Wasson Field, Gaines County, 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 Occidental Permian Ltd. be **APPROVED**, as per the attached order.

Respectfully submitted,

Margaret Allen
Technical Hearings Examiner