



RAILROAD COMMISSION OF TEXAS

OFFICE OF GENERAL COUNSEL

OIL & GAS DOCKET NO. 03-0265447

THE APPLICATION OF DENBURY ONSHORE, LLC TO CONSIDER UNITIZATION, SECONDARY RECOVERY AUTHORITY AND ENTITY FOR DENSITY FOR THE OYSTER BAYOU FIELD UNIT, OYSTER BAYOU FIELD, CHAMBERS COUNTY, TEXAS

HEARD BY: Donna K. Chandler, Technical Examiner
Marshall F. Enquist, Hearings Examiner

DATE OF HEARING: May 27, 2010

APPEARANCES:

Glenn Johnston
Patricia Moore
Jon Herber
Marie Urmin

Jim Cowden

REPRESENTING:

Denbury Onshore, LLC

John G. Middleton and Estate of
Triphene S. Middleton

EXAMINERS' REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Denbury Onshore, LLC requests Commission authority for unitization of the Oyster Bayou Field Unit and approval of secondary recovery operations on the Unit by means of CO₂ injection. Denbury also requests that the Oyster Bayou Field Unit be approved as an entity for density purposes in the Oyster Bayou Field.

This application was unopposed and the examiners recommend approval.

DISCUSSION OF THE EVIDENCE

The Oyster Bayou Field was discovered in 1941. Cumulative production from the field is approximately 143 million BO. Current production from the field is approximately 100 BOPD. The field is in an advanced stage of primary depletion.

The proposed Oyster Bayou Field Unit consists of 8 tracts which contain 3,912 acres. The limits of the field are well defined by development and the proposed unit

contains all of the productive acreage of the field. A large fault to the east serves as the trapping mechanism and the western limit of the field is a bounding fault.

The unitized formation is the subsurface productive portion of the Unit Area which is that stratigraphic interval or its correlative equivalent between the subsurface depths of 8,147 feet and 8,505 feet, as shown on the log of the Sun Oil Company - Felix Jackson, et al, Well No. 50, located 1,500 feet from the north line and 800 feet from the east line of T.N.O.R.R. Survey, A-288, Chambers County, Texas.

The unitized formation consists of several Frio sands which are collectively known as the Seabreeze. The most prolific is the A-1 sand, which contributes 79.5% of the original oil-in-place. All of the sands are continuous across the unit area, with general thickening to the west. The various sands are apparently in vertical communication as there is gas present only at the top of the A-1 sand, having migrated from the other deeper sands.

Remaining primary recovery from the leases within the unit boundaries is 85,000 BO. Primary recovery has already resulted in the recovery of 62% of the 231 million barrels of original oil-in-place. Estimated secondary recovery from the unit is estimated to be 143 million BO, or an additional 10% of original oil-in-place.

Average porosity of the reservoir is 27% and average water saturation is 19% in the A-1. Permeability in the A-1 is up to 2,000 md, and averages 275 md in the A-2. Original reservoir pressure was 3,800 psia and current reservoir pressure is 1,900 psi. The reservoir will be re-pressured to about 4,000 psi during the first year of the project.

Denbury plans to implement the CO₂ flood using a 160 acre 9 spot injection pattern. It is possible that later in the life of the project, the patterns will be reduced to an 80 acre 5 spot pattern. Monitoring wells will be used to insure that the injected CO₂ remains in the reservoir and does not migrate through a non-sealing fault to the south. The total cost to implement and operate the secondary recovery project is \$165.3 million. Estimated revenue as a result of the secondary recovery project is \$350 million. These estimates are based on an oil price of \$75 per barrel.

The participation formula for the Unit is based on 95% original oil-in-place and 5% surface acreage. Surface acreage is included as a factor because approximately 70 acres are necessary to accommodate the central CO₂ recycling facilities. At the time of the hearing, 99.57% of the working interest ownership and 90.19% of the royalty interest ownership had signed the unit agreement. On tracts which do not have 100% sign-up, Denbury will separately meter production in order to separately account for production from those tracts. There are no state lands in the Unit.

Denbury requests that the Oyster Bayou Field Unit be designated as an entity for density purposes. It is possible that the injection pattern for the Unit will be altered in the future. Designation of the Unit as an entity for density will allow Denbury to drill new wells

as needed in optimum locations on the unit without having to obtain between-well spacing exceptions. This designation will also eliminate the need to file proration unit plats for individual wells.

FINDINGS OF FACT

1. Notice of this hearing was sent to all operators and royalty interest owners within the proposed unit and to offset operators and mineral owners of offsetting unleased tracts. Notice was published in *The Progress*, a newspaper of general circulation in Chambers County, for four consecutive weeks beginning April 28, 2010. No protestants appeared at the hearing.
2. The proposed unit consists of 8 tracts which contain 3,912 acres.
3. The unitized formation is the subsurface productive portion of the Unit Area which is that stratigraphic interval or its correlative equivalent between the subsurface depths of 8,147 feet and 8,505 feet, as shown on the log of the Sun Oil Company - Felix Jackson, et al, Well No. 50, located 1,500 feet from the north line and 800 feet from the east line of T.N.O.R.R. Survey, A-288, Chambers County, Texas.
4. At the time of the hearing, approximately 99.57% of the working interest ownership and 90.19% of the royalty interest ownership had signed the unit agreement.
5. Cumulative recovery from the leases proposed for unitization is 143.3 million BO. Secondary recovery operations will result in the recovery of an estimated 23.15 million BO which would otherwise go unrecovered.
6. Estimated cost to implement and operate the secondary recovery project is approximately \$165.3 million. The cost does not exceed the value of additional reserves to be recovered.
7. The participation formula for the Unit is based on 95% original oil-in-place and 5% surface acreage.
8. The secondary recovery project will not be successful unless the area is unitized.
9. The secondary recovery program will inject produced salt water and carbon dioxide delivered by the Denbury Green Pipeline - Texas, LLC.
10. The agreement was voluntarily executed by all parties affixing their signatures thereto and no person has been compelled or required to enter into the agreement. The unit agreement binds only those persons who have executed it, their heirs, successors, assigns and legal representatives. The

rights of all owners of interests in the field will be protected under the operation of the unit, regardless of whether an owner signed the unit agreement.

11. The owners of interest in the oil and gas under each tract of land within the area reasonably defined by development have been given an opportunity to enter into the unit on the same yardstick basis as owners of interest in the oil and gas under the other tracts in the unit.
12. The proposed injection program will move hydrocarbons across lease lines, and unitization is necessary in order to protect the correlative rights of the various interest owners.
13. The unitization agreement is necessary to accomplish the purposes of establishing a unit to effect secondary recovery operations and to operate cooperative facilities necessary. Other available or existing methods or facilities for secondary recovery operations are inadequate for the purpose of secondary recovery.
14. The unit agreement does not provide, either directly or indirectly, for the cooperative refining or marketing of crude petroleum, distillate, condensate, or gas, or any by-product thereof.
15. The unit agreement is subject to all valid orders, rules and regulations of the Railroad Commission.
16. The unit agreement contains no provision regarding field rules, nor does it limit the amount of production of oil or gas from the unitized area. The unit agreement does not release the operator from his obligation to reasonably develop lands or leases as a whole.
17. The unit agreement is a voluntary agreement entered into for the purpose of conducting secondary recovery operations.
18. The unit agreement does not provide for the location of wells.
19. There are no state lands in the unit.
20. The unit agreement is in the interest of public welfare as being reasonably necessary to prevent waste and to promote conservation.
21. The reservoir described in the unit agreement is a suitable reservoir for the proposed secondary recovery operation.
22. The unit agreement contains only the acreage reasonably necessary to accomplish the proposed secondary recovery project.

23. On tracts where 100% sign-up is not attained, applicant will continue separate metering to account for production from that tract.
24. Designation of the unit as an entity for density purposes will allow for the drilling of new infill wells as necessary without obtaining between-well spacing exceptions, provided the density is not exceeded.

CONCLUSIONS OF LAW

1. Proper notice was given to all persons legally entitled to notice.
2. All things have occurred or have been accomplished that are necessary to give the Commission jurisdiction in this matter.
3. Applicant's proposed secondary recovery project satisfies all of the requirements set out in TEX. NAT. RES. CODE ANN. §§101.001 et seq.
4. Approval of the proposed unit agreement, secondary recovery operations and entity for density is in the public interest and is necessary to prevent waste and to promote the conservation of oil or gas or both.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the examiners recommend approval of the proposed Oyster Bayou Field Unit and secondary recovery operations project as set out in the attached order. It is further recommended that the Oyster Bayou Field Unit be approved as an entity for density purposes.

Respectfully submitted,

Donna K. Chandler
Technical Examiner



Marshall F. Enquist
Hearings Examiner