

OFFICE OF GENERAL COUNSEL

OIL & GAS DOCKET NO. 8A-0273695

THE APPLICATION OF HALLIBURTON OPERATING COMPANY TO CONSIDER
UNITIZATION AND SECONDARY RECOVERY AUTHORITY FOR THE LONG-HALL
FIELD TANNEHILL "C" SAND WATER FLOOD UNIT IN THE LONG-HALL (TANNEHILL)
FIELD, KENT COUNTY, TEXAS

HEARD BY: Andres J. Trevino P.E., Technical Examiner
Marshall F. Enquist, Hearings Examiner

DATE OF HEARING: February 14, 2012

APPEARANCES:

Ana-Maria Marsland-Griffith
Cole Halliburton
Greg Cloud
Vance M. Long

Paul Ray Atkinson
Bob Satterwhite

REPRESENTING:

Halliburton Operating Co.

Self
Self

EXAMINERS' REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Halliburton Operating Co. requests Commission authority for unitization of the Long-Hall Field Tannehill "C" Sand Water Flood Unit and approval of secondary recovery operations on the Unit in the Long-Hall (Tannehill) Field.

This application was unopposed and the examiners recommend approval.

DISCUSSION OF THE EVIDENCE

The Long-Hall (Tannehill) Field was discovered in April 2006 at an approximate depth of 4,284 feet. There are 25 wells completed in the field since its discovery. Currently Halliburton Operating operates 9 leases with 9 wells in the Long-Hall (Tannehill) Field. There two other operators in the field that will also participate in the Unit.

The area proposed for the subject unitization covers acreage that includes the majority of the productive reservoir. The reservoir limits are well defined by a sand thickness isopach map. The Unit is believed to include both drained and undrained areas. Royalty and working interest owners of productive areas were given an opportunity to participate in the unit on the same yardstick basis as those interest owners agreeing to participate in the unit. Cumulative primary production from the 10 wells in the Unit Area is 415,937 BO. There are essentially no remaining primary production from the wells as the Betty Irene No.1 is the only well currently producing at a rate of 8 BOPD. The expected total primary production is 416,000 BO. Secondary production is estimated at 416,000 BO. Secondary to primary recovery ratios is expected to be 1 to 1, similar to another solution gas drive Tannehill reservoir, the Sage Draw (Middle Tannehill) Field located 4 miles to the North.

The unitized formation is the subsurface portion of the Unit commonly known as the Long-Hall (Tannehill) Field. The Long-Hall (Tannehill) Field wells produce from two distinct Tannehill sands, the Tannehill "B" and Tannehill "C" sands. Halliburton has determined the two sands are separate and not in communication as evident in differences in bottom hole pressures and production rates. The formation to be unitized is described as the Tannehill "C" Sand. The Tannehill "C" Sand is encountered in the interval from 4,276 feet to 4,290 feet on the Halliburton Operating's Melvina, No. 1, (API No. 42-263-31751) located in the H. & G.N. RR Co. Survey, Block 1, A-47, Section 83, Kent County, Texas.

The unitized interval includes the top of the Tannehill "C" Sand through the base found at 4,290 feet on the type log. The Tannehill "C" Sand is found in all wells throughout the Unit Area. The Tannehill "C" Sand pinches out under the Unit. Other wells in the field produce from the Tannehill "B" Sand. The Tannehill "C" Sand's average porosity is 22% and average water saturation is 30%. Halliburton plans to waterflood the Unit Area by utilizing the existing 7 producing wells, and 3 injection wells initially. Halliburton will convert the 3 producing wells to injection wells and has no plans to drill additional wells. Halliburton will use a down structure type pattern to maximize sweep of the reservoir. The secondary recovery program will use produced salt water and salt water from a Tannehill B producing well in the Hall-Long Field located 2 miles to east. The Unit's waterflood project will be implemented in two stages. Initially the waterflood will have 3 injection wells and may have up to 5 injection wells depending on the performance of the initial injection wells.

The proposed Long-Hall Field Tannehill "C" Sand Water Flood Unit consists of 12 tracts which contain a total of 510 acres. There are approximately 1,775.3 acre-feet of Tannehill "C" Sand in the proposed unit area. The participation formula is based on the ratio of the surface area of an individual Tract to the total surface area of the Unit area. The Unit Agreement has been ratified by 93% of the royalty interest ownership and 100% of the working interest ownership overall. Tract 12 currently has 46% royalty interest sign up, but Halliburton expects that royalty interest sign-up will soon exceed 65% for the tract. There are no state lands in the Unit Area.

It is estimated that the total cost to implement the project will be \$2,000,000. Secondary reserves are estimated to be 416,000 BO. Estimated total value of additional oil production from the proposed secondary recovery project is \$38 million at \$95/bbl.

FINDINGS OF FACT

1. Notice of this hearing was sent to all operators and interest owners within the proposed unit and to offset operators and mineral owners of unleased tracts. Notice was also published in *The Texas Spur*, a newspaper of general circulation in Dickens and Kent Counties, for four consecutive weeks beginning December 15, 2011. There were no protests to the application.
2. The proposed unit consists of 12 tracts which contain a total of 510 acres.
3. The unitized formation is the subsurface portion of the Unit Area commonly known as the Long-Hall (Tannehill) reservoir. The formation is described as the Tannehill "C" Sand. The Tannehill "C" Sand is encountered in the interval from 4,276 feet to 4,290 feet on the Halliburton Operating's Melvina, No. 1, (API No. 42-263-31751) located in the H. & G.N. RR Co. Survey, Block 1, A-47, Section 83, Kent County, Texas.
4. Secondary recovery operations will result in the recovery of an estimated 416,000 BO which would otherwise go unrecovered.
5. The cost to implement the project does not exceed the value of additional reserves to be recovered.
6. The participation formula is based on the ratio of the surface area of an individual Tract to the total surface area of the Unit area.
7. The secondary recovery project will not be successful unless the area is unitized.
8. The secondary recovery program will use produced salt water and salt water from a Tannehill B producing well in the Hall-Long Field located 2 miles to east.
9. 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.

10. 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.
11. 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.
12. The unitization agreement is necessary to accomplish the purposes of establishing a unit to effect secondary recovery operations and to operate the necessary cooperative facilities. Other available or existing methods or facilities for secondary recovery operations are inadequate for the purpose of secondary recovery.
13. 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.
14. The unit agreement is subject to all valid orders, rules and regulations of the Railroad Commission.
15. 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.
16. The unit agreement is a voluntary agreement entered into for the purpose of conducting secondary recovery operations.
17. The unit agreement does not provide for the location of wells.
18. There are no State lands in the unit.
19. The reservoir described in the unit agreement is a suitable reservoir for the proposed secondary recovery operation.
20. The unit agreement contains only the acreage reasonably necessary to accomplish the proposed secondary recovery project.
21. The unit agreement has been ratified by 100% of the working interest ownership and 93% of the royalty interest ownership in the 12 tracts.
22. On tracts where 100% sign-up is not attained, the applicant will continue to

use existing lease production facilities to account for production from that tract and/or will conduct monthly well tests to account for production from that tract.

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. (Vernon 1993).
4. Approval of the proposed unit agreement and secondary recovery operations 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 Tannehill "C" Sand Water Flood Unit and secondary recovery operations project as set out in the attached order.

Respectfully submitted,

Andres J. Trevino
Technical Examiner

Marshall F. Enquist
Hearings Examiner