

**THE APPLICATION OF EOG RESOURCES, INC. TO CONSIDER UNITIZATION AND SECONDARY RECOVERY AUTHORITY AND ENTITY FOR DENSITY FOR THE COWDEN/HALFF (WOLFCAMP) UNIT, BUCK TRAP (WOLFCAMP) FIELD, UPTON COUNTY, TEXAS**

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

**DATE OF HEARING:** April 15, 2010

**APPEARANCES:**

Flip Whitworth  
Joe Caputo  
Tom McCray  
Mike Francis

**REPRESENTING:**

EOG Resources, Inc.

**EXAMINERS' REPORT AND RECOMMENDATION**

**STATEMENT OF THE CASE**

EOG Resources, Inc. requests Commission authority for unitization of the Cowden/Halff (Wolfcamp) Unit and approval of secondary recovery operations on the Unit. EOG also requests that the Cowden/Halff (Wolfcamp) Unit be approved as an entity for density purposes.

This application was unopposed and the examiners recommend approval.

**DISCUSSION OF THE EVIDENCE**

The proposed Cowden/Halff (Wolfcamp) Unit consists of two tracts which contain a total of 160 acres. There are currently two producing wells within the proposed unit area, all of which are operated by EOG. There is one other well carried on the Commission's proration schedule for this field. The Hasel 15 No. 1 operated by COG Operating is about three miles away from the EOG wells.

The unitized formation is the subsurface portion of the Unit Area described as the Buck Trap (Wolfcamp) Field, which is identified as an isolated reef pinnacle within the Wolfcamp's stratigraphic interval between the depths of 8,800 feet and 9,250 feet in the Halff 18 Well No. 1 located in Section 18, Block Y, A-584, I. Murchinson/ GC & SF RR Co. Survey, Upton County, Texas as shown on the Density Neutron Gamma Ray log.

This Buck Trap (Wolfcamp) reservoir is a reef "mound" identified by 3-D seismic data. The limits of the field are well defined by the isochron map generated with the 3-D seismic data collected. The pay reef pinches out in all directions. The reservoir size is approximately 36 acres and 450 feet thick. There are two 80 acre tracts that contain one well each. There is one other well on the proration schedule, the COG Hasel 15 No.1 which is located 3 miles to the east. Because the field boundaries are clearly identified with 3-D seismic data the COG Hasel 15 No.1 should not be placed in this field. Besides this misplaced well, all of the field productive acreage is within the proposed Unit boundaries.

Cumulative production from the leases to be included in the unit is 1.03 MMBO, since the field was discovered in 1999. Currently the wells produce no oil and approximately 36 MCFD. Original oil-in-place for the field is estimated to be 3.9 million BO. There is no remaining primary production. EOG estimates that secondary recovery from the unit will be approximately 454,000 BO. This estimate is based on the performance of the Amacker 66 No.1 Wolfcamp "mound" waterflood in the area. The expected secondary to primary recovery ratio is 44.6%

Average porosity of the Wolfcamp "mound" is 8.8% and average water saturation is 13.5%. Permeability averages 20-50 md with some zones as high as 1 darcy. Original reservoir pressure was 4,719 psia.

Initially, EOG plans to convert the Cowden 18 No. 1 well into an injection well. The well will be used to fill up the reservoir with water. It is estimated it will take 5.1 MMBW and 3½ years to achieve reservoir fill up. The source water for the waterflood will be preferably produced saltwater purchased from COG Operating, however brackish water produced from the Santa Rosa thru water supply wells will be used if water can not be purchased from COG. The total cost to implement the secondary recovery project is \$3.9 million to \$3.3 million depending whether the water supply wells are drilled. Estimated revenue as a result of the secondary recovery project is \$31.8 million (based on \$70/BO) with an estimated unrisks profit of \$10.3 million after capital costs, taxes and royalties are paid.

The participation formula for the Unit is based on 100% acreage. At the time of the hearing, 100% of the working interest ownership and 100% of the royalty interest ownership had signed the unit agreement.

EOG Resources requests that the Cowden/Halff (Wolfcamp) Unit be designated as an entity for density purposes. This will allow EOG to place any additional wells, if necessary, in optimum locations within the limited size of the reef without having to obtain between-well spacing exceptions.

**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.
2. The proposed unit consists of two tracts which contain 160 acres in total.
3. The unitized formation is the subsurface portion of the Unit Area described as the Buck Trap (Wolfcamp) Field, which is identified as an isolated reef pinnacle within the Wolfcamp's stratigraphic interval between the depths of 8,800 feet and 9,250 feet in the Halff 18 Well No. 1 located in Section 18, Block Y, A-584, I. Murchinson/ GC & SF RR Co. Survey, Upton County, Texas as shown on the Density Neutron Gamma Ray log.
4. At the time of the hearing, 100% of the working interest ownership and 100% of the royalty interest ownership had signed the unit agreement.
5. Cumulative recovery from the leases proposed for unitization is 1.03 MMBO. Secondary recovery operations will result in the recovery of an estimated 454,000 BO which would otherwise go unrecovered.
6. Estimated cost to implement the secondary recovery project is \$3.9 million. The cost does not exceed the value of additional reserves to be recovered.
7. The participation formula for the Unit is based on 100% acreage.
8. The secondary recovery project will not be successful unless the area is unitized.
9. The injected water will be purchased produced water from COG operating or brackish water from the Santa Rosa.
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 for water injection and to operate cooperative facilities necessary thereto. 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 identified as a single reservoir for Commission purposes and is a suitable reservoir for a water injection 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 maintain separate tanks 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 wells 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. (Vernon 1993).
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 Cowden/Halff (Wolfcamp) Unit and secondary recovery operations project as set out in the attached order. It is further recommended that the Cowden/Halff (Wolfcamp) Unit be approved as an entity for density purposes.

Respectfully submitted,

Andres J. Trevino, P.E.  
Technical Examiner

Marshall F. Enquist  
Hearings Examiner