



# RAILROAD COMMISSION OF TEXAS

## HEARINGS DIVISION

**OIL AND GAS DOCKET NO. 06-0296093**

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**THE APPLICATION OF GLORI ENERGY HOLDINGS, INC. TO CONSIDER  
UNITIZATION AND SECONDARY RECOVERY AUTHORITY FOR THE PROPOSED  
COKE (PALUXY) UNIT, COKE FIELD, WOOD COUNTY, TEXAS**

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**HEARD BY:** Paul Dubois – Technical Examiner  
John Dodson – Hearings Examiner

**HEARING DATE:** May 28, 2015

**CONFERENCE DATE:** July 14, 2015

**APPEARANCES:**

Flip Whitworth  
Miguel Yilalys  
Tor Meling  
Mike Shaw  
Dan Pyziak

**REPRESENTING:**

Glori Energy Holdings Inc.

**EXAMINER'S REPORT AND RECOMMENDATION**

**STATEMENT OF THE CASE**

Glori Energy Holdings Inc. ("Glori") requests Commission approval of the Coke (Paluxy) Unit Agreement and Commission authority for the unitization of the Coke (Paluxy) Unit ("Unit"), approval of Glori's secondary recovery operations on the Unit, and designation of the Unit as an entity for density purposes. The application is unopposed and the Examiners recommend approval of the Unit Agreement and the proposed unitization, approval of the secondary recovery operations on the Unit, and designation of the Unit as an entity for density purposes.

**DISCUSSION OF EVIDENCE**

The Coke Field, as recognized by the Commission, includes the entire Paluxy Formation, and was discovered on June 8, 1942, at a depth of 6,310 feet. The Coke Field rules provide for 467 feet lease line spacing, 990 feet between well spacing, 40 acre

density with 20 acre tolerance, and allocation based on 75% acres and 25% per well. The top allowable is 111 BOPD with an allowable gas-oil ratio of 2,000 cubic feet per barrel. The estimated cumulative oil production from the Coke Field through April 2015 is 44.801 MMBO and 3,894,769 MCF.

There are 21 active wells and 1 inactive well in the Coke Field. Glori is the only operator in the field.

The Unitized Formation is the subsurface portion of the Unit Area described as the Paluxy Formation between the depths of 6,290 feet and 6,648 feet as shown on the Induction Electric Log of the Delta Drilling Company, J.M. Clark Well #1-R (API No. 42-499-30167), Berry Smith Survey, A-537, Wood County, Texas.

The Unitized Interval has an average porosity of 20%, connate water saturation of 28%, residual oil saturation of 32.5% and horizontal permeability ranging from 162 to 724 millidarcies. The reservoir is in the late primary stage of depletion with a current water cut of 99.3%.

The geological structure of this Paluxy sandstone reservoir is a gentle anticline with some 140-150 feet of structural relief. While the original oil water contact of this water drive reservoir was at 5,855 feet, there has been no production from the Coke Field from any well outside of and down dip of the Unit's boundary since December 1978, assurance that all tracts capable of contributing to production have been included within the Unit.

Glori's proposed secondary recovery operations involve the injection of microbes or nutrients with water to reduce the interfacial tension ("IFT") between the oil and water thereby mobilizing residual oil trapped in the pore space of the reservoir. This technology, which Glori calls Activated Environment for the Recovery of Oil ("AERO"), was originally developed by Statoil in the 1990s and has been successfully utilized to increase ultimate recoveries by as much as 20% OOIP over projected primary in several reservoirs in both North America and Europe. Based upon these case histories and the reservoir parameters of the Coke Field, Glori estimates that 3,246 MBO will be produced over the volume projected under primary conditions, or 7% of estimated primary. The total cost to implement and operate this secondary recovery project is expected to be \$21.1 million. The value of the oil to be recovered as a result of the unitization is expected to exceed the cost to recover the additional oil.

The Unit Agreement provides for a two phase participation formula. Phase I is based upon well potential as of August 2014 and remains in effect until Unit production is 550 BOPD when Phase II participations take effect. Glori anticipates that unit production of 550 BOPD will occur shortly after injection is commenced. Phase II participation is based 65% on well potential as of August 2014, 20% on remaining proved developed producing reserves and 15% upon estimated AERO reserves.

There are some 1,400 acres in the Unit with 23 different tracts. At the time of the hearing, 100% of the working interest ownership and 82% of the royalty interest ownership had signed the Unit Agreement or a ratification of this agreement. There are no state owned lands in the proposed Unit. Glori will continue to conduct monthly well tests from wells on tracts for which 100% sign-up is not achieved.

Designation of the unit as an entity for density will prevent waste by providing flexibility in locating wells to maximize the recovery of reserves in response to the secondary recovery operations and eliminate unnecessary administrative burdens for both Glori and the Commission.

### FINDINGS OF FACT

1. Notice of hearing was sent to all working interest owners, royalty interest owners and other mineral interest owners within the Unit and all operators and unleased owners in tracts offsetting the Unit at least ten days prior to the hearing. Notice was also published in the Wood County Democrat, a newspaper of general circulation in Wood County for four consecutive weeks (April 22, 2015, April 29, 2015, May 6, 2015, and May 13, 2015).
2. The proposed Coke (Paluxy) Unit consists of 23 tracts which contain some 1,400 acres. There are 21 active wells and 1 inactive well in the Coke field and Glori is the only operator.
3. The Unitized Formation is the subsurface portion of the Unit Area that is the Paluxy Formation and known as the Coke Field which is the interval between the depths of 6,290 feet and 6,648 feet as shown on the Induction Electric Log of the Delta Drilling Company, J.M. Clark Well #1-R (API No. 42-499-30167), Berry Smith Survey, A-537, Wood County, Texas.
4. The geological structure of the Unitized Formation is a gentle anticline with 140 to 150 feet of structural relief. The drive mechanism for this sandstone reservoir is water drive with a current water cut of 99.3%.
5. At the time of the hearing, 100% of the working interest ownership and 82% of the royalty interest ownership had signed the Unit Agreement or a ratification thereof.
6. Glori's proposed secondary recovery operations are expected to result in the recovery of an estimated 3,246 MMBO which would otherwise go unrecovered.
  - a. This process, which Glori calls Activated Environment for the

Recovery of Oil ("AERO") involves the injection of microbes/nutrients with water to reduce the interfacial tension ("IFT") between oil and water in porous and permeable water drive reservoirs.

- b. The reduction of IFT mobilizes residual oil trapped in the pore space of the reservoir and allows such oil to be produced.
  - c. This technology has been proven to result in the production of significant secondary reserves in several projects in Europe and North America.
7. The total cost to implement and operate the secondary recovery project is expected to be \$21.1 million. The cost does not exceed the value of additional reserves to be recovered.
8. The Unit Agreement provides for a two phase participation formula.
  - a. Phase I is based upon well potential in August 2014 and remains in effect until Unit production is 550 BOPD when Phase II participations take effect.
  - b. Phase II participation is based 65% upon well potential in August 2014, 20% upon remaining, proved and developed producing reserves and 15% upon estimated potential AERO reserves.
9. The secondary recovery project will not be successful unless the Unit Area is unitized.
10. The Unit 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 interests 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 interests 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 the field rules, nor does it limit the amount of production of oil and gas from the unitized area. The Unit Agreement does not release the operator from its 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-owned lands in the proposed 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 secondary recovery project.
22. The Unit Agreement contains only the acreage reasonably necessary to accomplish the proposed secondary recovery project.
23. Well tests will be conducted to allocate production to wells on tracts for which 100% sign-up was not achieved.
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.

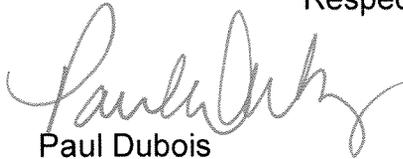
**CONCLUSIONS OF LAW**

1. 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. Applicant's proposed secondary recovery project satisfies all of the requirements set out in Tex. Nat. Res. Code Ann. §§101.001-052.
4. Approval of the proposed unit agreement for 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.

**RECOMMENDATION**

Based on the above findings of fact and conclusions of law, the Examiners recommend approval of the proposed Coke (Paluxy) Unit Agreement and Unit, the proposed secondary recovery operations, and designation of the Unit as an entity for density, as set out in the attached final order.

Respectfully submitted,



Paul Dubois  
Technical Examiner



John Dodson  
Hearings Examiner