September 5, 2007

OIL AND GAS DOCKET NO. 7B-0252230

THE APPLICATION OF THE SQUARE ONE ENERGY, INC. TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS, HOGTOWN- MOORE UNIT WELLS NO. 1102; 1202; 1602; 3109 AND 3112, DESDEMONA FIELD, EASTLAND AND ERATH COUNTIES, TEXAS

HEARD BY: Thomas H. Richter, P.E., Technical Examiner
DATE OF HEARING: July 31, 2007
TRANSCRIPT RECEIVED: August 30, 2007

APPLICANT:	**REPRESENTING:**
Clark Jobe, Attorney	Square One Energy, Inc.
Keith B. Masters	
Donna G. Freyder	
John Marting	
Patrick M. McKinney	

EXAMINERS' REPORT AND RECOMMENDATION
STATEMENT OF THE CASE

This is the application of Square One Energy to complete five new wells for water injection on its Hogtown-Moore Unit for a secondary water flood program in the Desdemona Field. The application was protested but subsequently, no protest was made at the hearing. Commission staff provided a menu of concerns. Staff's primary focus concerned wells within 1/4 mile that the status was either unknown or there were no cement plugs between the top of the injection interval and the base of the usable quality water. [1]

DISCUSSION OF THE EVIDENCE

APPLICANT'S EVIDENCE

The Desdemona Field was discovered in 1918 and the producing interval, the Bend Conglomerate, is productive between 2,700' - 3,100' subsurface depth. The field is governed by Statewide Rules. There are two operators in the field, however, the other operator has only one well with a 14(b)(2) Extension. Square One Energy operates two large units: Hogtown-Moore Unit and

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[1] Commission letter dated May 14, 2007.

the Desdemona Field Unit for a total of 31 wells. The productive intervals within the Bend Conglomerate are the Penn Sand and the Duke Sand. Previous operators have attempted secondary waterflood programs which were not entirely successful.

The Hogtown-Moore Unit encompasses approximately 2,700 acres. There are 19 shut-in wells. The productive intervals have an average of 15% porosity, 150 md average permeability and average net pay thickness of 40'. The current reservoir pressure is ± 50 psi. Square One proposes initiating a secondary recovery program which will involve the conversion of one existing well to water injection and the drilling of four new water injection wells.

The wells are completed in such a manner to insure there is no vertical migration of injected fluids. The TCEQ has stated the usable quality water must be protected from the ground surface to a depth of 250' - 300'. Sufficient surface casing (8-5/8") has been set and cemented from the casing shoe to the ground surface to protect the usable quality water. Longstring casing (5-1/2") has been set to ±3,100' and cement circulated to the surface or determined by cement bond log ranging from 1,750' to 950' from the ground surface. Injection shall be through 2-3/8" tubing set on packer at ±2,850'. The perforated injection intervals range from ±2,700' to ±3,000'. The proposed maximum injection pressures for each injection well is 1,350 psi. The maximum injection volumes range from 400 BWPD to 2,000 BWPD. The maximum volumes are different for the wells depending on the well's location and the results of the reservoir modeling simulation. There is at least 400' of shale immediately above the proposed injection interval.

Injection into the proposed injection wells will not endanger the usable quality water. All known offset wells within 1/4 mile of each injection were located. The Desdemona Field was discovered in 1918 and subsequently many wells were completed (possibly some were not properly permitted and the actual location unknown). Many wells were plugged in accordance with the plugging requirements at a time that were less stringent than now or not plugged at all.

Hydraulic analysis calculates that the hydrostatic pressure necessary to raise a column of brine water from the top of the injection interval at 2,700' to the base of the freshwater at 300' is 1,123 psi. A reservoir simulation model was made of the subject reservoir and tested using historical data for accuracy (initial potentials of wells production volumes, pressures, structure, sand thickness, porosity, permeability, etc). The modeling provided the relative permeability of each cell (an area where other wells may or may not be located). There were 92 wells completed in the field between 1918 and 1980. The simulation model was validated thus establishing the model's capability to predict future reservoir transients. Reservoir simulation modeling predicts that the proposed secondary recovery project will recover an additional 1.54 MMBO.

Reservoir modeling and proposed monitoring will ensure that water injected into the subject reservoir will not have a sufficient bottomhole pressure to raise brine to the base of the usable quality water. Current reservoir pressure is ± 50 psi. Known well location but unknown status were spotted in the modeling grid system. Injection rates and volumes were varied and computed to the unknown status well until the predicted pressure was less than that necessary for raising a brine column to the base of the usable quality water. The predictions are based on the 23 years the

secondary recovery project will in effect. As a result of the modeling the proposed maximum volumes are: Well No. 1202 is 400 BWPD; Well No. 1602 is 1200 BWPD and Wells No. 1102, 3109 and 3112 are 2000 BWPD. To insure that the modeled reservoir pressures are maintained within the modeled predictions and for those wells that maybe present but are unknown and/or unplugged, a proposed reservoir pressure monitoring program will be commenced. Any injection well that obtains a 500 psig wellhead injection pressure will be subject to an annual pressure fall-off test. Annual testing results will be filed with the Commission. Any injection well that exceeds a bottomhole static pressure of 1100 psig according to the fall-off test will result in suspension of further injection.

Make up water will be obtained from only other Square One Energy operated wells in the area. It will be a closed system with no trucking. No freshwater will be used in the program.

Square One Energy, Inc. does have a current approved Form P-5 and maintains a $250,000 bond for financial assurance as required by the Commission.

Notice of the application and of this hearing was given to all persons required to be given notice by the provisions of Statewide Rule 46. Notice of the application was published in the *Eastland Telegram*, a newspaper of general circulation in Eastland County, on March 22, 2007 and was published in the *Stephenville Empire-Tribune*, a newspaper of general circulation in Erath County, on March 21, 2007 Notice of the application was filed with the Erath County Clerk and Eastland County Clerk on April 6, 2007. Notice of the application was mailed to the surface owners Robert Brown, Patricia Brown Cummings and Truman Powers on April 6, 2007.

FINDINGS OF FACT

1. Notice of the application and of this hearing was given to all persons required to be given notice by the provisions of Statewide Rule 46. Notice of the application was published in the *Eastland Telegram*, a newspaper of general circulation in Eastland County, on March 22, 2007 and was published in the *Stephenville Empire-Tribune*, a newspaper of general circulation in Erath County, on March 21, 2007 Notice of the application was filed with the Erath County Clerk and Eastland County Clerk on April 6, 2007. Notice of the application was mailed to the surface owners Robert Brown, Patricia Brown Cummings and Truman Powers on April 6, 2007.

2. The Desdemona Field was discovered in 1918 and the producing interval, the Bend Conglomerate, is productive between 2,700' - 3,100' subsurface depth. The field is governed by Statewide Rules.

3. Square One Energy operates the Hogtown-Moore Unit. The productive intervals are the Penn Sand and the Duke Sand. Previous operators have attempted secondary waterflood programs which were not entirely successful.

4. The Hogtown-Moore Unit encompasses approximately 2,700 acres with 19 shut-in wells. Square One proposes initiating a secondary recovery program which will involve the conversion of one existing well to water injection and the drilling of four new water injection wells.

5. The secondary recovery project will result in the recovery of additional reserves through the effective secondary waterflood process.

    a. Implementation of the proposed secondary recovery program will result in an estimated additional recovery of 1.54 MMBO.

6. The proposed injection wells are completed in such a manner to insure there is no vertical migration of injected fluids.

    a. The TCEQ has stated the usable quality water must be protected from the ground surface to a depth of 250' - 300'.

    b. Sufficient surface casing (8-5/8") has been set and cemented from the casing shoe to the ground surface to protect the usable quality water.

    c. Longstring casing (5-1/2") to ±3,100' has been set and cement circulated to the surface or determined by cement bond log ranging from 1,750' to 950' from the ground surface.

    d. Injection shall be through 2-3/8" tubing set on packer at ±2,850' and the perforated injection intervals range from ±2,700' to ±3,000'.

    e. The proposed maximum injection pressures for each injection well is 1,350 psi.

    f. The maximum injection volumes range from 400 BWPD to 2,000 BWPD (Well No. 1202 is 400 BWPD; Well No. 1602 is 1200 BWPD and Wells No. 1102, 3109 and 3112 are 2000 BWPD). The maximum volumes are different for the wells depending on the well's location and the results of the reservoir modeling simulation.

    g. There is at least 400' of shale immediately above the proposed injection interval.

7. Injection into the proposed injection wells will not endanger the usable quality water.

    a. All known offset wells within 1/4 mile of each injection were located.

    b. The Desdemona Field was discovered in 1918 and subsequently many wells were completed (possibly some were not properly permitted and the actual location unknown). Many wells were plugged in accordance with the plugging requirements at a time that were less stringent than now or not plugged at all.

c. There were 92 wells completed in the field between 1918 and 1980.

d. Reservoir modeling and proposed monitoring will ensure that water injected into the subject reservoir will not have a sufficient bottomhole pressure to raise brine to the base of the usable quality water.

e. As a result of the modeling the proposed maximum water injection volumes are: Well No. 1202 is 400 BWPD; Well No. 1602 is 1200 BWPD and Wells No. 1102, 3109 and 3112 are 2000 BWPD.

f. To insure reservoir pressures are maintained and for those wells that maybe present but are unknown and unplugged, a proposed reservoir pressure monitoring program will be commenced.

i. Any injection well that obtains a 500 psig wellhead injection pressure will be subject to an annual pressure fall-off test.

ii. Any injection well that exceeds a bottomhole static pressure of 1100 psig according to the fall-off test will result in suspension of further injection.

8. The proposed injection is in the public interest because it will maximize oil recovery from the Hogtown-Moore Unit without endangering useable quality water.

9. Square One Energy, Inc. does have a current approved Form P-5 and maintains a $250,000 bond for financial assurance as required by the Commission.

CONCLUSIONS OF LAW

1. Proper notice was timely given to all parties entitled to notice pursuant to applicable statutes and rules.

2. All things have occurred and have been accomplished to give the Commission jurisdiction in this case.

3. The use of the proposed disposal well will not endanger oil, gas, or geothermal resources or cause the pollution of surface water or fresh water strata.

4. The applicant has complied with the requirements for approval set forth in Statewide Rule 46 and the provisions of Sec. 27.051 of the Texas Water Code.

5. The use of the proposed injection wells are in the public interest pursuant to Sec 27.051 of the Texas Water Code.

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EXAMINERS' RECOMMENDATION

Based on the above findings and conclusions, the examiners recommend that the application of Square One Energy, Inc. to inject water for secondary recovery purposes into Unit Wells No. 1202, 1602, 1102, 3109 and 3112 on the Hogtown-Moore Unit in the Desdemona Field be approved subject to conditions as set out in the attached Final Order.

Respectfully submitted,

Thomas H. Richter, P.E.
Technical Hearings Examiner
Office of General Counsel