OIL AND GAS DOCKET NO. 6E-0228952

THE APPLICATION OF MISSION RESOURCES COMPANY TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL AND GAS IN THE SOUTH KILGORE UNIT LEASE, WELL NOS. 73, 51 AND 47, EAST TEXAS FIELD, RUSK COUNTY, TEXAS

Heard by: Margaret Allen, Technical Hearings Examiner
Mark Tittel, Hearings Examiner

Procedural history

Application received from Bargo Energy Company: December 11, 2000
Protest from Tommy Konczak received: February 20, 2001
Hearing requested: May 1, 2001
Hearing held: September 7, 2001
Proposal for decision issued: March 6, 2002

Appearances

	Representing
Mike McElroy Rick Johnston Tom Jennings	Mission Resources Company
W. Scott Goleman Tommy Konczak	Tommy Konczak

EXAMINERS' REPORT AND PROPOSAL FOR DECISION

STATEMENT OF THE CASE

This application was filed by Bargo Energy Company but the property is now being operated by Mission Resources Company ("Mission"). Mission is seeking to use three additional wells on its South Kilgore Unit ("subject unit") as injection wells to increase recovery in the East Texas Field. The application is protested by Tommy Konczak ("protestant") who is an adjacent landowner. The protestant is concerned that injection on the subject lease will cause or increase pollution on his land.

The memorandum which transmitted the request for hearing from the Commission's Underground Injection Control Section noted the following areas of concern in addition to the protest:

> Surface casing in the above referenced wells was not set to the base of usable quality water as determined by the Texas Natural Resource Conservation Commission. In order to prevent potential pollution of usable quality water, the applicant should be required to check the mechanical integrity of each well by performing an annual annulus pressure test. The pressure test must be performed in accordance with the instructions of Form H-5.
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> Insufficient cement exists in the annular space behind the 5 3/16-inch casing above the

proposed injection interval to effectively confine injection fluids to the proposed interval for Well No. 73. The applicant should be required to perform a cement squeeze at a depth of 3350 feet prior to beginning injection operations. The squeeze should be performed in a manner to effectively seal the annular space behind the casing to as to prevent migration of injected fluid behind the casing.

Insufficient cement exists in the annular space behind the 7-inch casing above the proposed injection interval to effectively confine injection fluids to the proposed interval for Well No. 51. The applicant should be required to perform a cement squeeze at a depth of 3600 feet prior to beginning injection operations. The squeeze should be performed in a manner to effectively seal the annular space behind the casing to as to prevent migration of injected fluid behind the casing.

DISCUSSION OF THE EVIDENCE

Applicant's evidence

The East Texas Field is very long in a north-south direction and the area of concern in this hearing is about half the way down the eastern edge of the field. The field is relatively narrow east to west and production is from west dipping sands of the Woodbine Formation. Most of the East Texas Field is connected to a strong aquifer pushing from the west to the erosional edge of the Woodbine on the east. The area of this application is unconnected stratigraphically to the aquifer and waterflooding is necessary to push remaining oil to the producing wells. The Woodbine sandstone in the South Kilgore Unit has bottomhole pressure of less than 100 psi.

Waterflooding of the South Kilgore Unit began in August of 1998. There are ten active permitted injection wells on this unit and over 80 producing wells. Each well is allowed to inject up to 1500 barrels of water per day at a maximum pressure of 1000 psi, which is the same as the proposed operations in this application. The use of fresh water for injection was approved August 10, 2000. Produced water is being re-injected and as the amount of produced water increases the need for fresh, make-up injection water will be reduced and eventually eliminated.

Historical production from the South Kilgore Unit is 628 million barrels of oil and 30 MMCF of gas. Since water injection began, monthly oil production from the unit has increased from 4000 barrels to 30,000 barrels. Mission pointed out that to be this successful, injected water must be reaching the producing wells, and not leaving the unit.

This area of the East Texas Field was first developed many years ago, and at that time wells were not located in anticipation of secondary recovery. The waterflooding pattern has been irregular and the three proposed injection wells are located in areas of the South Kilgore Lease not yet drained. According to Mission, the wells in this application should be able to sweep the lenticular Woodbine sandstones of this unit more efficiently.

Proposed Injection Well Nos. 47 and 51 will be the westernmost injection wells on the unit. Proposed Injection Well No. 73 will take the place of Injection well 73-I, just to the north, which has had very little water injected into it. The Texas Natural Resource Conservation Commission has recommended that usable-quality water be protected to a depth of 1300 feet. Although all three of the proposed injection wells have short surface casing, alternate provisions for cement behind the production casing will protect usable-quality water, according to Mission. The applicant has also agreed to annual mechanical testing.

Well No. 47 was drilled in 1972 and the 8-5/8th inch surface casing was set to 111 feet. The 5 inch production casing was cemented from 3729 feet to the surface. Tubing will be installed on a packer to be set at 3582 feet. The injection interval will be from 3682 to 3729 feet, with perforations from 3682 to 3690 feet.

Well No. 51 was drilled to 3714 feet in 1956. It has 10-3/4 inch surface casing cemented to 101 feet and 7 inch production casing cemented from 3705 to 3270 feet. In 1999, a 4-1/2 inch liner was cemented from 3419 feet to the surface. At the request of the Commission, the applicant intends to perforate this liner at 3270 feet and squeeze 200 sands of cement. This should place 694 feet of cement, assuming 30% washout, behind the casing above the top of the injection interval. Rule 46 requires at least 400 feet of cement behind the casing above the 3250-foot packer. The injection interval will be the same as the perforations and will be from 3637 to 3689 feet.

Well No. 73 was drilled in 1935 to a total depth of 3630 feet. Surface casing with a diameter of 10 inches was cemented to 105 feet and 5-1/2 inch production casing was cemented from 3485 feet to an unknown height. The applicant recently added a 4-1/2 inch liner that was cemented from 3404 feet to the surface. At the Commission's request, the liner will be perforated at 3350 feet and 200 sacks of cement will be squeezed behind the production casing so as to seal the annulus and prevent migration of injected fluid behind the casing. This well is an open-hole completion with a slotted liner between 3396 and 3610 feet. The injection interval will be from 3485 feet to 3630 feet, below a packer to be set at 3300 feet.

In 1995, a study by Dr. Don Warner determined the Woodbine to be sufficiently underpressured that not even in the immediate vicinity of the injection wells is there likely to be upward flow of injected fluid. The Railroad Commission allows an applicant to use this study to calculate a zero radius of review.[1] Mission therefor has not reviewed the status nor plugging records of any wells near the proposed new injection wells.

The South Kilgore Unit is at the eastern edge of the East Texas Field, where the producing Woodbine extends eastward in a salient. The unit is L-shaped with the long arm running east-west and the short arm of the L extending southward along the western side. The applicant's map shows that immediately south of the main part of the South Kilgore Unit, the Woodbine has been completely eroded, forming a re-entrant approximately a mile long. To the south of this re-entrant, there is another salient pointing to the northeast, where the Woodbine is again present.

The Harvey Unit is a large unit south of the subject unit. The applicant testified that wells on the South Kilgore Unit produce from the Kenedy sand, a stringer sandstone near the base of the Woodbine. A separate stringer Woodbine sandstone, known as the Harvey sand, produced on the Harvey Unit and is apparently unconnected to the Kenedy sandstone.

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[1] Based on a Memorandum initialed by the Commission on August 22, 1995.

When injection began on the South Kilgore Unit, the Harvey Unit had almost ceased operations. The applicant's map shows few wells ever drilled near the south side of the main part of the subject unit (to the south of the re-entrant). The Woodbine wells that did produce from south of the re-entrant were located at the very eastern end of that salient, about 7000 feet from the juncture where the two salients form part of the main Woodbine deposit. These wells, now abandoned, were about 2000 feet east-southeast of the nearest South Kilgore Unit wells.

Protestant's evidence

The protestant is a surface landowner south and southeast of the eastern end of the subject unit. The protestant's land extends to the end of the separate Woodbine salient south of the South Kilgore Unit. The westernmost land of the protestant is about 4000 feet northeast of the juncture where the two salients join . The closest part of his property to the proposed Injection Well No. 73 is about 1100 feet east. There is an existing injection well, No. 79, that is a few hundred feet closer to the protestant than is the proposed Injection Well No. 73. Proposed Injection Well Nos. 47 and 51 are much farther from the protestant's acreage and there are several wells between them and the protestant.

The protestant believes there is one abandoned well on his property, within 1/2 mile of Injection Well 73, that may not be properly plugged under the most recent Commission rules. He also has over 20 plugged and abandoned Harvey Unit wells on his property that are over 5000 feet east of proposed Injection Well No. 73. According to Mr. Konczak, these wells were not properly cased or plugged, and at least two of them are leaking. He submitted photos from these two wellheads, the Harvey Unit Nos. 10-1 and 11-1, to show standing water around them with a skim of oil and gas bubbles. According to the protestant, water from around these wells tested positive for benzene and hydrogen sulfide. The protestant has a water well 85 feet from Well No. 10-1 that produces fresh water from the Wilcox Formation.

When the protestant purchased his property in 1984, there were operating oil wells that were part of the Harvey Unit. The Harvey lease was drilled in the 1960's and is essentially inactive now. Mr. Konczak testified that he first noticed a problem with oil and gas waste on his property in 1997. He first called the Railroad Commission about this pollution around the old Harvey Unit wells at least 4 years ago. At the request of Mr. Konczak, the Railroad Commission has inspected these wells several times, most recently in July, 2001. The Protestant testified that the Railroad Commission has contacted Sonat, who was responsible for the Harvey Unit wells when they last produced. He has also contacted Sonat and asked them to clean up the oil and gas waste on his property, most recently about two years ago.

The protestant believes that the injected water will go to the areas of least pressure, which may be improperly plugged wells on his property. Even if the proposed injection wells are not the closest to his land, pressure in the Woodbine Formation may be increased by increased injection. Increased pressure in the Woodbine could cause more oil and gas waste to reach the surface through the abandoned Harvey Unit wellbores.

EXAMINERS' OPINION

In order for any injected water to reach the wells on the protestant's land, the injected fluid would have to be pushed several thousand feet downdip to the juncture where the Woodbine has not been eroded, and then 7000 feet updip to the east on the other salient. The success of the South Kilgore Unit to date shows the injected water is being pushed to the producing wells on the unit. Production from pumping wells, keeps the pressure reduced around them. Any water injected into the proposed injection wells will go to the areas of lowest reservoir pressure, around the producing wells.

The saltwater and hydrocarbon breakouts on the protestant's land are the result of operations on the Harvey Unit. They began before injection on the South Kilgore Unit was initiated in 1998. It is very unlikely that injected water could reach from the South Kilgore Unit to the Harvey Unit even if the two units were not producing from unconnected Woodbine sand stringers.

The three proposed injection wells will increase the efficiency of the South Kilgore Unit waterflood by sweeping areas that have not been contacted by previous water injection. These proposed wells pose no significant danger of pollution to the surface either of the South Kilgore Unit or the protestant's property. The examiners recommend the application be granted.

FINDINGS OF FACT

1 Notice of hearing on this application to inject into the subject wells was issued to all interested persons, offset operators and to all surface owners at least ten (10) days prior to the hearing.

    a. A waiver of objection was received from Dewayne Palmer and Vanessa Hazelwood on September 5, 2001.

    a. Notice of the application (Form H-1) was mailed to all offset operators, surface owners, City of Kilgore Clerk and Rusk County Clerk on November 28, 2000.

    b. Notice of the application was published in the Kilgore News Herald, a newspaper of general circulation in Rusk County, on November 3, 2000.

    c. Notice of this hearing was issued by the Commission on August 13, 2001.

2. The South Kilgore Unit has ten active injection wells as part of its successful waterflood project that began in 1998.

3. The three subject wells will improve sweep efficiency on parts of the unit that have not yet been drained by the existing pattern.

4. Each of the three proposed new injection wells has surface casing cemented to less than 120 feet, while usable-quality water occurs to a depth of 1300 feet.

5. Well No. 47 was drilled in 1972 and is adequately cased and cemented to protect usable- quality water.

    a. The 8-5/8th inch surface casing was cemented to 111 feet.

    b. The 5 inch production casing was cemented from 3729 feet to the surface.

    c. Tubing will be installed on a packer to be set at 3582 feet, above the injection perforations between 3682 and 3690 feet.

6. Well No. 51 was drilled in 1956, and the existing casing and proposed cement squeeze operations will be able to prevent injected water from reaching usable-quality water.

   a. The 10-3/4 inch surface casing was cemented to 101 feet.

   b. The 7 inch production casing was cemented from 3705 to 3270 feet, and a 4-1/2 inch liner has been cemented from 3419 feet to the surface.

   c. The liner will be perforated at 3270 feet and 200 sands of cement squeezed behind the casing above the top of the injection interval.

   d. A packer will be set at 3250 feet above the injection perforations between 3637 and 3689 feet.

7. Well No. 73 was drilled in 1935, and the existing casing and proposed cement squeeze operations will be able to prevent injected water from reaching usable-quality water.

   a. Surface casing with a diameter of 10 inches was cemented to 105 feet.

   b. Production casing with 5-1/2 inch diameter was cemented from 3485 feet to an unknown depth, and a 4-1/2 inch liner has been cemented from 3404 feet to the surface.

   c. This liner will be perforated at 3350 feet and 200 sacks of cement will be squeezed behind the production casing to seal the annulus and prevent migration of injected fluid behind the casing.

   d. This well is an open-hole completion with a slotted liner between 3396 and 3610 feet; the packer will be set at 3300 feet.

8. The maximum injection rate for each well will be 1500 BWPD while the average injection rate will be 1000 BWPD.

9. The average injection pressure for each well will be 750 psi with the maximum injection pressure to be 1000 psi.

10. Current bottom-hole pressure in the East Texas Field is less than 100 psi and even in the immediate vicinity of the injection wells there is unlikely to be upward flow of injected fluid.

11. Any oil and gas pollution on Konczak's land is due to operations of the now-abandoned Harvey Unit and will not be affected by the three proposed injection wells.

CONCLUSIONS OF LAW

1. Proper notice was given to all necessary parties as required by Statewide Rule 46(c) [Tex. R.R. Comm'n, 16 TEX. ADMIN. CODE § 3.46(c)] and other applicable statutory and regulatory provisions.

2. All things necessary to give the Commission jurisdiction to decide this matter have been performed or have occurred.

3. Applicant has shown that fluid injection operations, conducted at the proposed pressures and volumes, under the proposed permit conditions, will not endanger oil, gas or geothermal resources or cause the pollution of usable-quality water, thus meeting the requirements of Statewide Rule 46 [Tex. R.R. Comm'n, 16 TEX. ADMIN. CODE § 3.46].

EXAMINERS' RECOMMENDATION

Based on the above findings and conclusions, the examiners recommend that the application of Mission Royalty Company to inject up to 1500 barrels of water per day at maximum injection pressure of 1000 psi in its South Kilgore Unit Lease Well Nos. 73, 51 and 47 in the East Texas Field be **GRANTED,** subject to the conditions proposed by the Environmental Section of the Oil & Gas Division**.**

Respectfully submitted,

Mark Tittel
Hearings Examiner

Margaret Allen
Technical Hearings Examiner

Date of Commission Action______________________________