OIL AND GAS DOCKET NO. 08-0258358

THE HEARING ON THE MOTION OF THE RAILROAD COMMISSION OF TEXAS TO DETERMINE THE EFFECTIVENESS OF THE TEMPORARY FIELD RULES FOR THE TOYAH, NW (SHALE) FIELD, REEVES AND CULBERSON COUNTIES, TEXAS

HEARD BY: Donna K. Chandler, Technical Examiner
Marshall F. Enquist, Hearings Examiner

APPEARANCES:	**REPRESENTING:**
Mike McElroy Mickey Olmstead Clark Jobe Cary McGregor Jud Walker	Chesapeake Operating, Inc.
Jamie Nielson Rick Johnston Sally Kvasnicka M. Brad Bennett	Brad Bennett; Fasken Oil & Ranch, Ltd; Fasken Land and Minerals, Ltd.
Jamie Downing	Wise Asset No. 1, Ltd.; Wise Asset No. 2, Ltd.
Bill Patterson	Wise Asset No. 1, Ltd.; Wise Asset No. 2, Ltd.; Stanley Jobe; Billy Mack Jobe; Randy Taylor
Mark Hannah David Copeland	COG Operating LLC and COG Oil & Gas L.P.
Robert Hatter Larry Borella	General Land Office
Thomas B. Cowden	9K Ranch, D Ranch
Jennifer Cooper John Cooper Randy Taylor	Self Self Self

Donna Pepper	Self
John Bush	Self
John Griffin	Self
Alan Hill	Self
Robert McCamey	Self
M. McDonnold, Jr.	Self and McDonnold Producing, Inc.
Gwendolyn Geltemeyer	Self; Carrie Davis; Davis St. Clair; Jon St. Clair; Justin St. Clair; Sharon St. Clair; Bush-Griffin Trust; Mike Harrison; Joe Smith; John Cooper; Abby Geltemeyer
Davis St. Clair	Self

PROCEDURAL HISTORY

Notice of Hearing:	August 4, 2008
Pre-Hearing Conference:	October 24, 2008
Date of Hearing:	January 16, 2009
Transcript Received:	February 3, 2009
Record Closed:	February 17, 2009
Proposal For Decision Issued:	May 7, 2009

EXAMINERS' REPORT AND PROPOSAL FOR DECISION

STATEMENT OF THE CASE

By Final Order signed on October 11, 2006, in Oil and Gas Docket No. 08-0248239, the Commission approved a new field designation for the Toyah, NW (Shale) Field ("subject field") and adopted temporary field rules for the field. The rules adopted and currently in effect for the field are summarized as follows:

1. Designation of the field as the correlative interval from 11,978 feet (TVD) to 13,040 feet (TVD) as shown on the log of the Block 59 State 35 Well No. 1H;

2. 467'-1,200' well spacing;

3. 1,280 acre density, with additional acreage assignment allowed based on length of horizontal drainhole;

4. Allocation based on 75% acreage and 25% deliverability.

The rules were adopted on a temporary basis for 24 months, subject to review after notice and hearing. Notice of the review hearing was given to Chesapeake Operating, Inc. ("Chesapeake"), the operator of all active gas wells in the field.

A pre-hearing conference was held on October 24, 2008. In addition to Chesapeake, numerous appearances were made by both leased and unleased mineral interest owners in the area. After the pre-hearing conference, party status was granted to Chesapeake, COG Operating LLC ("COG"), Brad Bennett ("Bennett"), and Fasken Land and Minerals, Ltd. ("Fasken").

There were numerous discovery disputes during this proceeding. Discovery issues were addressed at a preliminary hearing on October 24, 2008. On December 11, 2008, the examiners issued a protective order to protect the confidentiality of documents produced in the discovery process.

At the October hearing, Chesapeake objected to the discovery request of Bennett, but did not offer evidence establishing that net pay maps or figures were trade secrets. In depositions taken on January 9, 2009, it was revealed that Chesapeake had calculated net pay figures and maps which Chesapeake's expert had utilized but which Chesapeake refused to provide to Bennett. On January 15, 2009, the examiners issued a ruling granting Bennett's Motion to Compel, ordering Chesapeake to produce the net pay maps and figures responsive to Bennett's discovery requests under the umbrella of the previously issued Protective Order.

Chesapeake appealed this ruling and the appeal was subsequently overruled by operation of law after the conclusion of the evidentiary hearing in this matter. Chesapeake has never complied with the Commission ruling that it produce, in accordance with the terms of the protective order, all of its net pay figures and maps concerning this field. However, as the protestants have not filed any motions regarding the discovery since the appeal of this ruling was denied, and the information is not necessary for the preparation of this proposal for decision, the matter now appears to be moot.

At the hearing on the merits, Chesapeake presented evidence in support of amending the density rule to provide for 640 acre density for vertical wells, with the assignment of a maximum of 1,408 acres (1,280 acres plus 10% tolerance) to a horizontal well with a lateral length of at least 2,000 feet. Chesapeake requests that these amended rules be in effect for a period of four years, and subject to review at that time. Bennett and Fasken support a density rule of 160 acres for vertical wells, with assignment of additional acreage to horizontal wells pursuant to Statewide Rule 86. COG supported Chesapeake's proposal.

DISCUSSION OF THE EVIDENCE

Chesapeake Evidence

The subject field was discovered in April 2006. The discovery well for the field was the Block 59 State 35 No. 1H. This well has a 3,360 foot horizontal lateral in the Barnett Shale. There have been more than 40 completions in the subject field, about half of which are horizontal wells and half of which are vertical wells. Some wells are completed in the Barnett Shale only, some are completed in the Woodford Shale only, and others have

completions in both intervals. Many of the wells have been unsuccessful completions. Vertical wells in the field cost an average of $8 million to drill and complete while horizontal wells cost an average of $12 million to drill and complete.

The designated interval for the field includes the Barnett Shale, Mississippian Lime and Woodford Shale formations, with a gross thickness of approximately 1,300 feet. The Mississippian Lime between the two shales varies in thickness from 30-100 feet and is believed to be a fairly effective barrier to fracture stimulation.

At the time of the temporary field rule hearing in 2006, it was believed that the Barnett/Woodford Shale formations in the subject field would be productive over a very large area, possibly into Culberson, Reeves and Pecos Counties. Based on drilling since the prior hearing, it appears that the Barnett/Woodford Shale is producible only in a portion of Reeves County.

High angle faults across the area can provide direct communication with significant water and CO_2 from the deeper Ellenburger and Devonian formations. Chesapeake has some wells which produce in excess of 18% CO_2 and 2,000 barrels of water per day. The produced water has properties consistent with Ellenburger water, which underlies the Devonian. For this reason, drilling horizontal wells through these faults presents a risk of an unsuccessful well. Chesapeake has identified many of the larger faults by 3-D seismic and has drilled its wells at locations to avoid the faults. Chesapeake now uses a newer technology called maximum curvature to identify smaller faults (less than 60 feet of throw) not seen on 3-D. In addition to the necessity in avoiding faults, horizontal wells must be drilled in the minimum stress direction of the rock in order to maximize the presence of natural fractures. Horizontal wells are drilled generally in a northeast/southwest direction.

Several of the wells drilled in the field have used microseismic to evaluate the fracture stimulations performed on the wells. Microseismic uses up to 11,000 geophones in a radial pattern about 2 ½ miles around the wellbore which is being fracture stimulated. As the wells are fracture stimulated, the geophones record the fracture fairway, the fracture width and fracture length.

The MBF 72-4 Well No. 1 and the Sunray 72-3 No. 1RE are approximately 3,900 feet apart. Both are vertical wells and five stages were fracture stimulated in each well: the Woodford, the Mississippian Lime, two separate intervals in the Lower Barnett and one interval in the Upper Barnett. After each stage, each well was flowed back to monitor gas production. The microseismic from these two wells indicates fracturing over areas in excess of 640 acres in both the Woodford and the Barnett.

The Wright State 70-5 No. 1RE, a vertical well, has microseismic data available for four stages. In this well, the geophones recorded fracturing at distances in excess of 2,000 feet from the wellbore in all four stages. Similar results were seen in the Block 59 State 35 No. 2H horizontal well. The Block 72 State 36 No. 1 and Block 58 State 32 No. 1 are

both vertical wells. The microseismic for these last two wells confirms fracturing into a fault and less effective fracture stimulation of the rock.

Intense geologic analyses were performed on rock samples from the MBF 72-4 Well No. 1. From these studies, it was determined that the Woodford 2 interval is the best overall reservoir in the field, which has about 70% quartz by weight and only about 20% clay. This high quartz content is indicative of a very brittle rock that fractures very easily. The microseismic confirms this feature of the Woodford. Pyrolosis was also performed on rock samples which indicated that the hydrocarbon in the rock was dry gas, with small enough atoms to flow through the small pore spaces of the rock. Additionally, a very sophisticated core analysis was performed on the rock samples to determine porosity, saturations and permeability. This information is vital in determining whether the shale will produce gas.

Because the Woodford is believed to be the most prospective for development, Chesapeake has focused its latest studies on the Woodford, subdividing it into 4 facies. Because of its characteristics, the Woodford 2 has been the target for horizontal laterals. Chesapeake's goal for horizontal laterals is a length of 3,000-4,000 feet in the Woodford 2. A fracture stimulation in the Woodford 2 provides communication to the Woodford 1 above and the Woodford 3 below. The Barnett is typically completed in the vertical section of the wellbore and commingled with the horizontal section of the Woodford. In the eastern part of the field, it is difficult to find areas between faults which will allow for a 3,000 foot lateral. In these areas, vertical wells will be the only avenues to develop the field.

More than half of the wells in the field have been on production for a year or less. Cumulative production from the field is 10.7 BCF through December 2008. Since the discovery of the field, completion techniques have changed, resulting in initial rates of wells being much higher in newer wells. Many of the more recent wells have initial rates of 2-3 MMCFD, compared to less than 1 MMCFD in the initial wells.

Chesapeake believes that it's proposed rules are necessary to gather additional information about the field for further development. It has been determined that wells must be oriented to encounter fractures perpendicular to the orientation of the fractures. It has also been determined that faults must be avoided in order to achieve a commercial well. Fracture stimulation of wells is necessary for a well to produce commercial quantities of gas and microseismic information demonstrates that fractures affect large areas. No other operators are developing the field and the prospective productive area of the field has been significantly reduced, compared to when the development of the field first began. Many or the areas previously believed to be commercially productive in adjacent counties have been proven to be not feasible for development. Further, it is common for the Commission to adopt larger unit sizes for fields until development of the field is sufficient to provide a more complete analysis of drainage capabilities.

Protestants' Evidence

Bennett and Fasken have unleased minerals in both Reeves and Culberson Counties. Additionally, Fasken and Bennett own surface acreage in both counties and have leased the minerals on behalf of the General Land Office (Mineral Classified Lands). These leases contain provisions which allow acreage to be retained by lessees based on the field rule density adopted by the Commission. The larger the unit size in effect for a field, the more acreage a well can hold. Bennett and Fasken believe that the density rule for a field should reflect the drainage capability of a well. Unit sizes too large will result in less development of a field, and therefore less royalty to the State of Texas.

Microseismic results from four vertical wells were presented by Bennett and Fasken. For the Block 58 State 32 No.1 well, the maximum area affected by the stimulation was 161 acres in the Lower Barnett interval. In the Upper Barnett, 71 acres were affected and in the Atoka, 111 acres were affected. These area calculations are based on the dimensions of a rectangular area which encompasses the microseismic events.

For the Block 59 State 27-11 No. 1 well, the stimulation affected a maximum area of 18 acres in the Lower Barnett and 19.5 acres in the Atoka/Upper Barnett. In the Block 72 State 36 No. 1, the stimulation affected maximum areas of 121 acres, 106 acres and 173 acres in the various intervals. For the Wright State 70-5 Well No. 1, the stimulation affected a maximum area of 32 acres in the Woodford, 29 acres in the Lower Barnett and 26 acres in the Upper Barnett.

The areas discussed above would be maximum drainage areas of the wells. The fracture stimulations performed on the wells open fractures at distances from the wellbore as measured by the microseismic. However, there is no information to determine if these fractures remain open and contribute to gas production from a well.

In the earlier temporary field rule hearing, Petro-Hunt submitted an estimate of 77 BCF of recoverable gas per 640 acres from both the Barnett and Woodford shales. In the discovery process for the current hearing, Chesapeake provided its estimate of recoverable gas beneath 640 acres to be only 6 BCF of gas, or about 10 MMCF of recoverable gas per acre. These more recent calculations were based on 130 feet of net pay in the field and 15% assumed recovery efficiency.

Using Chesapeake's estimate of 10 MMCF per acre, Bennett and Fasken calculated drainage areas for eight wells (three horizontal and five vertical wells) using the estimated ultimate recoveries for the eight wells. The EUR's range from 969 MMCF to 5,416 MMCF. For the vertical wells, the calculated drainage areas range from 102 acres to 200 acres. On this basis, Bennett and Fasken believe that 160 acre base units for vertical wells are appropriate for the field.

Additionally, Chesapeake proposes that horizontal wells with a minimum lateral length of 2,000 feet be allowed to assign up to 1,408 acres for proration purposes (1,280 acres plus 10% tolerance). Bennett and Fasken believe that any additional acreage assignments for horizontal wells should be based on the provisions of Statewide Rule 86, which allows assignment of additional acreage based on lateral length. For example, with a lateral length of 4,500 feet, up to 240 additional acres could be assigned to the horizontal well.

EXAMINERS' OPINION

The examiners recommend that the density rule for the Toyah, NW (Shale) Field be amended to provide for 640 acre base units, with additional acreage assignable pursuant to Statewide Rule 86. The examiners further recommend that these rules be reviewed by the Commission 24 months after a Final Order is signed in this docket.

The examiners recognize that this field is unique and that development of the field is still in the early stages. Chesapeake's proposed density rule is based substantially on micro-seismic data obtained subsequent to the temporary field rule hearing. This data indicate that the fracture stimulations performed on the Sunray 72-3 No. 1 RE and the MBF 72-4 No. 1 wells affected areas of up to 640 acres. In the evidence presented by Bennett and Fasken, these two wells were not included in the calculations of areas affected by the stimulations. The four wells for which Bennett and Fasken presented area calculations had a maximum area affected of 173 acres for the Block 72 State 36 No. 1 well, with microseismic dimensions of 2,700 feet by 2,800 feet. Bennett and Fasken did not dispute the results of the microseismic for the Sunray 72-3 No. 1RE or the MBF 72-4 No. 1. However, Bennett and Fasken argue that there is no evidence to support that gas will be recovered from areas which were impacted by the stimulation because it is not known whether the fractures remain open after flow-back.

The examiners agree that there is no way to know whether the fractures created by the stimulations in the wells are open, and contribute to production or not. For this reason, it is recommended that the base proration unit size be reduced from 1,280 acres to 640 acres at this time, in keeping with the Commission's historical policy of downsizing the unit size for a field in an orderly manner. The examiners believe that a reduction to a 160 acre density rule at this time in the life of this field is too extreme. As more data becomes available in the next two years, the appropriate density can be re-visited in another hearing.

It is not the intent of the examiners to equate the effects of fracture stimulation in a well to the drainage area of that well. However, the examiners also recognize that standard volumetric calculations for a shale field such as this, for which production is accomplished only by means of fracture stimulation, may have limited reliability. Even the microseismic does not indicate that a fracture stimulation in any well affected an area larger than 640 acres. Additionally, Chesapeake presented no data to justify the assignment of up to 1,408 acres for a horizontal well.

The examiners believe that the most prudent method to encourage further development of this field is to provide sufficient flexibility to operators such that additional data can be accumulated regarding appropriate fracture fluid, stimulation methods and completion methods. The adoption of a 640 acre density rule at this time, subject to review, should accomplish this goal without causing waste or harming correlative rights.

FINDINGS OF FACT

1. Notice of this hearing was given to all parties entitled to notice at least ten days prior to the date of hearing.

2. All things have occurred necessary to give the Railroad Commission jurisdiction in this matter.

3. By Final Order signed on October 11, 2006, in Oil and Gas Docket No. 08-0248239, the Commission approved a new field designation for the Toyah, NW (Shale) Field and adopted temporary field rules for the field.

4. The field rules for the Toyah, NW (Shale) Field are summarized as follows:

   a. Designation of the field as the correlative interval from 11,978 feet (TVD) to 13,040 feet (TVD) as shown on the log of the Block 59 State 35 Well No. 1H.

   b. 467'-1,200' well spacing.

   c. 1,280 acre density, with additional acreage assignment allowed based on length of horizontal drainhole.

   d. Allocation based on 75% acreage and 25% deliverability.

5. After the pre-hearing conference held on October 24, 2008, party status was granted to Chesapeake, COG Operating LLC (“COG”), Brad Bennett (“Bennett”), and Fasken Land and Minerals, Ltd. (“Fasken”).

   a. Bennett and Fasken have unleased minerals in both Reeves and Culberson Counties. Additionally, Fasken and Bennett own surface acreage in both counties and have leased the minerals on behalf of the General Land Office (Mineral Classified Lands).

   b. COG is the operator of two inactive wells in the field.

   c. Chesapeake operates all of the active wells in the field.

6. Based on data obtained subsequent to the original hearing, horizontal wells in the subject field are generally in a northeast/southwest direction in order to maximize incurring natural fractures.

7. Information obtained from microseismic data indicates that fracture stimulations in some wells extend over areas up to 640 acres. In some wells, the microseismic indicates that fracture stimulations encountered a fault and were much less effective.

8. Most of the wells in the field have very limited production of a year or less. Cumulative production from the field is 10.7 BCF through December 2008.

9. As a result of evolving completion techniques, the more recent wells in the subject field have initial rates of 2-3 MMCFD, compared to less than 1 MMCFD in the initial wells.

10. Standard volumetric calculations for drainage areas in a field such as the subject field are not generally accepted as reliable because production is accomplished only by means of fracture stimulation. Drainage areas for wells in the subject field cannot be accurately determined at this time.

11. Reducing the base unit size to 640 acres for a vertical well in the subject field will not harm correlative rights or cause waste, but is necessary to accumulate additional data necessary to further develop the field.

12. Chesapeake did not demonstrate that assignment of additional acreage to horizontal wells on a basis other than pursuant to Rule 86 is necessary to promote development of the field.

CONCLUSIONS OF LAW

1. Proper notice was issued in accordance with the applicable statutory and regulatory requirements.

2. All things have occurred to give the Railroad Commission jurisdiction to consider this matter.

3. Amending Rule 3 of the field rules for the Toyah, NW (Shale) Field to provide for base 640 acre density, on a temporary basis subject to review in 24 months, will not harm correlative rights or cause waste, and will promote the orderly development of the field.

EXAMINERS' RECOMMENDATION

Based on the above findings and conclusions, the examiners recommend that Rule 3 of the field rules for the Toyah, NW (Shale) be amended to provide for 640 acre density.

Respectfully submitted,

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Technical Examiner

Marshall F. Enquist
Hearings Examiner