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* KEY ISSUES: CONFISCATION                     *
*               placement of zero contour line *
*                   on isopach map             *
*               first well on tract            *
*                                              *
* FINAL ORDER: R37 GRANTED                     *
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RULE 37 CASE NO. 0212658

APPLICATION OF APACHE CORPORATION FOR AN EXCEPTION TO STATEWIDE RULE 37 TO DRILL ITS REED WELL NO. 4 IN THE KEY WEST (MORROW, UPPER) FIELD, WHEELER COUNTY, TEXAS

HEARD BY: Meredith Kawaguchi, Legal Examiner
Thomas H. Richter, P.E., Technical Examiner

APPEARANCES:	**REPRESENTING:**
FOR APPLICANT:	
Michael McElroy (Attorney)	Apache Corporation
Brad Johnson	
Tim Sullivan	
FOR PROTESTANT:	
Andy Taylor (Attorney)	Enron Oil & Gas Company
Tony Maranto	
Tony Barrett	

PROCEDURAL HISTORY

APPLICATION FILED:	June 7, 1996
NOTICE OF HEARING:	July 30, 1996
DATE OF HEARING:	October 22, 1996
TRANSCRIPT RECEIVED:	November 18, 1996
PFD CIRCULATED:	February 11, 1997
CURRENT STATUS:	Protested

STATEMENT OF THE CASE

This is the application of Apache Corporation ("Apache") for a Rule 37 exception to drill the proposed Reed Lease Well No. 4 in the Key West (Morrow, Upper) Field. Field rules provide for minimum well spacing of 1320'/2640' (lease line/between well), 640 acre gas proration units with 10% tolerance and a 100% acreage allocation formula. The proposed well will be located 660' from Apache's west lease line. The application is opposed by Enron Oil & Gas Corporation ("Enron") which has an offset tract west of the Reed Lease. Apache's application is based on confiscation.

GENERAL

The Key West (Morrow, Upper) Field was discovered by completion of the HNG Oil Company Britt 3 Lease Well No. 1 in March 1982. HNG Oil Company applied for and received a new field designation for the well. In Oil & Gas Docket No. 10-84,325, effective February 23, 1987, the Commission approved the new field as the Key West (Morrow, Upper) Field and adopted the field rules referenced above. The Commission found that the Key West (Morrow, Upper) Field was a separate reservoir from the Key (Morrow, Upper) Field located to the east.

Currently there is only one active producing well in the Key West (Morrow, Upper) Field, the Enron Britt 3 Well No. 1.

APACHE'S EVIDENCE

Apache does not believe that the Key West (Morrow, Upper) Field reservoir extends far enough east of its common lease line with Enron to drill its proposed well at a regular location i.e. 1320' from its west lease line. In this area the Upper Morrow is made up of detrital chert fragments which were derived from erosion of the Amarillo-Wichita mountains which were south of the area. As erosion occurred, the chert was deposited as fan deltas to the north in distributary, incised channel environments. The channels are narrow but deep enough for substantial thicknesses to be deposited. The channels are usually a quarter of a mile to three quarters of a mile in width.

According to Apache the Key West (Morrow, Upper) Field is present only in the Enron Britt 3 Well No. 1. The subject field is not present in the Apache wells approximately 5600' east of the Britt 3 Well No. 1. These wells to the east are classified in the Key (Morrow, Upper) Field.

The Britt 3 Well No. 1 has seven feet of net pay (porosity >8%). There are approximately nine wells surrounding the Britt 3 Well No. 1 that have no Key West (Morrow, Upper) "sand" present or that have no net "sand" present. Thus, Apache knows only where the reservoir is <u>not</u> present. (See attached Apache Exhibit 2)

Exhibit 2, Apache's net pay isopach of the Key West (Morrow, Upper) Field, indicates a maximum thickness up to 60 feet. Other Upper Morrow fields in the immediate area have formation thicknesses up to 80 feet. For the subject field the problem becomes one of placing the "zero" contour on the net isopach map. The geological data indicate that there are seven feet of sand in the Britt 3 Well No. 1, that no sand is present in wells that surround the Britt well, and that the narrow

channels of the Upper Morrow formations may have reservoir thicknesses up to 80 feet.

A helpful parameter in constructing the isopach map is the volume of gas in the reservoir. The Britt well, as previously stated, was completed in 1982 and is the only well to produce from this reservoir. The HNG Britt 9 Well No. 3 to the south of this area was placed in the Key West (Morrow, Upper) Field. This well produced only .48 BCF of gas before depleting. The Britt 3 Well No. 1 has cumulative production of 9.53 BCF of gas and is still producing approximately 1.7 MMCF of gas per day. Therefore, the HNG Britt 9 Well No. 3 was probably producing from a reservoir separate from the Key West (Morrow, Upper) Field. Production decline analysis and P/Z analysis estimate that original recoverable gas-in-place is 20 BCF of gas. Apache believes that these analyses not only estimate what the well is "seeing", but also indicate the volume of the reservoir. Pressure data clearly indicate that the Key West (Morrow, Upper) Field is not in pressure communication with the Key (Morrow, Upper) Field. Using the geological data and the reservoir engineering data, Apache proposes the net isopach map displayed on its Exhibit No. 2.

The primary issue is the location of the "zero" contour line on Apache's lease in Section 2. Apache believes that its interpretation is a reasonable representation of the Key West (Morrow, Upper) Field, which also takes into account the Key (Morrow, Upper) Field. (See attached Apache Exhibit No. 7) If the proposed well is drilled at a regular location (1320' from the lease line) Apache believes the Key West (Morrow, Upper) reservoir will be absent completely.

Apache submits that the proposed well at the Rule 37 exception location is necessary for it to recover the remaining, currently recoverable gas. Based on its isopach there are 14,947 acre feet in the reservoir. The reservoir includes portions of six sections. Enron's lease, located in Section 3, had 8.2 BCF of original recoverable gas-in-place. As stated, this well has already produced 9.53 BCF of gas. The proposed well will be in Section 2. The estimated original recoverable gas-in-place is 5.4 BCF. This is a pressure depletion reservoir and structure is not of concern. The current remaining recoverable gas reserves underlying Apache's tract in Section 2 in the Key West (Morrow, Upper) Field is approximately 2.8 BCF.

ENRON'S EVIDENCE

Enron believes that Apache has not only mapped the Key West (Morrow, Upper) Field incorrectly but that there is an existing producing well on Apache's Section 2 tract, Well No. 1-2A, which can be used to produce the Key West (Morrow, Upper) reservoir. Enron agrees with Apache's depositional interpretation of the reservoir. However, it believes that the distributary channels are wider than depicted by Apache. In constructing its isopach map, Enron drew the "zero" contour line at or near wells with no sand present. (See attached Enron Exhibit No. 3) This construction presents a broader areal interpretation than Apache's with a maximum sand thickness of ten feet. The Britt 3 Well No. 1 only had a sand thickness of seven feet. According to Enron, it is error to construct an isopach for this reservoir with thickness contours up to 60 feet with so little well control in the subject field. Log analysis indicates that the Key West (Morrow, Upper) Field interval is below the Key (Morrow, Upper) Field interval and separated by four feet of shale. Although it is not known if this shale stringer is continuous across the area, there is no reason to believe that it does not continue. Enron asserts that the log of the Apache Reed Well No. 1-2A shows that the Key West

(Morrow, Upper) interval is present and perforated in Well No. 1-2A, and that this well is currently perforated and prorated in the Key (Morrow, Upper) Field. Enron surmises that these lower perforations are suffering "skin damage", a term that describes a physical condition which limits or restricts gas entry into the well bore. Enron believes that this is a possible explanation why the bottom hole pressure in the Reed Well No. 1-2A does not reflect the higher bottom hole pressure of the Enron Britt 3 Well No. 1. The Key (Morrow, Upper) Field has cumulative production in excess of 35 BCF of gas, whereas the Key West (Morrow, Upper) Field has cumulative production of 9.53 BCF of gas.

According to Enron, if the Key West (Morrow, Upper) Field interval is not present in the Apache Reed Well No. 1-2A, the "zero" contour line should be drawn very near to existing wells where it was determined that the sand was not present. Alternately, Enron submits that if the Apache isopach map is used, a location 990' from the lease line should encounter the Key West (Morrow, Upper) Field at a contour interval of approximately 8 to 10 feet.

EXAMINERS' OPINION

Apache's Rule 37 application hinges on the location of the "zero" contour line in the Key West (Morrow, Upper) Field on the Reed Lease. Based on pressure differences between the Key West (Morrow, Upper) and Key (Morrow, Upper) reservoirs, and the configuration of Morrow reservoirs in long narrow channels, the examiners are of the opinion that the evidence is clear that the Key West (Morrow, Upper) interval is not present in the Apache Reed Well No. 1-2A. Thus the proposed well will be Apache's first well in the Key West (Morrow, Upper) Field. Constructing an isopach map with the "zero" contour line placed on or near well bores with no sand is unrealistic, particularly where the distributary channels are known from regional and area geological data to be relatively narrow. In addition, the channels are relatively thick, and consequently, depositions of the Purvis Cherts can be as thick as 60 to 80 feet in both reservoirs. The examiners believe that Apache's interpretation and depiction of the Key West (Morrow, Upper) Field is more reasonable than Enron's interpretation. The true "zero" contour which represents the sand's pinch-out cannot be determined. The pinch-out could be farther east than Apache depicts, but it is probably farther west than Enron's depiction.

Enron alluded to a location 990' from the lease line, but did not quantify how this less irregular location would be less harmful than the proposed 660' location. Enron did state that according to its reservoir engineering, there were approximately 8 BCF original recoverable reserves under its Section 3 tract, and the cumulative production for the Enron Britt 3 Well No. 1 was 9.53 BCF of gas. Apache has carried its burden of proof for a Rule 37 exception for the proposed Reed 2 Well No. 4 in the Key West (Morrow, Upper) Field. Considering the uncertainty involved in determining the location of the "zero" contour, the applied-for Rule 37 location is reasonable.

FINDINGS OF FACT

1. Proper notice as specified by statute was given to all affected operators in the field, to all

affected, adjacent lessees, and to mineral interest owners of each adjacent, affected unleased tract.

2. The well that is the subject of this application will be in the Key West (Morrow, Upper) Field which was discovered in 1982. The field rules were adopted under Oil & Gas Docket No. 10,84,325 effective February 23, 1987.

3. The field rules provide for minimum well spacing of 1320'/2640' (lease line/between well), 640 acre gas proration units with 10% tolerance and a 100% acreage allocation formula.

4. Apache Corporation proposes a spacing exception permit under the provisions of 16 Texas Administrative Code §3.37 (Railroad Commission Statewide Rule 37) to drill Well No. 4, Reed Lease, 640 acres, Section 2, Block 1, B & B/LB Henderson Survey, A-8344, Key West (Morrow, Upper) Field and Wildcat Field above 16,500', Wheeler County, Texas. The proposed well will be located 660 feet from the west line and 1980 feet from the south line of the lease and the survey.

5. Currently, there is only one active producing well in the Key West (Morrow, Upper) Field, the Enron Oil & Gas Company Britt 3 Well No. 1.

6. The Key West (Morrow, Upper) Field reservoir is part of Upper Morrow formation.

   a. In this area the Upper Morrow is made up of detrital chert fragments which were derived from erosion of the Amarillo-Wichita mountains which were south of the area.

   b. As erosion occurred, the chert was deposited as fan deltas to the north in distributary, incised channel environments.

   c. The channels are narrow but were deep enough for substantial thicknesses to be deposited.

   d. The channels are usually a quarter of a mile to three quarters of a mile in width.

   e. The channels extend generally from south to north.

7. The Key West (Morrow, Upper) Field is present only in the Enron Britt 3 Well No. 1.

   a. The Britt 3 Well No. 1 has seven feet of net pay (porosity > 8%) in the Key West (Morrow, Upper) Field. There are several wells surrounding the Britt well with either no Key West (Morrow, Upper) gross sand present or no net sand present.

   b. The Key West (Morrow, Upper) section is not present in the Key (Morrow, Upper Morrow) Field approximately one mile to the east.

8. Apache's geological interpretation of the Key West (Morrow, Upper) Field is reasonable.

9. Apache's proposed well at the Rule 37 exception location is necessary for it to recover the remaining, currently recoverable gas in the Key West (Morrow, Upper) Field.

   a. This is a pressure depletion reservoir and structure is not of concern.

   b. There is a total of 14,947 ac-ft in the reservoir. The reservoir includes portions of six sections with an original recoverable gas-in-place of 20 BCF of gas.

   c. The proposed well will be in Section 2. The estimated original recoverable gas-in-place is 5.4 BCF.

   d. The current remaining recoverable gas reserves underlying Apache's tract in Section 2 in the Key West (Morrow, Upper) Field is approximately 2.8 BCF.

10. Any well at a regular location on the Reed Lease would not penetrate the Key West (Morrow, Upper) field.

11. There is considerable uncertainty in determining the exact location of the "zero" contour in the Key West (Morrow, Upper) Field on the Reed Lease.

CONCLUSIONS OF LAW

1. The application on Railroad Commission Form W-1 was properly filed.

2. Proper notice was issued by the Railroad Commission to appropriate persons legally entitled to notice.

3. All things have been done and have occurred to give the Railroad Commission jurisdiction to decide this matter.

4. A well at the proposed location is a reasonable location that will afford the applicant a reasonable opportunity to recover the hydrocarbons underlying the Reed Lease in the Key West (Morrow, Upper) Field, or their equivalent in kind, thereby preventing confiscation.

RECOMMENDATION

The examiners recommend that the application of Apache Corporation for an exception to Statewide Rule 37 to drill the Reed 2 Well No. 4 in the Key West (Morrow, Upper) and Wildcat Fields be approved.

Respectfully submitted,

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Legal Examiner

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