OIL AND GAS DOCKET NO. 7C-0236633

THE APPLICATION OF ANADARKO E & P COMPANY, LP TO AMEND THE FIELD RULES FOR THE DAVIDSON RANCH (PENN 7890) FIELD, CROCKETT COUNTY, TEXAS

Heard by: Donna K. Chandler, Technical Examiner
James M. Doherty, Hearings Examiner

Procedural History of Case:

Application Filed:	October 8, 2003
Notice of Hearing:	October 24, 2003
Hearing Dates:	November 20 and December 8, 2003
Transcript Received:	January 5, 2004
PFD Issued:	February 3, 2004

Appearances:	**Representing:**
Ana Maria Marsland-Griffith Rick Johnston Andrew Taylor Frank Davis	Anadarko E & P Company, LP
George Neale Charles Sharp Carl Rounding Charlie Hoff	Pioneer Natural Res. USA, Inc.
Philip Whitworth William Fisher David Burkett Dale Mueller	Harrison Interests, Ltd.
Brian Sullivan	Chevron-Texaco

EXAMINERS' REPORT AND PROPOSAL FOR DECISION

STATEMENT OF THE CASE

Field rules for the Davidson Ranch (Penn 7890) Field provide for well spacing a minimum of 660 feet from lease lines, 1,320 feet between wells, and 320 acre density with optional 80 acre density. Anadarko E & P Company, LP ("Anadarko") requests that these rules be amended to provide for a minimum of 330 feet from lease lines, 660 feet between wells, with the adoption of a 20 acre optional density rule. Chevron-Texaco supported Anadarko's requests.

Pioneer Natural Res. USA, Inc. ("Pioneer") and Harrison Interests, Ltd. ("Harrison") have no objection to the proposed 20 acre density but did oppose the change in well spacing requested by Anadarko. Pioneer and Harrison support 660'-660' well spacing.

DISCUSSION OF EVIDENCE

Field Rules History

The Davidson Ranch (Penn 7890) Field was discovered in 1964. In 1972, field rules were adopted for the field which provided for 660'-1,980' well spacing, 320 acre gas units with 10% tolerance, and allocation based on 100% acreage. In 1977, the rules were amended to provide for optional 160 acre gas units. In 1988, the rules were again amended to provide for 660'-1,320' well spacing, with the addition of 80 acre optional gas units. No changes to the spacing and density rule have been made since the 1988 amendment.

The Davidson Ranch (Penn 7890) Field has over 400 gas wells, more than half of which are operated by Anadarko. The allocation formula of 100% acreage has been suspended since 1993. Cumulative production from the field is 314 BCF of gas and 1.1 million barrels of condensate. The October 2003 proration schedule shows that 274 wells in the field already have less than 80 acres assigned to them.

Anadarko

The Davidson Ranch (Penn 7890) Field produces from the Sonora sandstones in the Val Verde Basin. According to Anadarko's depositional model of the area, the sands within the field are sub-marine fan or sub-marine canyon type deposits which have multiple distributary channels. The model shows that the depositional units are not continuous over large areas and the sands within the depositional units are vertically and laterally discontinuous. Productive sands encountered in one well may not be present in a nearby well, though the log characteristics may be quite similar in the two wells.

Anadarko submitted an east-west cross-section across the field area which demonstrates that sand “packages”, or complexes, can be correlated from well to well. However, the individual sands within the packages are generally very heterogeneous and discontinuous. Anadarko describes the field as a very complex, discontinuous sand system. The individual sands are believed to be laminated with significant barriers to flow from well to well.

As early as 1977, the Commission was presented with evidence in hearings that the field is composed of lenticular zones which required additional wells for efficient drainage. In the 1977 hearing to amend field rules, evidence was presented showing the average drainage area to that date was 26.7 acres per well.

For this hearing, Anadarko presented drainage area calculations for 23 of its wells. For these 23 wells, the average drainage area is 27 acres, with a range of 4.1 acres to 70 acres. These calculations included net pay with 6% porosity cut-off and 60% gamma ray cut-off. Net pay in the wells ranges from 51 feet to 283 feet. The water saturation used in the calculations was 25%. When net pay and water saturation were varied in the calculations, there was little effect on the calculated drainage areas.

Anadarko submitted documents from administrative Rule 37 and/ or Rule 38 exception applications filed by both Pioneer and Harrison. These documents show that wells on the leases for which exceptions were filed drain less than 80 acres. On Pioneer's McDonald A lease exception application, Anadarko used Pioneer's data to show that drainage areas for the 13 wells on the lease range from 18 acres to 167 acres. Of the 13 wells on that lease, 9 had calculated drainage areas less than 40 acres. On Harrison's Davidson F lease exception application, Anadarko used Harrison's data to show that the two existing wells on the lease would drain 15 and 22 acres. On Harrison's McMullen “A” lease exception application, Anadarko used Harrison's data to show that the three existing wells on the lease would drain approximately 14, 19 and 38 acres.

To illustrate that new wells are encountering fairly high initial pressures, Anadarko presented pressure information from its wells on Section 15. There were three wells drilled on this 640 acre section in the 1970's. The highest pressure encountered was 3,249 psi, compared to an initial reservoir pressure of about 3,719 psi. Subsequently, after 8 additional wells were drilled on the section between 1989 and 1996, Anadarko drilled three wells on the section in 1997. The highest pressure encountered in the three 1997 wells was 3,190 psi. The lowest pressure encountered by any well on this section of 16 wells was 2,251 psi. Anadarko believes that these pressures indicate lack of drainage by existing wells after over thirty years of production on the section.

To further illustrate lack of drainage by existing wells in the field, Anadarko submitted data from its Scheuber B lease. The two wells on this lease, the No. 2 and No. 7, are 1,074

feet apart. The No. 2 was completed in 1979 with an initial pressure of 3,064 psi. The No. 7 was completed in 1996 and had an initial pressure of 2,739 psi. This pressure information indicates to Anadarko that the No. 2 is not effectively draining the area 1,074 feet away. Additionally, the production decline for the No. 2 well was not affected by the completion of the No. 7 well.

Anadarko requests 330'-660' well spacing in conjunction with the 20 acre optional density rule. Rule 38(b)(2)(A) prescribes standard drilling unit sizes in fields where only a spacing rule has been adopted. In fields which have 330'-993' or 467'-933' spacing, 20 acre drilling units are prescribed. Anadarko believes that the requested 330' lease line spacing is therefore appropriate in association with the 20 acre optional density rule requested. Additionally, Anadarko submitted two sources which identify 330'-660' well spacing as the standard spacing for 20 acre density: the *Texas Oil and Gas Handbook*, published by R. W. Byram and Company and the Railroad Commission's *W-1 Training and Procedure Manual*.

Harrison Interests

Harrison operates 18 wells in the Davidson Ranch (Penn 7890) Field. Harrison objects to the 330' lease line spacing proposed by Anadarko because wells drilled at 330' locations will likely drain leases in which Harrison owns an interest, thereby harming their correlative rights. Harrison believes that in some instances, wells may be justified at 330' locations, but that such locations should re applied for pursuant to Rule 37. Harrison also pointed out that 261 unprotested Rule 37 and/or Rule 38 exceptions have been granted in this field.

Harrison agrees with Anadarko's assessment that the field has varying sand thickness and quality, with numerous sand/shale sequences. Through cross-sections, Harrison demonstrated its interpretation that some individual sands are continuous over large areas, whereas other sands cannot be correlated from well to well. Harrison submitted several temperature logs which indicate gas entry into the wellbores. The temperature logs show that, even with fairly uniform porosity in the Penn, gas entry into the wellbores varies substantially from different sands within the Penn. Harrison believes this demonstrates that permeability varies greatly within the Penn. In such “layered” reservoirs, the individual productive sands will have varying drainage areas. The lower permeability sands which contribute very little gas will have smaller ultimate recoveries and smaller drainage areas than other higher permeability sands.

In a 1999 study by Harrison, drainage areas for 41 wells in this field were calculated for each of the three correlative sand “packages” (not individual sands) within the Penn, identified as the Penn 1, the Penn 2 and the Penn 3U. In the Penn 1, calculated drainage areas range from about 5 acres to 70 acres. In the Penn 2, drainage areas range from about 10 acres to over 80 acres. In the Penn 3U, the drainage areas range from about 12 acres to over 100 acres. In the Penn 2 and 3U, 85% and 71% of the completions, respectively, will

drain more than 20 acres. Based on this study demonstrating that many wells will drain in excess of 20 acres, Harrison believes it is entitled to evaluate any locations proposed by offsetting operators within 660 feet of its lease lines. If a 660' lease line spacing rule is adopted for the field, Harrison would have an opportunity to evaluate such closer locations to its properties and, if necessary, protest such applications, pursuant to Rule 37.

Harrison completed its Davidson “F” No. 38 in May 2003. A bottomhole pressure survey was run which found a pressure of 2,929 psi. This represents approximately 19% depletion from original reservoir pressure. The closest producing well to the No. 38 was 1,383 feet away. This distance equates to a radial drainage area of 138 acres for the other well.

Harrison presented initial production rate information for wells in the field completed from 1989 forward. This information indicates a general decline in initial producing rates over time, indicating depletion of the field under the existing rules.

Harrison pointed out that in 1995, the Commission adopted rules for the Ozona (Canyon Sand) Field which allowed optional 40 acre density but retained a 660' minimum lease line spacing rule, which is normally associated with 80 acre density. That spacing rule was adopted for the field in an attempt to balance waste and correlative rights issues in a field which consisted of several sand packages, some of which were capable of draining more than 40 acres.

EXAMINERS' OPINION

The examiners recommend adoption of a 20 acre optional density rule for the field. This aspect of the application was not protested. Anadarko showed that there are wells in the field which have drainage areas substantially less than 80 acres, some even less than 20 acres.

The examiners further recommend that 330'-660' well spacing be adopted for the field. This is the spacing rule normally associated with 20 acre density. Harrison argues that its correlative rights will be violated because some individual sands within the field will certainly drain in excess of 330 feet, given that the drainage radius for 20 acres is 527 feet. The examiners recognize that many of the better sands within the Penn interval will indeed drain in excess of 330 feet. However, for some sands within the interval, the drainage radii are very small and the reserves from these poorer quality sands will not be recovered unless wells are drilled on closer spacing, resulting in the waste of gas reserves from those sands. The Commission does not consider drainage areas of individual sands within a field when determining appropriate rules for that field.

Additionally, Harrison's 1999 study included a total of 52 completions in either the Penn 1, Penn 2 or Penn 3U. Of these 52 completions, 38 had calculated drainage areas of less

than 30 acres. A 30 acre drainage area has a radius of 645 feet, or about the same as the 660 foot spacing requested by Harrison. Of the 52 completions, 24 have drainage areas of less than 20 acres, or a 527 foot radius. Harrison's own evidence shows that most intervals within the Penn drain less than 660 feet

FINDINGS OF FACT

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

2. The Davidson Ranch (Penn 7890) Field was discovered in 1964 and there are over 400 gas wells producing from the field.

3. The Davidson Ranch (Penn 7890) Field is governed by rules providing for 320 acre/optional 80 acre density and minimum well spacing of 660 feet to lease lines and 1,320 feet between wells.

4. The Davidson Ranch (Penn 7890) Field is a heterogeneous reservoir which consists of numerous lenticular sand/shale sequences.

5. Calculated radial drainage areas for wells in the Davidson Ranch (Penn 7890) Field vary significantly and the adoption of a 20 acre optional density rule is necessary to maximize recovery from the field.

    a. For 23 of Anadarko's wells, the radial drainage areas range from 4.1 acres to 70 acres, with an average of 27 acres.

    b. Data presented to the Commission by Harrison in applications for Rule 37/38 exceptions indicate radial drainage areas from 14 acres to 38 acres for five of Harrison's wells.

    c. Harrison's data from a 1999 study indicate drainage areas for various Penn intervals range from 5 acres to over 100 acres.

6. A spacing rule requiring a minimum of 330 feet from lease lines and 660 feet between wells is appropriate for the Davidson Ranch (Penn 7890) Field in conjunction with the optional 20 acre density rule.

    a. The spacing normally associated with 20 acre density is 330 feet from lease lines and 660 feet between wells.

    b. Locating wells a minimum of 330 feet from lease lines will allow for

recovery of reserves from individual sands which are not present in other wells or have very small drainage capabilities.

CONCLUSIONS OF LAW

1. Proper notice of this hearing was issued.

2. All things have been accomplished or have occurred to give the Commission jurisdiction in this matter.

3. Amending field rules for the Davidson Ranch (Penn 7890) Field to provide for 20 acre optional density and 330'-660' well spacing is necessary to prevent waste.

RECOMMENDATION

Based on the above findings and conclusions of law, the examiner recommends that Rules 1 and 2 of the field rules for the Davidson Ranch (Penn 7890) Field be amended to provide for 330'-660' well spacing and optional 20 acre density.

Respectfully submitted,

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Technical Examiner

James M. Doherty
Hearings Examiner