OIL AND GAS DOCKET NO. 08-0275393

THE APPLICATION OF ANADARKO PETROLEUM CORPORATION TO AMEND THE FIELD RULES AND TO AUTHORIZE PERMANENT GAS WELL CLASSIFICATION FOR WELLS IN THE SANDBAR (BONE SPRING) FIELD, LOVING COUNTY, TEXAS

HEARD BY: Andres J. Trevino, P.E. - Technical Examiner
Marshall F. Enquist - Legal Examiner

HEARING DATE: April 18, 2012

APPEARANCES:	**REPRESENTING:**
Ana Maria Marsland Griffith	Anadarko Petroleum Corporation
David Christian	
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EXAMINER'S REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

The Sandbar (Bone Spring) Field currently operates under Field Rules that were last amended by Final Order No. 08-0268905, effective February 22, 2011.

1. Designation of the field as the correlative interval from 8,007 feet to 11,067 feet as shown on the log of the Sandbar 53-2-39 Well No. 1;

2. 467'-933' lease line spacing, with no minimum between well spacing requirement between horizontal and vertical wells; take point language; box rule; NPZ provisions; off-lease penetration;

3. 320 acre oil units with provisions for additional acreage assignment based on length of drainhole;

4. Gas field is classified as associated-prorated, oil wells have unlimited net gas-oil ratio authority; allocation based on 95% acreage and 5% per well; AOF status.

Anadarko requests that the rules be amended to eliminate between well spacing, that the first and last take points be as close as 200' to a leaseline, add 40 acre optional units, add Rules No.5 and No. 6 to allow a 6 month exception to produce oil wells without tubing and to allow a waiver of the 10 day rule for the filing of paperwork related

to the completing of oil wells in the field. Anadarko also requests that gas wells with a gas-oil ratio of 3,000 cubic feet per barrel or higher be permanently classified as gas wells, effective the date of first production for each well.

The application was unprotested and the examiners recommend that the field rules for the Sandbar (Bone Spring) Field be amended as proposed by Anadarko and that wells producing with a gas-oil ratio of 3,000 cubic feet per barrel or higher be permanently classified as gas wells.

DISCUSSION OF EVIDENCE

The Sandbar (Bone Spring) Field was discovered in September 2010 at a depth of 8,900 feet. The field produces primarily from the Upper Avalon formation. Field Rules currently provide for a designated interval, 467'-933' lease line spacing, with no minimum between well spacing requirement between horizontal and vertical wells; take point language; box rule; NPZ provisions; off-lease penetration; 320 acre oil units with provisions for additional acreage assignment based on length of drainhole; and allocation based on 95% acreage and 5% per well; oil wells in the field assigned unlimited net gas-oil ratio authority; and a classification of associated-prorated for the gas field. There are 11 gas wells and 2 oil wells completed in the field. All wells are horizontal wells. Cumulative production from the field through March 2012 is 2.1 BCFG and 204.3 MBC.

Anadarko is amending the existing field rules in the Sandbar (Bone Spring) Field to adopt additional horizontal rules to allow efficient and orderly development of the Sandbar (Bone Spring) Field with horizontal wells. Anadarko requests to adopt 0' between well spacing to be consistent with the spacing rules of other fields undergoing horizontal development.

Anadarko requests a special rule allowing that the first and last take point on a horizontal wells to be as close as 200 feet any property line, lease line, or subdivision line provided that for such wells the perpendicular distance from any take point on such horizontal drainhole between the first take point and the last take point to any point on any property line, lease line, or subdivision line shall be a minimum of 467 feet. This will reduce a "shadow zone" created when the first and last take points on separate wells are 933 feet apart. The reduced shadow zone will be only 400 feet wide allowing the recovery of additional reserves within the 533 foot zone that would otherwise go unrecovered. Anadarko requests 40 acre optional units to allow flexible placement of future infill drilled wells. A vertical well is not expected to drain more than 40 acres in the very tight (0.0014 md) Upper Avalon formation. The proposed horizontal rules are similar to horizontal rules found in other Bone Spring fields in the area.

Anadarko additionally requests that all wells demonstrating a gas-oil ratio of 3,000 cubic feet per barrel and above in the Sandbar (Bone Spring) Field be permanently

classified as gas wells, effective the date of first production for each well. There is no defined gas cap in the field. Wells logs of the tight Upper Avalon formation can not determine if a well will produce gas of oil or if the well will produce commercial quantities of hydrocarbons. The majority of the wells are classified as gas wells. Anadarko submitted mathematically recombined C7+ wellstream analysis for 5 wells operated by Anadarko. The analysis includes the producing gas-oil ratio at the test date, heptanes-plus mole percent, and API gravity. The combined average gas-oil ratio for the five subject wells is approximately 10,600 cubic feet per barrel and varied between 27,905 to 5,136 cubic feet per barrel. Current Commission policy allows for any well that exhibits a heptanes-plus mole % of 11% or less, may be classified as a permanent gas well. This is supported by research published in McCain[1], and by Phillip L Moses,: *Engineering Applications of Phase Behavior of Crude Oil and condensate Systems*, Journal of Petroleum Technology, July 1986.The mol% heptanes-plus in 5 samples analyzed were less than 12.5%. The heptanes-plus mole percentages for individual wells varied between 2.05% to 8.82%. For a gas-oil ratio on initial test of less than 3,000 cubic feet per barrel, most of the wells would have more than 12.5 mol% heptanes-plus and would be classified as an oil well. For a gas-oil ratio on initial test of 3,000 cubic feet per barrel and above, most of the wells would have less than 12.5 mol% heptanes-plus and would be classified as a gas well. Any additional wells completed in the field are expected to exhibit similar fluid characteristics. Additional mathematically recombined heptanes-plus wellstream analyses are unnecessary for classification of wells as gas wells.

Anadarko requests adoption of Field Rule No. 5 to allow a six month exception for all wells in the Sandbar (Bone Spring) Field to Statewide Rule 13(b)(5)(A), which requires producing a flowing oil well through tubing. Without an exception to this rule, flowing oil wells will be required to be rapidly depleted or killed. Anadarko fears that killing a well may permanently damage the well's completion, as frac fluid will remain in the reservoir and may negatively impact the long term production characteristics of the well. In addition, rapid depletion of reservoir pressure has shown to cause damage to Upper Avalon completions by destabilizing frac proppant and shortening propped frac wings, which will reduce a well's ultimate recovery. Anadarko also requests Field Rule No. 6 to allow a six month exception to Statewide Rule 51(a) regarding a waiver of the 10 day rule for the filing of paperwork related to the completing of oil wells in the field. This rule will grant the Commission the authority to issue an allowable back to the initial completion date for all oil wells in the field and will prevent unnecessary shut-ins to alleviate potential overproduction issues related to completion paperwork filings. Similar "tubingless completion rules" have been approved in the Phantom (Wolfcamp) Field, the Eagleville (Eagleford-2) Field and the Briscoe Ranch (Eagleford) Field. Although the majority of Anadarko wells are gas wells, should an oil well be completed, Anadarko will have the flexibility not to run tubing during the initial phase of production.

Finally, Anadarko requests that the Anadarko Petroleum Corporation, APC 28-4,

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[1] McCain, William D, 1990, The Properties of Petroleum Fluids.

Well No. 1 (API 42-301-31348) be transferred to into the Sandbar (Bone Spring) Field. The well produces from the same Upper Avalon formation as other wells in the Sandbar (Bone Spring) Field.

FINDINGS OF FACT

1. Notice of this hearing was given to all persons entitled to notice and no protests were received.

2. The Sandbar (Bone Spring) Field was discovered in September 2010 at a depth of 8,900 feet. The field produces primarily from the Upper Avalon formation. Field Rules currently provide for a designated interval, 467'-933' lease line spacing, with no minimum between well spacing requirement between horizontal and vertical wells; take point language; box rule; NPZ provisions; off-lease penetration; 320 acre oil units with provisions for additional acreage assignment based on length of drainhole.

3. There are 11 gas wells and 2 oil wells completed in the field. All wells are horizontal wells. Cumulative production from the field through March 2012 is 2.1 BCFG and 204.3 MBC.

4. Anadarko and other operators are actively developing the Sandbar (Bone Spring) Field by drilling horizontal wells.

5. The horizontal rules field rules proposed by Anadarko will allow efficient and orderly development of the Sandbar (Bone Spring) Field with horizontal wells.

6. Adoption of 0' between well spacing is consistent with the spacing rules of other Bone Spring fields undergoing horizontal development. The 0' between well spacing will allow the drilling of horizontal wells in between the existing vertical wells and allow maximum flexibility in placing horizontal wells to maximize hydrocarbon recovery.

7. Adoption of a special rule allowing that the first and last take point on a horizontal wells to be as near as 200 feet from any property line, lease line, or subdivision line provided that for such wells the perpendicular distance from any take point on such horizontal drainhole between the first take point and the last take point to any point on any property line, lease line, or subdivision line shall be a minimum of 467 feet will allow the recovery of reserves that would otherwise go unrecovered.

8. All wells completed with a gas-oil ratio of 3,000 cubic feet per barrel and above in the Sandbar (Bone Spring) Field should be permanently classified as gas wells because they produce from a retrograde condensate gas

reservoir.

a. There is mathematically recombined heptanes+ wellstream analysis for 5 wells in the field.

b. The mol% heptanes+ in all of the samples analyzed was less than 11%.

c. The heptanes+ mole percentages for individual wells varied between 2.05% to 8.82%

d. The combined average gas-oil ratio for the five subject wells is approximately 10,600 cubic feet per barrel and varied between 27,905 to 5,136 cubic feet per barrel.

9. There are technical difficulties associated with installing tubing prior to fracture stimulation and flow back of the load water.

10. Statewide Rule 13(b)(5)(A) requires flowing oil wells to be produced through tubing. Currently, the rule does not explicitly allow for exceptions.

11. Statewide Rule 13(b)(5)(A) does not require flowing gas wells to be produced through tubing.

12. It is appropriate that the Anadarko Petroleum Corporation, APC 28-4, Well No. 1 be transferred to into the Sandbar (Bone Spring) Field since the well produces from the same Upper Avalon formation as other wells in the Sandbar (Bone Spring) Field.

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 the Field Rules for the Sandbar (Bone Spring) Field is necessary to prevent waste, protect correlative rights and promote development of the field.

4. All wells completed with a gas-oil ratio of 3,000 cubic feet per barrel and above in the Sandbar (Bone Spring) Field, Loving County, Texas, are gas wells, effective the date of first production, based on the definition of a gas well pursuant to Statewide Rule 79 (a) (11) (C).

RECOMMENDATION

Based on the above findings of fact and conclusions of law, the examiners recommend that the Commission amend the Field Rules for the Sandbar (Bone Spring) Field as requested, and that wells producing with a gas-oil ratio of 3,000 cubic feet per barrel or higher be permanently classified as gas wells.

Respectfully submitted,

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