

Rule 3: Delete the fifth full paragraph of Rule 3b and replace it with the following:

For the determination of acreage credit in this field, operators shall file for each well in this field a Form P-15 Statement of Productivity of Acreage Assigned to Proration Units or Form P-16 Data Sheet Acreage Designation. On that form or an attachment thereto, the operator shall list the number of acres that are being assigned to each well on the lease or unit for proration purposes. Operators shall not be required to file plats with the Form P-15 or Form P-16 Data Sheet showing individual proration units for oil or gas wells. Operators may, however, file such proration unit plats for individual wells in the field if they choose. Provided further, that if the acreage assigned to any well has been pooled, the operator shall furnish the Commission with such proof as it may require as evidence that interests in and under such proration unit have been so pooled. There is no maximum diagonal limitation in this field.

New: Gas Classification: Adopt a new provision that all wells completed with a gas-oil ratio of 3,000 cubic feet per barrel and above in the Sugarkane (Austin Chalk) Field are permanently classified as gas wells without the need of further administrative review, effective the date of initial completion.

Based on a review of the data and evidence in the record, the Administrative Law Judge and Technical Examiner (collectively "Examiners") conclude that the proposed field rule language may improperly classify some oil wells as gas wells. As a result, the Examiners proposed alternative language as follows:

For any well in the subject field completed with a gas-oil ratio (GOR) of 3,200 cubic feet per barrel and above, the operator may elect to have such well permanently classified as a gas well without the need of further administrative review effective the date of initial completion, provided the initial producing GOR was determined by stabilized well test conducted within 90 days of well completion and in accordance with the GOR determination requirements of Commission procedures as indicated on Forms G-1, G-5 or W-2 as appropriate, and using gas measurement methods as described in the current Commission publication Gas-Oil Ratio Calculation, or methods of at least equal accuracy.

In a letter received on August 9, 2016, Marathon stated that the alternative field rule language is acceptable and does not consider it to be adverse. In addition, the data and evidence presented by Marathon indicates that the San Christoval Ranch Unit A AC 2H (API No. 42-297-35596) and the Children Weston Unit 4H (API No. 42-255-33310) may be classified as gas wells. The Examiners recommend amending the field rules for the Sugarkane (Austin Chalk) Field.

DISCUSSION OF THE EVIDENCE

The Sugarkane (Austin Chalk) Field was discovered on September 7, 2006 at a depth of 11,360 feet. The August 2015 gas proration schedule shows 22 wells have been assigned allowables in the field. There are many more wells completed in the field that are prorated in the Sugarkane (Eagle Ford) Field that are downhole commingled with a Statewide Rule 10 exception. The oil proration schedule shows a single oil well in the field. Marathon has additional Form W-2's that are pending, and the completion papers have been filed for the following five wells:

1. Hartman AC 1H (API No. unknown);
2. Guajillo East AC 2H (API No.013-35016);
3. Best-Hurth Unit AC 1H (API No. 255-33896);
4. San Christoval Ranch Unit A AC 1H (API No. 297-35595); and
5. San Christoval Ranch Unit A AC 2H (API No. 297-35596).

Gas wells are defined as any well:

- a) *which produces natural gas not associated or blended with crude petroleum oil at the time of production;*
- b) *which produces more than 100,000 cubic feet of natural gas to each barrel of crude petroleum oil from the same producing horizon; or*
- c) *which produces natural gas from a producing horizon productive of gas only encountered in a wellbore through which crude petroleum oil also is produced through the inside of another string of casing or tubing. A well which produces hydrocarbon liquids, a part of which is formed by a condensation from a gas phase and a part of which is crude petroleum oil, shall be classified as a gas well unless there is produced one barrel or more of crude petroleum oil per 100,000 cubic feet of natural gas; and that the term "crude petroleum oil" shall not be construed to mean any liquid hydrocarbon mixture or portion thereof which is not in the liquid phase in the reservoir, removed from the reservoir in such liquid phase, and obtained at the surface as such.¹*

Marathon Exhibit No. 9 shows a Railroad Commission Memorandum dated August 3, 2006 which proposed a new administrative procedure for gas well classification, allowing wells to be administratively classified as a gas well if the heptanes plus (C₇+) mole (or "mol") percent of a compositional analysis is less than 11%. The fluid sampling for the compositional analysis should be performed by a third

¹ 16 Tex. Admin. Code § 3.79(11). 16 Tex. Admin Code §3.79 is generally referred to as Statewide Rule 79.

party who certifies that the sample is representative of the reservoir fluid and has identical properties to those of a fluid taken from the subject reservoir on the same day. The memo stated that the published research of Phillip L. Moses² and William D. McCain, Jr.³ supports this change.

As a result of the August 3, 2006 Memorandum, current Commission practice is to administratively classify a well as a gas well when analysis demonstrates the proportion of heptanes and heavier hydrocarbon molecules (i.e, "heptanes plus" or "C7+") is less than 11 mole percent of the recombined wellstream composition. If an applicant cannot meet the established criteria for administrative classification, an applicant can request a hearing and provide additional information to show that a particular well meets the definition of "gas well" found in Statewide Rule 79. For example, similar to this case, the underlying research indicates that an initial producing gas-oil ratio (GOR) of more than 3,000 to 3,200 standard cubic feet (scf) per barrel may also be indicative of a retrograde gas condensate reservoir. In other cases in which the C7+ and initial producing GOR data demonstrate the conditions in which the fluid exists as a retrograde gas condensate in the reservoir, the Commission has adopted field-specific gas well classification rules that allow an operator to seek administrative gas well classification when the initial producing GOR is 3,000 scf/bbl or greater. Numerous fields have adopted gas well classification language based on initial producing GOR. (Table 1).

Table 1: Administrative Permanent Gas Well Classification Based on a 3,000:1 GOR

Field	O&G Docket No.	Date
Briscoe Ranch (Eagleford)	01-0270024	05/24/2011
Sugarkane (Eagle Ford)	02-0272551	01/10/2012
Hawkville (Eagleford)	02-0272550	01/10/2012
DeWitt (Eagle Ford)	02-0272549	01/10/2012
Ford, West (Wolfcamp)	08-0283648	10/22/2013
Derby (Bone Spring)	08-0282091	08/06/2013
Sand Bar (Bone Spring)	08-0275393	06/12/2012

In Final Order 02-0272551, a permanent gas well classification was approved for wells completed in the Sugarkane (Eagle Ford) Field, in Bee, De Witt, Karnes, and Live Oak Counties with a GOR of 3,000 cubic feet per barrel and above, without the need of further administrative review, effective the date of initial completion. Tim Smith, Marathon's, expert engineering witness testified that the hydrocarbons contained in the Austin Chalk Formation are sourced from the Eagleford Formation. This statement is supported by USGS Fact Sheet 2011-3046, which states that the underlying Eagle Ford

² Moses, Phillip. L. *Engineering Applications of Phase Behavior of Crude Oil and Condensate Systems*. July 1986. Journal of Petroleum Technology. Pg 715-723.

³ McCain, William, Jr. *Properties of Petroleum Fluids*, 2nd ed. 1990.

shale is the main source rock for the Austin Chalk Formation hydrocarbons.⁴ A geologic summary provided in the USGS fact sheet describes the Austin Chalk Formation as a low-to-moderate primary porosity and low primary permeability reservoir that is dependent on interconnected fracture networks for the production, but does also contain conventional-type accumulations of hydrocarbons.

Mr. Smith states that the fluid characteristics of both the Eagle Ford and Austin Chalk are very similar. The hydrocarbons in-place are controlled by geo-chemistry, and the characteristics of these hydrocarbons are a function of organic content, maturity, and the nature of the deposition itself, as the hydrocarbons are contained in ultra-tight permeability rock. There is no way for these hydrocarbons to migrate; they are held in-place.

In Mr. Smith's opinion, the characteristics of the hydrocarbons in this area are related to depth; the reason you have an oil window is that it is shallower, there is less heat, and it is considered less mature. In the wet-gas window there is no place for those hydrocarbons to go and the hydrocarbons are gas in the reservoir, but generate a substantial amount of liquid in the production stream and the production equipment, and therefore have a fairly low GOR.

The classification of a well is dependent on whether the hydrocarbons exist as a gas or liquid in-situ. In a Journal of Petroleum Technology paper, Phillip Moses concluded that "there is a fairly sharp dividing line ... C7+ of 12.5% and greater are almost always in the liquid phase. Less than 12.5% are almost always in the gas phase in the reservoir."⁵ Phillip Moses' data was published in 1986. More recently, William McCain has conducted further studies and determined that the transition between volatile oils and gas condensates is a composition of 12.9 mole % heptanes plus in the reservoir fluid. In William McCain's 2011 publication: *Petroleum Reservoir Fluid Property Correlations*, McCain states: "Thus, if the composition of the reservoir fluid contains more than 12.9 mol % heptanes plus, the reservoir fluid is an oil. If the composition of heptanes plus in the reservoir fluid is less than 12.9 mol %, the fluid is a gas. The transition from gases to oils is very distinct; only three of the hundreds of data points do not fit this pattern."⁶

In Mr. Smith's opinion, the heptanes plus of 12.9 mole % that represents a dividing line between oil and gas would be the same dividing line whether you are looking at liquids or gas from a conventional reservoir, or an unconventional reservoir,

⁴ Marathon Exhibit No. 8: *Assessment of Undiscovered Oil and Gas Resources of the Upper Cretaceous Austin Chalk and Tokio and Eutaw Formations, Gulf Coast, 2010*. Fact Sheet 2011-3046. June 2011.

⁵ Moses, Phillip. L. *Engineering Applications of Phase Behavior of Crude Oil and Condensate Systems*. July 1986. Journal of Petroleum Technology. Pg 715-723

⁶ McCain, William, D. Jr., Spivey, John P., and Lenn, Christopher P. *Petroleum Reservoir Fluid Property Correlations*, 2011.

as William McCain's research found that only three of the hundreds of data points do not fit this pattern.

Mr. Smith testified that Phillip Moses' article in the Journal of Petroleum Technology was written in 1986, whereas the Sugarkane (Austin Chalk) Field was discovered September 7, 2006. Therefore, the article was written before we learned how to recover hydrocarbons from source rock that was nano-permeability. In a conventional reservoir, it's not the source rock, it's a trap that has porosity and permeability. In contrast to a conventional reservoir, in an unconventional reservoir, we're dealing with nano-permeability. For a well completed in an unconventional reservoir the drainage area of each well is defined by the stimulated reservoir volume (SRV). The SRV is the area we have been able to create with a horizontal lateral and hydraulic fracturing, and propping of fractures. In Mr. Smith's opinion, in an unconventional reservoir we can examine fluid properties on a well-to-well basis, because it is incredibly unlikely that two separate wellbores, unless they are very close to one another, are communicating. Therefore, each individual well exists in its original condition at the time of completion.

Marathon has collected separator liquid and gas samples from approximately 40 wells. and laboratory analysis has been conducted to determine fluid type. Presently in the Sugarkane (Austin Chalk) Field if a well does not meet the administrative criteria of a heptanes plus 11 mole % or less, an operator would be required to request a hearing to present evidence to show that the well is a gas well. Therefore, Marathon proposes adopting a field rule that all wells completed with a gas-oil ratio of 3,000 scf/bbl and above be permanently classified as gas wells without the need of further administrative review, effective the date of initial completion. This proposed field rule would save operators in the field the expense of conducting compositional fluid analysis testing.

However, in reviewing the well data and evidence, the proposed field rule language using a GOR of 3,000 scf/bbl would improperly classify the San Christoval Ranch A AC 1H (API No. 297-35595) as a gas well, and potentially some future wells completed in the field. Marathon Exhibit Nos. 13 and 13S show the San Christoval Ranch A AC 1H exhibited a heptanes plus of 13.617 mole %, with a G-1/W-2 GOR of 3,071, and a W-2 GOR of 3,108 scf/STB. Mr. Smith's expert testimony agreed with the conclusion in Marathon Exhibit No. 12A, an excerpt from William McCain's 2011 publication: *Petroleum Reservoir Fluid Property Correlations*, that if the reservoir fluid contains a heptanes plus greater than 12.9 mole % , the reservoir fluid is an oil. If the composition of heptanes plus in the reservoir fluid is less than 12.9%, the fluid is a gas. Additionally, Marathon Exhibit 12A, Table 5-1 lists the dividing line between volatile oil and retrograde condensate to be 3,200 scf/STB.

As a result, the Examiners proposed amending the field rule GOR delineation to classify gas wells to be a GOR of 3,200 scf/bbl instead of 3,000 scf/bbl. Marathon stated that the proposed field rule language is acceptable and is not considered to be

adverse. The proposed language change from a GOR of 3,000 to 3,200 scf/bbl delineation would potentially affect a total of 3 wells with GOR's between 3,000 and 3,200 listed on Marathon Exhibit Nos. 13 and 13S. These wells are the San Christoval Ranch Unit A AC 1H (API No. 42-297-35595), the San Christoval Ranch Unit A AC 2H (API No. 42-297-35596), and the Children Weston Unit 4H (API No. 42-255-33310).

As previously described, the San Christoval Ranch Unit A AC 1H (API No. 42-297-35595) does not meet the proposed field rule language to be classified as a gas well and the tests results show this is an oil well. Based on the evidence, the San Christoval Ranch Unit A AC 2H (heptanes plus of 11.783 mole %) and the Children Weston Unit 4H (heptanes plus of 4.306 mole %) both exhibited a heptanes plus mole % less than 12.9 mole %, and may be classified as gas wells based on the evidence in the record.

Amending current Field Rule No. 3 to provide operators the ability to file the Form P-16 Data Sheet Acreage Designation will update the field rules to keep the rules current. This field rule amendment will also promote timely and efficient filing of Commission forms for wells in the field.

FINDINGS OF FACT

1. Notice of the hearing was provided to all operators in the field at least ten (10) days' prior to the date of the hearing and no protests were received.
2. The Sugarkane (Austin Chalk) Field was discovered on September 7, 2006 at a depth of 11,360 feet.
3. The underlying Eagle Ford shale is the main source rock for the Austin Chalk Formation hydrocarbons.
4. In Final Order 02-0272551, a permanent gas well classification was approved for wells completed in the Sugarkane (Eagle Ford) Field, in Bee, De Witt, Karnes, and Live Oak Counties with a GOR of 3,000 cubic feet per barrel and above, without the need of further administrative review, effective the date of initial completion.
5. The Austin Chalk Formation is a low-to-moderate primary porosity and low primary permeability reservoir that is dependent on interconnected fracture networks for production, but also contains conventional-type accumulations of hydrocarbons.
6. The fluid characteristics of both the Eagle Ford and Austin Chalk are very similar:

- a. hydrocarbons in-place are controlled by geo-chemistry;
 - b. the characteristics of these hydrocarbons are a function of organic content, maturity, and the nature of the deposition itself; and
 - c. the hydrocarbon properties in this area are related to depth, in terms temperature and maturity.
7. The San Christoval Ranch Unit A AC 2H heptanes plus is 11.783 mole %.
 8. The Children Weston Unit 4H heptanes plus is 4.306 mole %.
 9. The San Christoval Ranch A AC 1H exhibited a heptanes plus of 13.617 mole %, a G-1/W-2 GOR of 3,071, and a W-2 GOR of 3,108 scf/STB.

CONCLUSIONS OF LAW

1. Proper notice was issued as required by all applicable statutes and regulatory codes.
2. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. TEX. NAT. RES. CODE § 81.051.
3. Amending the field rules for the Sugarkane (Austin Chalk) Field, Atascosa, Bee, De Witt, Live Oak, and Karnes Counties, Texas will increase efficiency.

EXAMINERS' RECOMMENDATION

Based on the above findings of fact and conclusions of law, the Examiners recommend that the Commission amend the field rules for the Sugarkane (Austin Chalk) Field. The Examiners also recommend that the San Christoval Ranch Unit A AC 2H (API No. 42-297-35596) and the Children Weston Unit 4H (API No. 42-255-33310) be permanently classified as gas wells, without the need of further administrative review, effective the date of initial completion.

Respectfully submitted,



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Jennifer Cook
Administrative Law Judge