

December 15, 1999

OIL AND GAS DOCKET NO. 08-0223268

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**THE APPLICATION OF SANTA FE RESOURCES, INC., TO ESTABLISH RULES FOR OIL WELLS, TO AMEND GAS FIELD RULES, TO ESTABLISH NET GOR AUTHORITY AND TO TRANSFER VARIOUS WELLS INTO THE SIGNAL PEAK (WOLFCAMP) FIELD, HOWARD COUNTY, TEXAS**

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**Heard by:** Margaret Allen, Technical Hearings Examiner

**Procedural history**

Application received: November 16, 1999

Hearing held: December 15, 1999

**Appearances**

Flip Whitworth

Rod S. Phares

Richard C. Winchester

Stephen G. Gressett

Chuck Tanner

Representing

Santa Fe Resources, Inc.

**EXAMINER'S REPORT AND RECOMMENDATION**

**STATEMENT OF THE CASE**

This application was filed by Santa Fe Energy Resources Inc., but the company has changed its name to Santa Fe Snyder Corporation ("Santa Fe"). Current rules for the Signal Peak (Wolfcamp) Field, apply only to gas wells and were adopted under Docket No. 08-0220515, effective December 15, 1998. They are summarized as follows:

1. Designated interval from 7777 to 8090 feet as shown on the log of the E. M. Craig, Jr. Corporation "Avenger" 40 Lease Well No. 1;
2. 660-1320' well spacing;
3. 160-acre proration units with maximum diagonal of 4500'; and
4. Allocation based on acreage.

Santa Fe is seeking to retain the field's designation as associated, prorated with a suspended allocation formula, and to amend the gas field rules as follows:

2. 467-933' well spacing;
3. 160-acre proration units with optional 80 acre units; and

4. allocation based 95% on acreage and 5% on deliverability.

The field's oil wells are now on Statewide Rules and Santa Fe wants the oil wells governed by the same designated interval, spacing and density rules as the gas wells. The requested allocation formula is based 95% on acreage and 5% per well, which is almost identical to the gas allocation formula. Santa Fe also seeks field-wide Net GOR authority allowing oil wells to produce up to 1700 MCF/D, and to have all overproduction canceled.

Santa Fe believes that the following wells are incorrectly classified in the Hutto, South (Wolfcamp) Field and should be transferred to the Signal Peak (Wolfcamp) Field:

<u>Operator</u>	<u>Well name</u>	<u>ID number</u>	<u>Type</u>
Santa Fe Snyder	Powell Ranch 36-2	166633	Gas
Santa Fe Snyder	Texaco 35-2	168527	Gas
Santa Fe Snyder	Texaco 37-1	170852	Gas
Santa Fe Snyder	Powell Ranch #2	35806	Oil
Santa Fe Snyder	Powell Ranch 2702	35806	Oil
Santa Fe Snyder	Powell Ranch 2703	35806	Oil
Santa Fe Snyder	Powell Ranch 2704	35806	Oil
Santa Fe Snyder	Barber 1-1	36075	Oil
Santa Fe Snyder	Powell Ranch 38-2	36091	Oil
Santa Fe Snyder	Powell Ranch 14-2	36095	Oil
Santa Fe Snyder	Texaco 23-2	Pending	
Santa Fe Snyder	Barber 15-1	Pending	
Santa Fe Snyder	Powell Ranch 36-4	Pending	

Santa Fe also believes the following wells are incorrectly classified in the Howard-Glasscock (Wolfcamp 7400) Field and should be transferred to the Signal Peak (Wolfcamp) Field:

<u>Operator</u>	<u>Well name</u>	<u>ID number</u>	<u>Type</u>
Santa Fe Snyder	Powell Ranch 2701	36071	Oil
Santa Fe Snyder	Texaco 23-1	36105	Oil
Santa Fe Snyder	Barber 11-1	36106	Oil
<u>Operator</u>	<u>Well name</u>	<u>ID number</u>	<u>Type</u>
Santa Fe Snyder	Barber 1-2	36107	Oil
Santa Fe Snyder	Allday N11-1	36108	Oil
Miltex Oil Co.	Robertson #1	35874	Oil
Miltex Oil Co.	Powell 12-1	35912	Oil
Miltex Oil Co.	Powell 12-2	35912	Oil
Miltex Oil Co.	Powell 13-1	35963	Oil
Miltex Oil Co.	Powell Ranch 26-2	164461	Gas
Miltex Oil Co.	Texaco 37-1	167358	Gas

### **DISCUSSION OF THE EVIDENCE**

The Signal Peak (Wolfcamp) Field was discovered in 1983, and gas field rules were adopted in

1998. Only Santa Fe and Louis Dreyfus Natural gas Corp. are now listed as operators in the Signal Peak (Wolfcamp) Field, though this application will transfer six Miltex Oil Company wells into the field. Santa Fe has a working interest in the Miltex wells to be transferred into the Signal Peak (Wolfcamp) Field. Both Louis Dreyfus and Miltex waived any protest to Santa Fe's application.

The Signal Peak (Wolfcamp) Field produces from a lenticular Wolfcamp sandstone section. Some sandstones correlate from well to well though not across the field. Other sands have been found in only one well. Some sands extend more than 160 acres while others are much more limited. The requested well spacing is somewhat less than standard for 80-acre optional units but will allow wells to be planned to encounter as many sands as possible. Extra flexibility in locating wells is also useful because this is an area of ravines and canyons that restrict the location of drilling pads.

A well completed in several sands may produce from mostly oil-bearing or mostly gas-bearing reservoirs. It is therefore not easy to predict whether a new well will be classified as oil or gas, and making the designated interval and spacing rules identical for gas and oil wells will simplify permitting. The proposed density and allocation rules for oil wells and for gas wells are very similar as well. The classification of wells as gas or oil tends to remain stable, though when oil-bearing sandstones become depleted in an oil well, the well must usually be reclassified as a gas well. The applicant wants the Signal Peak (Wolfcamp) gas field to remain listed as associated, prorated and the allocation formula to remain suspended. This field as a whole does not have an identifiable gas cap and there is no reason to restrict gas well production to protect reservoir energy in various oil-bearing sands. Proposed rules for both oil and gas wells base allowables primarily on acreage which will protect correlative rights.

The average porosity of these Wolfcamp sandstones is 8%, the average permeability is 0.07 md and the water saturation is 60%. The average net productive thickness is 35 feet though that can vary considerably. The original reservoir pressure was in the range of 1950 psi and the initial gas/oil ratios of the various completions ranged from 5000 to 500,000 cubic feet per barrel. The applicant assumed the recovery factor for oil wells to be 10% and for gas wells to be 80%. Using these average reservoir properties, the applicant estimated the drainage areas of four oil wells scattered throughout the field. The estimated drainage areas depended also on the estimated ultimate recovery for each of these wells, and ranged from 41 to 140 acres. The calculated drainage areas of four scattered gas wells ranged from 26 to 136 acres. Both oil and gas wells can therefore be capable of draining over 80 acres and Santa Fe believes that rules for both types of wells should allow 160 acre proration units. The small drainage areas of some wells indicates that infill drilling will be needed to fully develop this field and Santa Fe has an ongoing drilling program to add wells on 80 acre proration units.

The current oil field allowable is 121 BOPD and 242 MCF/D per well. Santa Fe submitted step rate tests on four oil wells that showed these wells produced inefficiently at rates near 250 MCF/D. All of the well tests showed a decrease in gas/oil ratio as the gas rate increased. The most efficient gas rate (where the gas/oil ratio was lowest), for these four oil wells, ranged from 1550 MCF/D to 1700 MCF/D. The applicant is requesting a daily gas limit of 1700 MCF/D for oil wells and also that any overproduction acquired before or during the step rate tests be canceled.

The discovery wells for the Hutto, South (Wolfcamp) and Howard-Glasscock (Wolfcamp 7400) Fields are completed in Wolfcamp carbonates. There are more than 100 feet of shale between these shallower carbonates and the deeper Wolfcamp sandstones producing from the Signal Peak (Wolfcamp) Field. All of the wells that Santa Fe believes should be transferred to the Signal Peak (Wolfcamp) Field are completed only in the deeper Wolfcamp sandstones.

The locations of the discovery wells for the Hutto, South (Wolfcamp) and Howard-Glasscock (Wolfcamp 7400) further show the wells to be transferred are currently misclassified. The discovery well for the Howard-Glasscock (Wolfcamp 7400) Field, the Conoco Chalk A Lease Well No. 14, is located 2-1/2 miles south of the closest Wolfcamp sandstone well. The discovery well for the Hutto, South (Wolfcamp) Field, the Amerada Anderson Well No. 1, is more than four miles northwest of the closest well completed in the lower Wolfcamp sandstones. The discovery well for the Signal Peak (Wolfcamp) Field, the E.M. Craig Jr. Corp. Avenger "40" Lease Well No. 1, produces from Wolfcamp sandstones lower than the completion intervals of the Hutto, South (Wolfcamp) and Howard-Glasscock (Wolfcamp 7400) Fields. The designated field interval in the Avenger "40" is shown on its log between 7777 to 8090 feet, and the applicant wants to keep this same interval after the rules are amended.

### FINDINGS OF FACT

1. Notice of this hearing was issued to all operators in the Signal Peak (Wolfcamp) Field and to operators of wells to be transferred to the Signal Peak (Wolfcamp) Field on November 23, 1999.
2. Notice of this hearing was issued to all operators and unleased mineral interest owners offsetting wells to be transferred, as well as to interest owners offsetting wells currently in the Signal Peak (Wolfcamp) Field, on November 23, November 30, or December 16, 1999. No written protest was received.
3. The discovery wells for the Hutto, South (Wolfcamp) and Howard-Glasscock (Wolfcamp 7400) Field are completed in an upper Wolfcamp carbonate section and are more than 2 1/2 miles from the wells to be transferred.
4. The following wells are completed in the same lower Wolfcamp sandstones as the discovery well for the Signal Peak (Wolfcamp) Field and should be transferred to the Signal Peak (Wolfcamp) Field:

<u>Operator</u>	<u>Well name</u>	<u>ID number</u>	<u>Type</u>
Santa Fe Snyder	Powell Ranch 36-2	166633	Gas
Santa Fe Snyder	Texaco 35-2	168527	Gas
Santa Fe Snyder	Texaco 37-1	170852	Gas
Santa Fe Snyder	Powell Ranch #2	35806	Oil
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Santa Fe Snyder	Texaco 23-2	Pending	
Santa Fe Snyder	Barber 15-1	Pending	
Santa Fe Snyder	Powell Ranch 36-4	Pending	
Santa Fe Snyder	Powell Ranch 2701	36071	Oil
Santa Fe Snyder	Texaco 23-1	36105	Oil
Santa Fe Snyder	Barber 11-1	36106	Oil
Santa Fe Snyder	Barber 1-2	36107	Oil
Santa Fe Snyder	Allday N11-1	36108	Oil

Miltex Oil Co.	Robertson #1	35874	Oil
Miltex Oil Co.	Powell 12-1	35912	Oil
Miltex Oil Co.	Powell 12-2	35912	Oil
Miltex Oil Co.	Powell 13-1	35963	Oil
Miltex Oil Co.	Powell Ranch 26-2	164461	Gas
Miltex Oil Co.	Texaco 37-1	167358	Gas

5. Permanent rules of 160 acre proration units with 80 acre optional units are appropriate for both oil and gas wells.
  - a. Calculated drainage areas of gas wells range from 26 to 136 acres
  - b. Calculated drainage areas of oil wells range from 41 to 140 acres.
  - c. The productive sandstones are lenticular with some sands extending between wells and others of more limited areal extent.
  - d. Some sandstones are gas-bearing and others oil-bearing, making it difficult to predict the classification of a well before its completion.
  - e. Oil wells may be reclassified as gas wells as these wells near depletion.
  - f. Infill drilling will be necessary to fully develop the reservoir.
6. Rescinding the current gas rules will allow establishment of consistent rules that will govern both gas and wells.
7. Well spacing of 467-933 feet is necessary because the terrain in this field limits the locations of drilling pads.
8. The interval between 7777 and 8090 feet, as shown on the log of the discovery well for the Signal Peak (Wolfcamp) Field, the E.M. Craig Jr. Corp. "Avenger" 40 Well No. 1, contains all of the productive Wolfcamp sandstones section.
9. Because there are multiple, lenticular sandstones within the designated interval a two-factor allocation formula is required by statute.
10. The allocation formulas for both gas and oil wells are based 95% on acreage which will protect correlative rights.
11. Gas and oil are produced from different Wolfcamp sandstones in varying amounts and limiting gas well production will not improve oil recovery.
12. The oil wells are now on Statewide rules and have a top allowable of 121 BOPD and 242 MCF/D.
13. Step rate tests on four oil wells indicate that a daily gas limit of 1700 MCF/D will prevent waste.
  - a. All four wells had high relative gas/oil ratios when produced at or near the current daily gas limit.

- b. The gas/oil ratio in all four wells decreased as the gas production rate increased.
- c. The lowest gas/oil ratios shown on the step rate tests of the four wells were between 20,100 cubic feet per barrel and 46,300 cubic feet per barrel.
- d. The lowest gas/oil ratios, and therefor most efficient gas producing rate, occurred when the gas producing rates for these four wells were between 1550 and 1700 MCF.

**CONCLUSIONS OF LAW**

- 1. Proper notice was given as required by statute.
- 2. All things have been done or occurred to give the Railroad Commission jurisdiction to resolve this matter.
- 3. The requested field rules will prevent waste, protect correlative rights within the field, and promote orderly development of the reservoir.
- 4. Reclassification of wells to the correct field is a matter within the Commission's jurisdiction and will protect correlative rights.

**EXAMINER'S RECOMMENDATION**

Based on the above findings and conclusions, the examiner recommends the requested field rules for the Signal Peak (Wolfcamp) be approved, and that the specified wells be transferred to the Signal Peak (Wolfcamp) Field.

Respectfully submitted,

Margaret Allen  
Technical Hearings Examiner

Date of Commission Action: January 11, 2000

Exhibits

1. Map of field
2. Corrected addresses for two returned hearing notices
3. Map of cross section locations
4. Cross section A-A'
5. Cross section B-B'
6. Cross section C-C'
7. Cross section D-D'
8. Cross section F-F'
9. Cross section E-E'
10. List of wells to be transferred
11. Topographic map
12. Reservoir data sheet
13. Calculations of volumetrics and drainage areas
14. Step rate test for Barber 1-2
15. Step rate test for Powell Ranch 2703
16. Step rate test for Powell Ranch 2702
17. Step rate test for Barber 1-1
18. Waivers from Miltex and Louis Dreyfus, other operators in field
19. Summary of requested relief