

June 8, 2000

OIL AND GAS DOCKET NO. 05-0224815

THE APPLICATION OF MITCHELL ENERGY CORPORATION TO CONSOLIDATE VARIOUS PERSONVILLE N FIELDS INTO A NEW FIELD TO BE KNOWN AS THE PERSONVILLE, N. (CV CONSOLIDATED) FIELD AND TO ADOPT OPERATING RULES AND REGULATIONS FOR THE PERSONVILLE, N. (CV CONSOLIDATED) FIELD, LIMESTONE COUNTY, TEXAS

Heard by: Margaret Allen, Technical Hearings Examiner

Procedural history

Application received: May 5, 2000

Hearing held: June 7, 2000

Appearances

	Representing
Brian R. Sullivan	Mitchell Energy Corporation
Alex W. McCoy	
Raymond J. Smith	
Mark N. Stephenson	
Arville Slaughter	

EXAMINER'S REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Mitchell Energy Corp. is seeking standing to have the following Personville N fields consolidated into a new field to be known as the Personville, N. (CV Consolidated) Field:

Personville, N. (Bossier Sand)	70794 400
Personville N (Cotton Valley Lm)	70794 500
Personville N (Cotton Valley Sd)	70794 510
Personville N (CV Sd, Lwr)	70794 490

Mitchell is also proposing that permanent field rules be adopted for the new field. These rules are summarized as follows:

1. Designated interval between 9538 feet and 11,432 feet as shown on the log of the Mitchell Muse-Duke Lease, Well No. 1;
2. Well spacing of 467-1200 feet;

3. 640 acre gas proration units with 80-acre optional units; and
4. allocation based 95% on acreage and 5% on deliverability.

DISCUSSION OF THE EVIDENCE

Mitchell wants to do considerable infill drilling in the Personville N (Cotton Valley Lm) Field that now has 162 wells. Mitchell also believes the overlying Personville, N. (Bossier Sand), Personville N (Cotton Valley Sd) and Personville N (CV Sd, Lwr) Fields should be developed with the Cotton Valley limestone field. Cotton Valley/Bossier sandstones are not economic by themselves and will only be developed if wells can be completed in them at the same time as they are completed in the much more prospective Cotton Valley limestones. Mitchell's wells targeting only the Cotton Valley sandstones have not been very successful economically. Future discovery of production in the sandstones will likely be due to serendipity while drilling for other targets.

Seven of the eight wells in the Personville N (CV Sd, Lwr) Field which was discovered in 1991, are operated by Mitchell. The Personville N (Cotton Valley Sd) was discovered in 1995 and has two wells, both operated by Mitchell. Both of these fields are on Statewide Rules. The Personville N (CV Sd, Lwr) Field has produced 1.6 BCF from the sandstones between 9870 and 10,920 feet. The Personville N (Cotton Valley Sd) field has produced 193 MMCF from sandstones between 9600 and 9840 feet.

Mitchell does not operate wells in the fourth field in the proposed field consolidation. Valence operates the only well in the Personville, N. (Bossier Sand) Field, the Schultz "E" Lease Well No. 2, which has reported production of 94 MMCF. The Personville, N. (Bossier Sand) Field was discovered in 1992 and is under Statewide Rules. The productive interval is between 10,480 and 10,588 feet. Mitchell has included this field in the requested field consolidation because the productive interval in the Personville, N. (Bossier Sand) Field is entirely within that of the Personville N (CV Sd, Lwr) Field.

The Personville N (Cotton Valley Lm) Field has 177 producing and 12 shut-in wells, and cumulative production of 318.58 BCF. The field was discovered in 1968 and its designated interval now extends from 11,218 to 11,432 feet. The original field rules specified 640 acre density, and 63 wells were drilled on pooled units of approximately 640 acres. The estimated drainage areas of these wells were as high as 700 acres but most were less than 300 acres. When infill units of 320 acres were added to the field rules, another 45 wells were drilled. Most of these wells found incremental production but only six had estimated drainage areas over 200 acres. When the rules were amended to allow 160-acre optional units, a further 58 wells were drilled and 33 of these have estimated drainage areas of less than 80 acres.

Mitchell has recently drilled 14 wells in the Cotton Valley limestone under Rule 38 exceptions. One of these has an estimated drainage area of 209 acres, but the rest will drain from 26 to 95 acres. The IP from these wells ranged from 361 to 2700 MCF per day and their estimated

ultimate recoveries range from 234 to 3,356 MMCF. Analysis of three units where Rule 38 exception wells were drilled indicated that an additional well may add 1 to 2 BCF to a unit's expected ultimate unit recovery.

Mitchell has cored the complete geologic column in the Cotton Valley limestone and developed an extensive geologic model which will allow infill wells to be located where in the most favorable depositional environments. In general, the Cotton Valley limestones were deposited in offshore shoals and lagoons between the shoals and coastline. Five distinct cycles of shoal development indicate a gradual transgression of the seas inland. The productive Cotton Valley limestone was eventually capped by the deposition of the deeper marine Bossier shales.

Porosity developed in the shoals and channels where tidal and wave action concentrated the coarser-grained material. Some of the porosity lenses extend for a mile or so but most are much more localized. New infill wells usually encounter previously untapped lenses as well as more extensive lenses that have been partially depleted. Multiple faults contemporaneous with deposition have resulted in a much thicker overall productive interval on the eastern, or down-dip, edge of this long north-south monocline.

Mitchell made extensive studies of scaling that might result from commingling the water from the various fields to be consolidated. The combined water was less likely to form scale than water from the Cotton Valley limestone alone.

Mitchell has requested well spacing of 467-1200 feet to aid in locating wells between faults. This area of East Texas also features numerous small leases that have been pooled into irregularly-shaped units. Smaller than standard spacing will facilitate the location of infill wells on such units.

Mitchell intends to use the log of its Muse-Duke Lease Well No. 1 to describe the producing interval in the consolidated field. The top of the proposed designated interval (9538 feet) is the top of the Cotton Valley sandstone and the base (11,432 feet) is the bottom of the underlying Cotton Valley limestone (which is also the top of the Buckner Formation). Because of the multiple reservoirs included within the proposed designated interval, a two factor allocation formula is necessary.

The allocation formula for the Personville N (Cotton Valley Lm) is based 95% on acreage and 5% on deliverability. Mitchell is requesting the same allocation formula for the consolidated field. At present, the allocation formulae are suspended for all of the multi-well fields in the proposed consolidation and Mitchell expects that the one adopted for the Personville, N. (CV Consolidated) Field will also be suspended.

FINDINGS OF FACT

1. Notice of this hearing was given to all operators of wells in the fields to be consolidated on May 18, 2000.
2. The following fields can be produced economically, and without causing waste, if consolidated into a single field:

<u>FIELD</u>	<u>FIELD NUMBER</u>
Personville, N. (Bossier Sand)	70794 400
Personville N (Cotton Valley Lm)	70794 500
Personville N (Cotton Valley Sd)	70794 510
Personville N (CV Sd, Lwr)	70794 490

3. The field rules for the Personville N (Cotton Valley Lm) Field, adopted under Final Order No. 5-69,899, effective September 1, 1983, will no longer be applicable if this field is consolidated into the new field, the Personville, N. (CV Consolidated) Field.
4. The Cotton Valley limestone reservoirs were first developed in 1968, and the overlying Cotton Valley sandstone fields have discovery dates from the 1990's.
5. The Personville N (Cotton Valley Lm) Field has been very successful, with 177 active wells and cumulative production of 318.58 BCF.
6. Density rules for the Personville N (Cotton Valley Lm) Field began at 640 acres and when optional units of 320 acres and then 160 acres were added, infill wells encountered new reserves.
7. Several Rule 38 exception wells on 80-acre density have been drilled and most of these have found incremental recovery.
 - a. The initial deliverabilities of 14 such infill wells ranged from 361 to 2700 MCF per day.
 - b. The calculated ultimate recoveries of these infill wells ranges from 234 to 3356 MMCF and the estimated drainage areas ranges from 26 to 209 acres.
 - c. The bottom-hole pressure from these wells ranged from 3900 to 6400 psi.
 - d. Three units, already developed on 160 acre density, showed significant incremental production resulting from drilling Rule 38 exception wells.
8. The Cotton Valley limestones produce from porosity lenses deposited on shoals and along tidal channels where coarser-grained particles accumulated.
9. Some porous lenses extend across 640 acres, as indicated by pressure depletion between adjacent units, and some wells can be expected to drain 640 acres.
10. Many other porous lenses have limited areal extent and infill wells encounter new undrained compartments.
11. Well spacing of 467-1200 feet will facilitate the drilling of successful infill wells.
 - a. The stratigraphy is very complex and infill wells will be located to encounter the

depositional environments that have greatest potential.

- b. There is extensive faulting throughout the field and infill wells must be carefully located to avoid the faults.
 - c. The field has been developed by combining numerous small leases into larger, irregularly shaped units that have few regular locations available for infill drilling.
12. The overlying Cotton Valley sandstones are more unpredictable than the limestones and the average recovery of 250 MMCF from Cotton Valley sandstone wells will not support the drilling of wells just for the Cotton Valley sandstone.
 13. The designated interval between 9538 feet and 11,432 feet as shown on the log of the Mitchell Muse-Duke Lease, Well No. 1 covers the entire productive Cotton Valley Formation.
 14. As this designated interval includes multiple, stratigraphic reservoirs both within and between the Cotton Valley sandstones and limestones, a two factor allocation is required for statutory reasons.
 15. Allocation based 95% on acreage and 5% on deliverability will protect correlative rights and satisfy statutory requirements.
 16. Studies of possible scaling due to downhole commingling of production from the Cotton Valley sandstones and Cotton Valley limestones indicate that fluids from these two intervals can be combined safely.
 17. The producing interval in the Personville, N. (Bossier Sand) Field is within the producing interval of the Personville N (CV Sd, Lwr) Field.

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. Consolidation of the requested fields will prevent waste and protect correlative rights, while encouraging conservation.
4. Mitchell has standing to request consolidation of the Personville, N. (Bossier Sand) Field with other fields as it operates wells producing from the same stratigraphic interval.
5. The requested field rules for the resultant field, the Personville, N. (CV Consolidated) Field,

will prevent waste, protect correlative rights within the field, and satisfy statutory requirements.

EXAMINER'S RECOMMENDATION

Based on the above findings and conclusions, the examiner recommends that the Personville, N. (Bossier Sand); Personville N (CV Sd, Lwr); Personville N (Cotton Valley Sd); and Personville N (Cotton Valley Lm) Fields be consolidated into a new field to be known as the Personville, N. (CV Consolidated) Field. The field rules proposed for the resultant Personville, N. (CV Consolidated) Field should be adopted.

Respectfully submitted,

Margaret Allen
Technical Hearings Examiner

Date of Commission Action: June 22, 2000

Exhibits

1. Base map
2. Type log
3. Structure map
4. Depositional model of limestones
5. Cross section across northern study area
6. Cross section across central study area
7. Cross section across southern study area
8. Map of wells producing from sandstones
9. Cross section of CV sandstone wells
10. Model of sandstone deposition
11. Proration schedules
12. Reservoir data sheet for CV lime field
13. Reservoir data sheet for CV sand, lower field
14. Reservoir data sheet for CV (upper) sand field
15. Reservoir data sheet for Bossier sand field
16. Wells tested for water compatibility
17. Water analyses
18. Compatibility test results
19. Rule 10 exception
20. Rate vs Cum graph in northern Rule 38 study area
21. Rate vs Cum graph in central Rule 38 study area
22. Rate vs Cum graph in southern Rule 38 study area
23. Histogram of wells on 640 acres
24. Histogram of wells on 320 acres
25. Histogram of wells on 160 acres
26. Pressure history
27. Histogram of Rule 38 drainage areas
28. Cumulative production from sandstone wells