
APPLICATION OF ZACHRY EXPLORATION, INC. TO CONSIDER AN EXCEPTION TO STATEWIDE RULE 37 FOR THE THOMAS HEIRS LEASE, WELL NO. 1, CHESTERVILLE (6600) FIELD, COLORADO COUNTY, TEXAS

APPEARANCES:

APPLICANT -

Mickey Olmstead, Attorney
Tim Hildebrand, President & Geophysicist
Michael Clemenson, Consultant & Petroleum Geologist
Peter Bommer, Petroleum Engineer

Zachry Exploration, Inc.
Zachry Exploration, Inc.
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PROTESTANT -

David Nelson, Attorney
David Fenton, Geophysicist

Samson Lone Star LP
Samson Lone Star LP

PROCEDURAL HISTORY

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Notice of Hearing:
Hearing Held:
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Scott Petry, Hearings Examiner
Mark Helmueller, Hearings Examiner
Donna Chandler, P.E., Technical Examiner

STATEMENT OF THE CASE

Zachry Exploration, Inc. ("Zachry" or "applicant") seeks an exception to Statewide Rule 37 to drill its proposed Well No. 1 on the Thomas Heirs Lease for the Chesterville (6600) Field ("subject field"). The application is protested by Samson Lone Star LP ("Samson" or "protestant"), the operator of the offsetting 3234.12 acre Samson Chesterville Unit lease immediately to the northwest, north, and northeast of the applicant's lease. The Chesterville (6600) Field is a gas field governed by statewide rules mandating spacing of 467 feet from lease lines and 1200 feet between wells, with 40 acre density.

The proposed location is in the northern corner of the lease and is only 102' from the northeastern lease line and 120' from the northwestern lease line. Accordingly, an exception to Statewide Rule 37 is necessary to authorize drilling at the proposed location. The Thomas Heirs Lease contains 40.29 contiguous acres and the proposed well would be the only well on the lease producing from the Chesterville (6600) Field. Accordingly, no exception to the between well spacing requirements of Statewide Rule 37 or the density provisions of Statewide Rule 38 is necessary.

BACKGROUND

The protestant, Samson, holds a lease to the northeast, north and northwest of the applicant's Thomas Heirs Lease. The subject field is a depletion drive reservoir with significant structural features. The subject field has only one currently producing well, Samson's Chesterville Well No. 15, and this well has produced over 486.3 million cubic feet as of January 31, 2002. The applicant, Zachry, estimates the total recoverable reserves in the subject field to be approximately 5.8 billion cubic feet.

The prospect for the subject field was put together by the applicant in conjunction with the protestant, Samson. Therefore, the data involved in the field analyses of both parties came from the same seismic study. According to the protestant, the decision to grant or deny the requested Rule 37 application hinges largely on a "difference of opinion when it comes to interpreting seismic data".¹

DISCUSSION OF THE EVIDENCE

Seismic imaging is the process of defining a subsurface structure through "...measuring the reflection, refraction, and velocity of shock waves created by explosive charges set off in holes in the

¹Protestant's opening statement, transcript, page 11, line 15-17.

earth.”² Three-dimensional seismic imaging includes various aspects, such as the extrapolation of traditional two-dimensional imaging to form a three-dimensional model that aids in the study and analysis of a given formation.³ The use of three-dimensional (“3-D”) seismic exploration has been described as “the preeminent method of mineral exploration currently employed in the industry”⁴ and geophysicists who interpret this data are considered an integral part of an exploration team. Indeed, “in most cases today, it would be unthinkable to exclude geophysicists.”⁵

3-D seismic imaging is important in this analysis of the Rule 37 application because each party stressed the importance of its interpretation of the seismic data. Whether Zachry is able to recover its fair share of minerals under its tract from regular locations or whether Zachry’s proposed irregular location is reasonable are both, in large part, contingent on the determination of the more “correct” 3-D seismic analysis. While the applicant stressed that 3-D seismic had to be correlated with traditional well logs and other data, the protestant stressed that the 3-D seismic data alone was enough to show that the applicant could drill its well in a regular location.

I. THE APPLICANT'S EVIDENCE AND POSITION

The applicant, Zachry, is seeking an exception to Statewide Rule 37 based on confiscation. As support for this exception, Zachry submitted twenty-three exhibits and tendered three expert witnesses to show that it would not be able to recover its fair share of the minerals in a location that is regular to its lease lines. The three witnesses included the president of Zachry, Tim Hildebrand, the petroleum engineer for Zachry, Peter Bommer, and the consultant for Zachry, Michael Clemenson. Zachry put forth a set of exhibits with each witness and asserted that the exhibits clearly showed that the requested irregular location was reasonable and necessary to recover its fair share of hydrocarbons.

The applicant contends that its need for a well at the requested exception location is supported by its 3-D seismic interpretation for the Chesterville (6600) Field. Furthermore, Zachry submitted evidence establishing that its 3-D seismic interpretation was supported by traditional geological and engineering analyses.

² *Musser Davis Land Co. v. Union Pacific Resources*, 201 F.3d 561, 566 (5th Circ.2000), *citing* Eugene Kuntz, A Treatise on the Law of Oil and Gas, § 12.7 (1987).

³ Owen L. Anderson, *Geophysical “Trespass” Revisited*, 5 TEX. WESLEYAN L. REV. 137, 138 (1999).

⁴ Owen L. Anderson and John D. Pigott, *3D Seismic Technology: Its Uses, Limits, & Legal Ramifications*, 42 ROCKY MTN. MIN. L. INST. § 16.01 (1996).

⁵ *Id.*

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1. Seismic analyses and accompanying data

Mr. Hildebrand's analysis of the situation included several 3-D seismic printouts, including one marked "Yegua Anderson Sand Amplitude" and one that was a closeup view of the subject area. See *Appendix 1*. These 3-D seismic images included a color coded printout ranging from white for an amplitude of -16986 to black for an amplitude of 6114. According to Zachry, this printout clearly shows the areas that are more prone to productive reservoirs. For instance, Hildebrand noted that finding gas in an area depicted on *Appendix 1* as a clear "red" has a "100%" chance of success, whereas finding gas in an area that is a clear "blue" will almost certainly result in a dry hole. This sliding scale of color is supposed to indicate which areas are able to effectively produce and which ones are not. The colors themselves have to be taken in context with the amplitudes they represent.

The point of contention in this docket can be seen in the applicant's closeup seismic image. The proposed irregular location is in the square, or "bin", that is depicted as clear red on *Appendix 1* (a bin or square is scaled approximately 110' in length). The next bin south, towards a more regular location, is a greenish red. According to the applicant, the difference between a clear red square and a clear blue square is the difference between a productive well and a dry hole. It is argued that a regular location would have to be placed in a light blue square, which Hildebrand states has a "zero percent" chance of a commercial well.

Additional exhibits put forth by Zachry included charts of the seismic amplitudes in graphical scale, 3-D seismic lines along the cross section for comparisons of sands, and traditional two-dimensional well logs for the surrounding wells. Hildebrand testified that he had extensive experience in the Yegua sands, that he had drilled between thirty and forty wells in the Yegua sands, and that the use of well controls such as well logs and trough comparisons in the cross sections of the sands provided for more accurate geophysical data and, thus, a more accurate reading of the subsurface structure.

Zachry contends that it integrated "hundreds" of logs into this analysis and the results showed that their proposed well site was the least irregular location capable of recovering their fair share of the hydrocarbons. According to Zachry, their analysis used:

a comprehensive integration of all the subsurface geology, all these well logs, and those logs are ... actual hard data that is - - it is indisputable. So the first thing you have to rely on is your well control. You use that well control and make your seismic fit that well control. You can't take your seismic and try and make that fit the well control...the well control is real, the seismic is the next best set of data but it is not as good data as

the well control.⁶

Put another way, the applicant stated that 3-D seismic imaging must be correlated with known subsurface structures and should not be used as a stand alone procedure. Zachry's position is that their evidence is inherently more reliable because the 3-D is taken in conjunction with traditional well controls.

2. Geological Analysis Using Structure and Isopach Maps

The second witness, Michael Clemenson, is a consultant for Zachry and testified that he also correlated the well logs to the 3-D seismic readings. Mr. Clemenson sponsored several exhibits that showed a comparison of the logs for wells on the Samson lease. These exhibits indicated that pushing the well location any further south than the requested location would deprive the applicant of a productive well. To support this, a subsurface structure map was introduced which was contoured according to the well correlations of the "top of the Yegua 6600 sand in all the various wells."

When correlated with the 20 to 25 wells on the structure map, Clemenson testified that pushing the requested well location any further south would cause the well to encounter the reservoir below the gas-water contact. In addition to the structure map, Zachry introduced an isopach map with overlays that allegedly showed that the productive sands were stratigraphically pushed into "channels" and formed a crevasse environment. The isopach map shows that, by pushing the requested location any further south, the well would approach the zero limit of the sand. Summing up his testimony, Clemenson stated that it was his expert opinion that "at a regular location I believe you would drill a dry hole."

3. Petroleum Engineering Analysis

The third witness, Peter Bommer is a petroleum engineer with Zachry Exploration and was tendered as an expert witness in reservoir engineering. Zachry's counsel and Mr. Bommer discussed two exhibits that showed production for Samson's Chesterville No. 15 and how that information was incorporated into the reservoir engineering calculations. Mr. Bommer's role was to estimate the amount of gas that was recoverable under the applicant's lease.

Using petrophysical calculations from the Chesterville No. 15 and correlating them to the data for Zachry's Thomas Heirs Lease acreage calculations, Zachry estimated that there was approximately 6.1 billion cubic feet of gas in the reservoir at original conditions, with 5.8 billion cubic feet of that

⁶ Testimony of Tim Hildrebrand, transcript, page 30, line 9 - 24.

amount recoverable. More specifically, Zachry estimated that there was 115.7 million cubic feet of gas that was recoverable under its tract. Zachry also determined that Samson's Chesterville No. 15 well would be capable of draining the entire reservoir with a drainage radius of 3500 or 4000 feet, including any reserves underlying Zachry's lease.

II. PROTESTANT SAMSON'S EVIDENCE AND POSITION

Samson did not contest the presence of the Chesterville (6600) Field underlying the applicant's Thomas Heirs Lease. It did, however, contest whether a productive well could be drilled at a regular location. To support this assertion, Samson submitted two exhibits and tendered one expert witness to show that Zachry is able to recover its fair share of the minerals in a location that is regular to the lease lines. The only witness was David Fenton, a geophysicist with Samson.

Samson's first exhibit was a 3-D seismic image map for the area in question and was titled "CU #15 Amplitude and Time Structure Map." *See Appendix 2.* According to Samson, its map is based on the same information that was used by Zachry and shows a difference of opinion over interpretation, not in the raw data. The 3-D seismic map included a color coded printout ranging from black for an amplitude of 1000 to red for an amplitude of 7800 and above.

The red color code on Samson's map represented anything that was considered twice the background amplitude, with all the other colors representing something "less than two times background amplitude."⁷ Samson acknowledged that the red amplitude shows that there is the opportunity for gas in that interval, but that there are many things which could affect amplitude, including sand thickness, sand porosity, and "anything that changes the velocity or density of the rock."⁸

Samson asserted that the discrepancy between its map and the maps submitted by Zachry probably stemmed from two factors. The first factor is that each party used different interpretation software. The second factor is that Samson used "peak", or more positive, amplitudes while Zachry used the "trough", or more negative, amplitudes. Mr. Fenton went on to state, however, that the difference between using a peak or a trough did not really change the interpretation and that the peaks and troughs actually mirrored each other.

⁷ Testimony of David Fenton, transcript, page 140, lines 18-20.

⁸ Testimony of David Fenton, transcript, page 142, lines 1-5.

The second exhibit submitted by Samson is actually an addition to the first exhibit. Marked as Line A, it is an arbitrary line superimposed on Samson's 3-D seismic map. The line was placed in that particular location by Mr. Fenton to correlate an amplitude "event" with the legal location that was available to Zachry. It was Mr. Fenton's testimony that a well could be drilled at a regular location and still have the opportunity to be productive, but that he could not be certain that a productive well could be drilled at that location.

III. APPLICANT ZACHRY'S REBUTTAL

The major thrust of Zachry's rebuttal involved the discrepancy between the maps of the applicant and the map of the protestant. To rebut doubts the protestant's map may have raised, Zachry introduced a different view of their first 3-D seismic map.

Regarding the differences of mapping according to peaks rather than troughs, Zachry submitted a 3-D seismic map of their own that was plotted according to the peaks. According to Mr. Hildebrand, the result was a picture that was very similar to Zachry's trough interpretation. Therefore, the use of peaks versus troughs did not result in any appreciable difference in the mapping. This, according to the witness, led them to question where the additional differences came from and why so much of the protestant's map was "red" (and presumably productive).

The applicant then turned to the data that was used by the parties. Zachry argued that, while it was true that the parties used the same raw data, Samson had apparently modified it to give a different picture. Specifically, Samson limited its maximum peak amplitude to a value of 7,800, whereas Zachry's maximum peak amplitude was a value of 17,355. So, when Zachry adjusted their map, changed the color code, and gave everything above a value of 7,800 a red color, the end result was an exhibit that was very similar to the map presented by Samson.

The problem with this, according to Zachry, is that placing a maximum peak value at something as low as 7800 destroys the contrast that is needed to make an accurate assessment as to where a productive well should be located. By cutting down the amplitude range, it was argued, one would destroy any contrast or capability to show just how distinct the amplitudes are.

To elaborate this point, Zachry examined the location of Samson's Chesterville No. 15. According to Samson's 3-D seismic map, the location of the Chesterville No. 15 appears to be random, as the well is located in the middle of a large section of red. Zachry's structure map, however, shows that the location of the Chesterville No. 15 is actually at one of the highest structural positions. The basis of the location of Well No. 15 is only evident when one examines the wider amplitude 3-D seismic map

in conjunction with traditional fixed geological data.

EXAMINERS' OPINION

Exceptions to Statewide Rule 37 may be granted to prevent waste or to protect correlative rights and prevent confiscation. Zachry's application, however, is based solely on the protection of correlative rights. To obtain an exception to Statewide Rule 37 based on correlative rights, the applicant must show that: 1) it is not possible to recover its fair share of minerals under its tract from regular locations; and, 2) that the proposed irregular location is reasonable. A mineral interest owner's fair share is measured by the currently recoverable reserves under its property.

At the beginning of the hearing, the protestant's counsel stated that the hearing would deal primarily with differences of opinion regarding seismic data. Indeed, the protestant did not even dispute that the applicant had reserves under its lease or that it was entitled to recover them. Zachry's estimate of currently recoverable reserves of 115.7 million cubic feet under its lease and its assertion that Samson's existing well would drain those reserves were not contested by the protestant. What was contested was whether a regular location would allow Zachry its fair chance to recover the oil and gas or their equivalents in kind.

To be granted a Rule 37 exception, it is incumbent upon Zachry to show that the proposed exception location is reasonable. In this situation, showing that it is not possible to recover its fair share of minerals under its tract from regular locations and that the proposed irregular location is reasonable are intertwined. It was Zachry's argument that their 3-D seismic showed that the requested Rule 37 location was the only reasonable location that would not result in a "dry hole" and that this location was necessary to recover their fair share of reserves. They further argued that this location would not affect the drainage of the protestant's currently producing wells. Samson's argument, on the other hand, was that this Rule 37 is not necessary and that the burden is on the applicant to show that the proposed location is indeed necessary to recover its fair share of reserves.

Viewing the evidence in its totality, it is the examiners' opinion that the applicant's burden has been met. Three-dimensional seismic imaging is an important tool in analyzing potentially productive intervals, but it is just that - a tool. The differences in interpreting the raw data in this case clearly illustrate the discrepancies that may occur through the use of different software packages and different systems. Given these discrepancies, a more reliable interpretation is one that is based on additional fixed data that can be correlated with the 3-D seismic, rather than one based on the 3-D seismic alone.

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It is the examiners' opinion that Zachry's analysis is inherently more reliable because: 1) it included a wider amplitude range and was, thus, more inclusive of the structural differences, and 2) it correlated the 3-D seismic with fixed points of information obtained from traditional well logs. Correlating the 3-D seismic with wells that were considered "dry holes", and that exhibited similar color characteristics with a regular location on the Thomas Heirs Lease, reinforced the concept that the location was reasonable and that to require the operator to drill at a regular location would be to require them to drill a dry hole and then to re-apply for another Rule 37 exception. To put it another way, Zachry's analysis took in "the big picture" and used the 3-D seismic as part of an overall analysis that included various aspects of subsurface geology. Samson's analysis was not as encompassing and focused primarily on the use of the 3-D seismic imaging.

Zachry Exploration has established entitlement to an exception to Rule 37 to prevent confiscation of hydrocarbons underlying its lease. In support of its application, Zachry provided an unrebutted calculation of current reserves underlying the Thomas Heirs Lease and established that it would be drilling the first well on the lease. Finally, through its scientific data and witness testimony, the applicant showed that the proposed irregular location is a reasonable location given the structural design of the underlying reservoir. Accordingly, Zachry's application for an exception to Rule 37 to prevent confiscation should be granted.

Therefore, the examiners recommend adoption of the following proposed findings of fact and conclusions of law:

FINDINGS OF FACT

1. At least 10 days notice of this hearing was given to the designated operator, all lessees of record for tracts that have no designated operator, and all owners of record of unleased mineral interests for each affected adjacent tract.
2. Zachry Exploration, Inc. ("applicant") has applied on a Form W-1 for a permit to drill Well No. 1 on the Thomas Heirs Lease. Applicant proposes to drill its well at a location in the northern corner of the lease, which is 102' from the northeastern lease line and 120' from the northwestern lease line, in Colorado County, Texas. Applicant has applied to drill its proposed well for the Chesterville (6600) Field ("subject field").
3. The subject field is governed by statewide rules requiring spacing of 467 feet from lease lines and 1200 feet between wells. The field rules further specify a density pattern of 40 acres per well.

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4. Applicant's Thomas Heirs Lease is a tract containing 40.29 acres.
5. The currently recoverable reserves under applicant's Thomas Heirs Lease in the Chesterville (6600) Field cannot be recovered by a regularly located well on the lease.
 - a. There are approximately 115.7 million cubic feet of recoverable gas in the Chesterville (6600) Field underlying the applicant's Thomas Heirs Lease.
 - b. Moving the subject well location further south to a regular location will result in the well encountering the reservoir below the gas-water contact.
 - c. Moving the subject well location further south to a regular location will result in the well approaching the zero limit of the productive sand and the applicant will recover less than their estimated reserves of 115.7 million cubic feet of gas .
6. The applied-for location is necessary to allow applicant a reasonable opportunity to recover the currently recoverable reserves under its Thomas Heirs Lease and is as far away from the protestant's lease line as possible while still allowing the applicant to recover its share of hydrocarbons.

CONCLUSIONS OF LAW

1. Proper notice of hearing was timely given to all persons legally entitled to notice.
2. All things have occurred or have been done that are necessary to give the Commission jurisdiction to decide this matter.
3. An exception pursuant to Statewide Rule 37 to the Chesterville (6600) Field rules regarding well spacing is necessary to permit drilling the applied-for well.
4. Approval of the requested permit to drill a well at the proposed location is necessary to give the holders of the Thomas Heirs Lease a reasonable opportunity to recover their fair share of hydrocarbons underlying the Thomas Heirs Lease from the Chesterville (6600) Field.
5. Approval of the requested permit to drill a well at the proposed location is necessary to protect correlative rights in the subject field.
6. The applied-for location is reasonable.

RECOMMENDATION

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The examiners recommend that the subject application be granted in accordance with the attached final order.

Respectfully submitted,

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