



RAILROAD COMMISSION OF TEXAS

HEARINGS DIVISION

PROPOSAL FOR DECISION

RULE 37 CASE NO. 0276999

STATUS NO. 742691

District 05

APPLICATION OF XTO ENERGY, INC. FOR A RULE 37 EXCEPTION FOR THE EDEN
SOUTHEAST UNIT, WELL NO. 4H, NEWARK, EAST (BARNETT SHALE) FIELD,
TARRANT COUNTY, TEXAS

APPEARANCES:

FOR APPLICANT:

David Gross, Attorney at Law
Rick Johnston, Consulting Engineer
Keith Sawyer, Landman, XTO Energy, Inc.

APPLICANT:

XTO Energy, Inc.

FOR PROTESTANT:

Caroline McClimon, Attorney at Law

PROTESTANT:

Daniel and Rebecca Thai
Richard Turner

PROCEDURAL HISTORY

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| DATE APPLICATION FILED: | June 12, 2012 |
| DATE OF NOTICE OF HEARING: | August 7, 2012 |
| DATE OF HEARING: | August 23, 2012 |
| DATE TRANSCRIPT RECEIVED: | October 3, 2012 |
| RECORD RE-OPENED: | October 10, 2012 |
| RECORD CLOSED: | November 9, 2012 |
| HEARD BY: | Terry J. Johnson, Hearings Examiner Brian Fancher, Technical Examiner |

CASE SUMMARY

XTO Energy, Inc. seeks a Rule 37 permit to drill a horizontal well on its Eden Southeast Unit, which encompasses 1176 residential tracts. The perforated interval of Well No. 4H lies 121 feet from the tract owned by Protestants Daniel and Rebecca Thai and 27 feet from the tract owned by Protestant Richard Turner. Field rules require lease-line spacing of 330 feet. The well will be completed at a vertical depth of over 8,000 feet.

Protestants have declined multiple lease offers made by XTO.

A preponderance of the record evidence demonstrates that approval of the applications is necessary to prevent confiscation and protect correlative rights.

APPLICANT'S CASE

The Eden Southeast Unit

Located within the City of Arlington, XTO's Eden Southeast Unit (Eden Unit or Unit) is a rectangle with the longer sides oriented north to south.¹ The Unit encloses 322.375 acres, with 305.182 net mineral acres—94.6 percent—under lease to XTO. Although a sizable number of tracts in the Unit are partially leased, only six are wholly unleased.

Forty-nine percent of the mineral estate in the southern three-quarters of the Eden Unit is held by the Green Heirs, whose interest is under lease to XTO. Protestants' tracts are both within the Green Heirs zone. Consequently, Mr. and Mrs. Thai's 51 percent mineral estate in their 0.269-acre tract amounts to 0.13179 net mineral acres. Mr. Turner's 0.202-acre tract represents 0.10302 net mineral acres.

The perforated interval of Well No. 4H lies 121 feet from the Thai tract and 27 feet from the Turner tract. The well requires a Rule 37 exception because field rules call for lease-line spacing of 330 feet. The well will be completed at a vertical depth of approximately 8,000 feet.

XTO began leasing the area in 2007. Current market terms are \$500.00 per acre, with a three-year primary term and a 25% royalty. The Thais and Mr. Turner have rejected a lately-offered bonus that amounted to \$6500.00 per net mineral acre.

Petroleum engineer Rick Johnston, XTO's expert witness, testified that XTO plans to develop the Eden Unit with a total of four horizontal wells, all targeted for the upper-third

¹ Attached as Appendix A is the Eden Southeast Unit well location plat.

of the Barnett Shale and avoiding the water-intensive Ellenburger formation immediately below. There is one XTO well, No. 1H, already producing gas from beneath the Unit. A drilling permit for Well No. 2H, which will require a Rule 37 exception, was issued on November 15, 2012. Well No. 3H was permitted on November 17, 2012 and has since gained an unopposed Rule 37 exception. The four wells will run parallel north-to-south and lie approximately 450 feet apart, evenly occupying the Barnett Shale acreage of the Unit.

Mr. Johnston also testified that, in light of the underlying geology, a vertical well would not make commercial sense. "I did not identify a single vertical well that's been drilled within five miles of this unit," he stated. And, after evaluating all producing wells within a five-mile radius, Mr. Johnston concluded, "[. . .] the only way to develop this unit is with horizontal wells." A Rule 37 exception for Well No. 4H is necessary because, even with nearly 95 percent of the minerals under lease, there is no regular-location bore path for a horizontal well in that portion of the Eden Unit.

Underlying Reserves

Mr. Johnston analyzed stratigraphic cross-section logs for four vertical pilot wells to determine the probable thickness of the Barnett Shale beneath the Eden Unit. These pilot wells form a line running northwest to southeast within a five-mile radius of the terminus of the currently-producing Well No. 1H.

The Chesapeake Bruder No. 1H (Pilot), located on the northwestern edge of the five-mile radius encountered the top of the Barnett Shale at a depth of approximately 8250 feet and the top of the Ellenburger at 8610. The Harding MTX No. 1H (Pilot), approximately 7500 feet to the southeast of the Eden Unit No. 1H, found the Barnett Shale at 8250 and the Ellenburger at 8560. Another 6000 to the southeast, the Hollis-Sullivan Sandy's Dream No. 1H (Pilot) penetrated the Barnett Shale at 8380, the Ellenburger at 8720. And 10,000 feet farther to the southeast, the XTO Mira Lagos No. 3H (Pilot) found the top of the Barnett Shale at 8320, with the Ellenburger at 8670.

Based on these logs, Mr. Johnston estimated the average thickness of the Barnett Shale beneath the Eden Unit to be approximately 330 feet.

Mr. Johnston sponsored an exhibit showing that the Barnett Shale under Tarrant County has an average formation thickness of 433 feet which holds some 139 billion cubic feet (BCF) of gas per square mile. Adjusting this benchmark for the Eden Unit's acreage and formation thickness, Mr. Johnston estimated the original gas in place beneath the Unit to

be 50.5 billion cubic feet (50.5 BCF). Applying what he characterized as a mid-range Barnett Shale recovery factor of 40 percent, Mr. Johnston calculated that there are recoverable gas reserves underlying the Eden Unit in the amount of 20.2 BCF.²

Estimated Ultimate Recovery and Drainhole Length

To illustrate the relationship between horizontal drainhole length and the reasonably estimated ultimate gas recovery (EUR) for wells in this region of the Barnett Shale, Mr. Johnston conducted a study of all wells completed in the formation within a five-mile radius of Well No. 1H.³ Identifying 175 productive wells within that radius, the study analyzed the cumulative gas production, drainhole-length and decline curve data for each identified well.⁴

Mr. Johnston's study amalgamates this information and, using a least-squares regression analysis, averages the data into a linear graph that expresses the EUR of the study wells in terms of perforated drainhole length, projecting the amount of additional gas that would be produced over the lifetime of the well for each added foot of drainhole. Mr. Johnston described the results of the study.

[. . .] as you increase the completed drainhole length of a well out here, you're going to recover .5326 million cubic feet of gas for each additional foot of drainhole.

[...]

An additional 1,000 feet [of drainhole], you're going to add 532 million cubic feet of gas to the ultimate recovery of the well.

Accordingly, Well No. 2H, with an estimated drainhole length (EDL) of 3889 feet, would produce an estimated 2.45 BCF of gas over its lifetime. Well No. 3H, with an EDL of 4,178 feet, will recover a lifetime total 2.6 BCF of gas. A rule 37 exception for Well No. 4H, with 3,870 feet of EDL will allow production of an estimated 2.44 BCF of gas over its life. Finally, based on its performance to date, Well No. 1H is estimated to produce a lifetime total of 4.4 BCF of gas. In other words, even with a Rule 37 exception for Well No. 4H, the aggregated lifetime total recovery for all four XTO wells in the Eden Unit is reasonably

² The recovery factor Mr. Johnston relies on is based on the Barnett Shale recovery factor of record in Docket No. 09-0242843 [Final Order Amending the Field Rules for the Newark, East (Barnett Shale) Field, July 11, 2005]. His testimony was unchallenged by Protestant.

³ Wells with no reported production were excluded from the study.

⁴ A decline curve projects the rate at which well pressure, and thus gas production, will decrease over time, and provides an estimate of the amount of gas that the well will ultimately produce over its economic life.

estimated to be 11.9 BCF of the 20.2 BCF of recoverable gas reserves beneath the Eden Unit.

PROTESTANT'S CASE

Protestants briefly cross-examined Mr. Johnston but offered no independent testimony or exhibits to contradict XTO's case.

OPINION AND RECOMMENDATION

Under Texas law, the mineral estate owner has a right to a fair and reasonable chance to recover the oil and gas under his property.⁵ This right is not unconditional, however, but subordinate to the conservation authority of the Railroad Commission.⁶ Under that authority, the Commission has adopted rules governing the spacing of gas wells in the Newark, East (Barnett Shale) Field in Tarrant County.⁷

These rules require that a horizontal wellbore remain at least 330 feet away from any unleased tract. The Commission, however, has the authority to grant a Rule 37 exception to this requirement where it is necessary to prevent waste or confiscation of hydrocarbons.⁸ A Rule 37 exception based on confiscation requires a showing that the proposed location is reasonable and that a regular location will not provide a reasonable chance to recover a fair share of the hydrocarbons in place beneath the mineral estate.

In the opinion of the Examiners, XTO has demonstrated that a Rule 37 lease-line spacing exception for the Eden Southeast Unit Well No. 4H is necessary to prevent confiscation and protect correlative rights.

XTO's development of the Eden Unit employs four parallel wellbores, each running the length of the Unit. These wells are evenly spaced approximately 450 feet apart and are positioned to maximize access to the full subsurface interval while minimizing the possibility of inter-well interference. The record evidence demonstrates that there is no regular location for a fourth well on the Eden Unit that will offer XTO a fair and reasonable chance to recover the hydrocarbons beneath the Unit. In the Examiners' opinion, the proposed location of Well No. 4H is reasonable.

There are an estimated 20.2 BCF of recoverable reserves beneath the Eden Unit, an amount that represents the mineral estate's fair share of the 50.5 BCF original gas in place. The record supports the conclusion that the other three wells on the Unit--No. 1H, No. 2H and No. 3H--are likely to produce a lifetime total of 9.46 BCF from these reserves.

⁵ *Gulf Land Co. v. Atlantic Refining Co.*, 131 S.W.2d 73, 80 (Tex. 1939); *Imperial American Resources Fund, Inc. v. Railroad Commission of Texas*, 557 S.W.2d 280, 286 (Tex. 1977)

⁶ Natural Resources Code § 81.051

⁷ Docket No. 09-0242843 [Final Order Amending the Field Rules for the Newark, East (Barnett Shale) Field, July 11, 2005]

⁸ Field Rules for the Newark, East (Barnett Shale) Field, Rule 2

Without the applied-for Rule 37 exception, the unleased interests of the 15 tracts within 330 feet of Well No. 4H constitute a 3,750-foot no-perforation zone on a 3,870-foot drainhole. This would leave the well with a 120-foot perforated interval that is unable to reach an otherwise recoverable 1.997 BCF of gas. With a Rule 37 exception, Well No. 4H is reasonably estimated to produce a lifetime total of 2.44 BCF of gas, some 2 BCF more than without an exception.

In sum, even with a Rule 37 exception for Well No. 4H, the mineral estate is likely to recover only 11.9 BCF of the estimated 20.2 BCF of recoverable gas reserves beneath the Eden Unit. Denial of the pending application would harm the correlative rights of the 94.6 percent of the minerals under lease and amount to confiscation of an otherwise recoverable 1.997 BCF of gas in place beneath the unit.

Protestants, who own a combined total of 0.23481—or approximately seven one-hundredths of one percent (.07694)—of the 305.182 net mineral acres that compose the Eden Unit, have declined offers to participate in the enterprise. That is their unrestricted right. Their opposition to the pending application, however, is supported by no proof to rebut XTO's evidence that the Rule 37 exception is justified.

RECOMMENDATION

The examiners recommend that the Commission adopt the findings and conclusions set out below and enter a final order granting the requested Rule 37 exception.

FINDINGS OF FACT

1. At least ten (10) days notice of hearing was provided to all affected persons as defined by the special field rules for the Newark, East (Barnett Shale) field rules.
2. XTO Energy, Inc. ("XTO") seeks a drilling permit authorizing an exception to the lease-line spacing requirement for its Eden Southeast Unit, Well No. 4H, a proposed horizontal well to be completed in the Newark, East (Barnett Shale) Field, Tarrant County, Texas.
3. Located within the city of Arlington, Texas, XTO's Eden Southeast Unit (Eden Unit or Unit) is an evenly-shaped rectangle, with the longer sides running north to south.
4. The Eden Unit is composed of 1176 residential tracts covering 322.375 acres, of which 305.182 net mineral acres, or 94.6 percent, are under lease to XTO.
5. Forty-nine percent of the mineral estate in the southern three-quarters of the Eden Unit is held by the Green Heirs, whose interest is under lease to XTO.
6. Protestants Daniel and Rebecca Thai, who own a 0.269-acre tract within the Green Heirs zone, hold 0.13179 net mineral acres in the Eden Unit.

7. The perforated interval of Well No. 4H lies 121 feet from the Thai tract.
8. Protestant Richard Turner, who own a 0.202-acre tract within the Green Heirs zone; holds 0.10302 net mineral acres in the Eden Unit.
9. The perforated interval of Well No. 4H lies 27 feet from the Turner tract.
10. XTO intends to develop the Eden Unit with a total of four horizontal wells running north to south; the wells evenly divide the acreage of the Unit and are positioned to maximize recovery from the target interval while minimizing inter-well drainage interference.
11. One well, the No. 1H, is currently producing from the Unit.
12. XTO obtained a permit for the second well, No. 2H, on November 15, 2011, but has not commenced drilling operations.
13. XTO obtained a permit for the third well, No. 3H, on November 17, 2011, but has not commenced drilling operations.

14. There is no regular location for a fourth well on the Eden Unit that will afford XTO a fair and reasonable opportunity to recover its fair share of hydrocarbons beneath the Unit.
15. The proposed location of Well No 4H is reasonable.
16. A vertical well will not allow production of a fair share of hydrocarbons beneath the Eden Unit.
17. Well No. 4 has a proposed drainhole length of 3,870 feet.

18. Without a Rule 37 exception, the unleased interests of the 15 tracts within 330 feet of Well No. 4H constitute a 3,750-foot no-perforation zone.
19. A stratigraphic cross-section log for four vertical pilot-hole wells completed within a five-mile radius of the bottomhole location for No. 4H demonstrates that this region the Barnett Shale has an average formation thickness of approximately 330 feet.
20. The thickness of the Barnett Shale underlying the Eden Unit is reasonably estimated to be 330 feet.
21. The average thickness of the Barnett Shale present in Tarrant County is estimated to be 433 feet, with gas reserves of 139 billion cubic feet (139 BCF) per square mile.

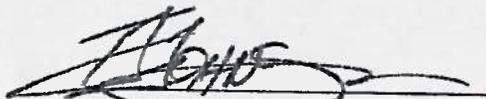
22. Based on the Tarrant County benchmark, and adjusting for the Eden Unit's acreage and estimated formation thickness, total gas in place beneath the Unit is reasonably estimated to be 50.5 BCF.
 23. With a reasonably estimated recovery factor of 40 percent, there are 20.2 BCF of currently recoverable gas reserves beneath the Eden Unit.
 24. There are 175 productive Barnett Shale wells within a five-mile radius of the No. 4H.
 25. XTO conducted a study of all 175 wells, analyzing the projected decline curve, production history and drainhole length data for each well.
 26. Employing a least-squares regression analysis, the study examines this data to arrive at an estimate of the amount of gas that would be produced per foot of drainhole in the proposed No. 4H.
 27. Based on this study, it is reasonably estimated that No. 4H would produce approximately 0.5326 million cubic feet (MMCF) of gas per foot of drainhole.
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28. Approval of the pending Rule 37 for Well No. 4H is reasonably estimated to result in a lifetime total recovery of approximately 2.44 BCF of gas from the reserves beneath the Eden Unit.
 29. The three regular-location wells permitted for the Eden Unit are reasonably estimated to recover a lifetime total of 9.46 BCF of gas from beneath the Eden Unit.
 30. Even with a Rule 37 exception for Well No. 4H, the mineral estate is likely to recover only 11.9 BCF of the estimated 20.2 BCF of recoverable reserves beneath the Eden Unit.
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31. Approval of the pending Rule 37 applications for Well Nos. 1H and 4H is reasonably estimated to increase total lifetime recovery of the gas reserves underlying the Eden Unit by 1.997 BCF.

CONCLUSIONS OF LAW

1. Proper notice of hearing was timely issued by the Railroad Commission to appropriate persons legally entitled to notice.
2. All things necessary to the Commission attaining jurisdiction over the subject matter and the parties in this hearing have been performed.

3. Approval of a Rule 37 exception for the Eden Southeast Unit, Well No. 4H in the Newark, East (Barnett Shale) Field, Tarrant County, Texas, is necessary to prevent confiscation and to protect correlative rights.

Respectfully submitted on this the 6TH day of FEBRUARY, 2013.



Terry J. Johnson
Hearings Examiner



Brian Fancher
Technical Examiner
