

**STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION COMMISSION**

**IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION FOR THE PURPOSE OF
CONSIDERING:**

CASE NO. 13351

**APPLICATION OF EDGE PETROLEUM EXPLORATION
COMPANY TO RESTRICT THE EFFECT OF SPECIAL RULES
AND REGULATIONS FOR THE DOS HERMANOS-
MORROW GAS POOL, EDDY COUNTY, NEW MEXICO**

ORDER NO. R-3022-D

ORDER OF THE OIL CONSERVATION COMMISSION

BY THE COMMISSION:

THIS MATTER came before the Oil Conservation Commission (the Commission) for hearing on March 8, 2005 at Santa Fe, New Mexico on the application of Edge Petroleum Exploration Company for *de novo* review, and the Commission, having heard the evidence and arguments of counsel and carefully considered the same, now, on this 14th day of April, 2005,

FINDS THAT:

1. Notice has been given of the application and the hearing of this matter, and the Commission has jurisdiction of the parties and the subject matter.

The Application

2. In the original application in this case, Edge Petroleum Exploration Company ("Edge") sought an order of the Division limiting the effect of the special pool rules for the Dos-Hermanos-Morrow Gas Pool to the area within the established horizontal boundaries of the pool.

3. The Special Rules and Regulations for the Dos **Hermanos-Morrow** Gas Pool were adopted by Order No. R-3022, entered in Case No. 3351 on December 22, 1965. These rules provide for not more than one well per 640 acres, to be located at least 1650 feet from the outer boundary of a section, and at least 330 feet from any quarter-quarter section line.

4. Statewide rules applicable to the Morrow gas formation where it is not governed by special pool rules providing otherwise [OCD Rule 104.C(2)] allow two wells per 320 acre unit, to be located in different quarter sections, at least 660 feet from the outer boundary of the quarter section and at least 10 feet from any quarter-quarter section line.

5. The **Dos-Hermanos-Morrow** Gas Pool consists only of Sections 21, 22, 27 and 28, Township 20 South, Range 30 East, **NMPM**, Eddy County, New Mexico. However, the Special Rules and Regulations for the Dos Hermanos-Morrow Gas Pool expressly apply to any well located within one mile of the outer boundaries of the pool.

6. Edge is an owner in the North Half of Section 29, Township 20 South, Range 30 East, which is immediately adjacent to Section 28 and therefore within one mile of the Dos Hermanos-Morrow Gas Pool.

7. Edge wants to drill a well on a 320-acre unit consisting of the North half of Section 29 closer than 1650 feet to the north and east lines of Section 29, and, accordingly, closer than 1650 feet to the boundary of the Dos **Hermanos** Morrow-Gas Pool.

8. Edge has not, however, applied for establishment of a non-standard unit or authorization of a non-standard location. Rather Edge seeks to modify the pool rules for the Dos Hermanos-Morrow Gas Pool so that they will apply only within the pool boundaries; thus allowing wells located outside of the pool, but within one mile of the pool boundary, to be spaced according to statewide rules.

Parties and Appearances

9. Edge appeared at the hearing through counsel and presented the testimony of Howard Creasy, a geologist, and James Keisling, a petroleum engineer, in support of the application.

10. V-F Petroleum Inc., (V-F) an operator of two wells currently producing from the Dos Hermanos-Morrow Gas Pool, appeared through counsel and presented the testimony of Louis J. Mazzullo, a geologist, and Roy C. **Williamson**, Jr., a petroleum engineer, in opposition to the application.

Undisputed Facts

11. V-F is the operator of the Budge Federal Com. Well No. 1 (API No. 30-015-33437) ["the Budge Well"], located within the Dos Hermanos-Morrow Gas Pool, at a **bottomhole** location 1688 feet from the South line and 1744 feet from the West line of

Section 21, Township 20 South, Range 30 East, NMPM. This well is producing gas from the Morrow formation.

12. Edge currently proposes to locate its well 710 feet from the North line and 1260 feet from the East line of Section 29. However, if Edge's application were granted, it could (as far as OCD rules are concerned) locate a well as close as 660 feet from the North and East lines of Section 29.

13. Edge's proposed location is geographically closer to the unit boundary of the unit on which the Budge well is located than is the Budge well, and is closer to such unit boundary than any location within the Budge unit that would be orthodox under the applicable pool rules.

14. A well was previously completed in the Morrow in the south half of Section 29. This was the Hudson Federal Well No. 1 (API No. 30-015-20834) ["the Hudson Federal Well"], located 1650 feet from the South and East lines (Unit J) of Section 29. The Hudson Federal Well was assigned to the Dos Hermanos-Morrow Gas Pool, but the pool boundaries were never expanded to include the South half of Section 29.

15. The Hudson Federal well produced a relatively small amount of gas from the Morrow formation, has ceased to produce, and is currently inactive.

Technical Testimony Presented by Edge

16. Mr. Creasey, a geologist employed by Edge, testified concerning the wells that have produced from the Morrow formation in the immediate vicinity, identifying cumulative production, bottomhole pressures and his interpretation of sand thickness and reservoir quality for each. He also testified generally concerning the characteristics of Morrow sands in the area and the factors that would influence drainage between Morrow wells.

17. Mr. Creasy testified that:

(a) Three wells are the crux of the drainage issues in the Dos Hermanos field: the Budge well in Section 21, northeast of Edge's proposed location; the McRae & Henry Federal G Gas Com Well No. 1 (API No. 30-015-20848) ["the Federal G well"], located in Section 21 approximately 1,850 feet east of the Budge well; and the McRae & Henry Emperor Oil Company Federal Gas B Com Well No. 1 (API No. 30-015-10465) ["the Emperor Oil well"], located in Section 28, east-southeast of Edge's proposed location.

(b) Despite their proximity, the Emperor Oil well completed in 1965, the Federal G well completed in 1974 and the Budge Well completed in 2004, all encountered approximately the same initial bottomhole pressures in the Morrow formation, indicating little or no drainage between these locations.

(c) The lower Morrow in this area is a fluvial-deltaic sand channelized from northwest to southeast. The middle Morrow is a sand that was deposited in a shoreline environment and exhibits greater variety, but based on the sand thicknesses in this particular area, middle Morrow deposits would appear also to trend from northwest to southeast.

(d) The Morrow formation is complex, and drainage areas are difficult to predict. However, wells in this area are not capable of draining 640 acres, and the probable drainage area is more likely 160 acres or less.

18. For purposes of providing a basis for a drainage area calculation for the Emperor Oil well, Mr. Creasy testified that, based on log analysis, he had estimated 98 feet of net sand and 50 feet of net porous sand in that well in the lower Morrow and middle Morrow C zones. In view, however, of the much greater production of the Emperor Oil well as compared to the Federal G well that showed similar sand thicknesses, and the unsatisfactory nature of the available logs to show porosity, he concluded that the net porous sand thickness in the Emperor Oil well was very close to the total net sand thickness.

19. Based on the limited drainage area of the wells in this vicinity, as indicated by the virgin pressures encountered in the Federal G and Budge wells, and on the northwest-to-southeast channelization typical of the highly productive lower Morrow, Mr. Creasy opined that a well at Edge's proposed location would occasion little or no drainage from Section 21 to the northeast.

20. Mr. Creasy further testified that the Hudson Oil well to the south of Edge's proposed location was completed only in the upper Morrow, the least productive of the Morrow zones in this area, due to water in the lower Morrow and lack of permeability in the middle Morrow, and that it would be imprudent to move Edge's proposed location further south because of the risk of encountering reservoir conditions comparable to those in the Hudson Oil well.

21. Mr. Keisling, a petroleum engineer employed by Edge, testified concerning the probable drainage areas and radiuses of the Morrow wells in this vicinity.

22. He testified that:

(a) Based on 70 feet of pay in the Lower Morrow in the Emperor Oil well, Mr. Keisling calculated a drainage area for that well of 225 acres, and a drainage radius of 1766 feet.

(b) Edge expects to encounter around 45 feet of pay in the Morrow in their proposed well, which would equate to a drainage area of 80 acres and a drainage radius of 1053 feet.

(c) Based on what is now known about this area, Morrow wells will not drain 640 acres, and 640-acre spacing with one well per unit is inappropriate.

(d) The absence of pressure depletion in the later-drilled wells definitely indicates that the existing Morrow wells (the Emperor Oil well, the Federal G well and the Budge well) have encountered separate Morrow reservoirs.

(e) The northwest-southeast strata orientation to which Mr. Creasy testified could explain the absence of pressure depletion.

Technical Testimony Presented by V-F

23. Mr. Mazzullo, a consulting geologist retained by V-F, testified to his interpretation of the Morrow formation in the Dos Hermanos field and surrounding area.

24. He testified that:

(a) The Morrow formation in this area, including Section 29 where Edge proposes to drill, is a common source of supply in that most of the Morrow sands can be correlated across this entire area, and there are no faults or other identified geologic barriers to provide a geologic basis to separate the Dos Hermanos pool from the surrounding sections.

(b) The lower Morrow, as well as the middle Morrow, has an extremely complex structure, including southwest-northeast-trending marine barrier and deltaic sands as well as fluvial-northwest-southeast-trending channel sands.

(c) Because of the channelized nature of the sands, an elliptical or variable drainage pattern is more likely in this formation than a radial drainage pattern.

25. Mr. Williamson, a consulting petroleum engineer retained by V-F, testified concerning the probable drainage area of the proposed Edge well.

26. Mr. Williamson plotted the indicated drainage areas for a well drilled at the location proposed by Edge based on alternative assumptions of 80-acre, 160-acre and 320-acre drainage areas, and on alternative assumptions of a radial shape or of a northeast-southwest-oriented elliptical shape. He also plotted, for the 80-acre and 160-acre assumptions, the "assumed no-flow location," being the line that would divide the area where greater movement would be toward the Budge well from the area where greater movement would be toward the proposed Edge well.

27. Based on the drainage areas he plotted, Mr. Williamson demonstrated that if the proposed Edge well has a radial drainage area greater than 80 acres, or a northeast-southwest-oriented elliptical drainage area of as much as 80 acres, a significant portion of its drainage area would be located under Section 21, which is dedicated to V-F's Budge well..

28. Mr. Williamson testified that the shape and orientation of drainage patterns in this formation would be difficult to predict, but he opined, based on the structural maps and

the pattern of development, that a northeast-southwest-oriented elliptical drainage area would be the most logical assumption.

Analysis of Technical Issues

29. The Commission concludes that:

(a) There is no evidence that Morrow wells in the vicinity of the Dos Hermanos pool will efficiently drain 640 acres. Instead the evidence indicates that most such wells will drain an area of 160 acres or less.

(b) Accordingly, Edge's application, insofar as it asks that the area surrounding the Dos Hermanos-Morrow Gas Pool be removed from the operation of special pool rules providing for 640-acre units limited to one well per unit, and placed under statewide rules providing for 320-acre units with up to two wells per unit, should be granted.

(c) The Morrow formation in the Dos Hermanos-Morrow Gas Pool and surrounding areas constitutes a common source of supply in that it consists of identifiable sands that can be correlated throughout the area, and there are no faults or other identified geologic barriers that separate the Dos Hermanos pool from the surrounding sections.

(d) However, evidence of virgin pressures encountered in wells in close proximity to each other, completed years apart, demonstrates that communication within the Morrow sands is far from uniform.

(e) Mr. Creasy's testimony that the lower Morrow sands in this area are predominantly channelized along a northwest-southeast axis was effectively rebutted by Mr. Muzzullo's testimony that the lower, as well as middle, Morrow sands might be channelized either northwest-southeast or northeast-southwest axis, and by the correlation of prevailing sands over a distance of several miles in wells located along a generally northeast-southwest axis.

(f) The virgin pressures encountered in several wells remain unexplained, but are consistent with a variety of different axes of channelization.

Analysis of Legal Issues

(g) The evidence is insufficient to practically determine the amount of gas either originally present or now remaining within the Dos Hermanos-Morrow Gas Pool and the surrounding sections, or within any unit in that area.

(h) The evidence indicates that if Edge's proposed well in Section 29 were of equal quality to the better wells in the vicinity and drained the reservoir in a radial

pattern, it would probably drain a portion of Section 21, and that that drainage could not be compensated by production from V-F's existing Budge well.

(i) Although the reservoir clearly is not homogeneous and isotropic, as assumed in some of Mr. Williamson's models, the evidence concerning the probable directions of actual drainage suggests a significant likelihood that the actual drainage area of Edge's proposed well would be elongated in a northeast-southwest direction, which would produce even greater drainage from Section 21 than would radial drainage.

(j) Furthermore, inasmuch as Edge seeks a rule change, and not merely a well-specific exception to the existing rules its burden of proof is not limited to the probable effects of a well at the location it now proposes. Instead, it must demonstrate that the proposed rule change would not impair V-F's correlative rights. The rule change would not only allow the well now proposed by Edge, but would also allow offsets to the west and northwest of V-F's Budge well in Section 20, as close as 660 feet from the section boundary.

(k) Thus even if the prevailing orientation of the productive Morrow sands is northwest to southeast, as Mr. Creasy opined, the proposed rule change would potentially give other operators an opportunity to drain gas from Section 21.

(l) V-F has made a considerable monetary investment in its Budge well, the location of which was selected at a time when a 1650 foot setback was required both in Section 21 where the well was drilled and in the adjoining Sections 29 and 20.

(m) To now allow Edge and other operators to offset that well at locations substantially closer to the common boundary than the rules then permitted without a convincing demonstration that such wells would not, in fact, result in net **uncompensated** drainage from Section 21 would be to deny V-F a reasonable opportunity to produce its just and equitable share of the gas.

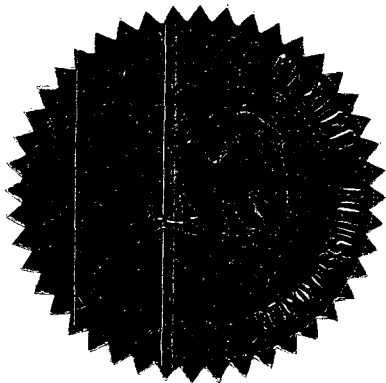
(n) Accordingly, while statewide rules should otherwise apply to Morrow wells in the sections surrounding the Dos Hermanos-Morrow gas pool, such wells should be located at least 1650 feet from the outer boundaries of the pool.

IT IS THEREFORE ORDERED THAT:

1. Pursuant to the application of Edge, Order No. R-3022, entered in Case No. 3351 on December 22, 1965 is hereby amended to provide that the Special Rules and Regulations for the Dos Hermanos-Morrow Gas Pool shall apply only within the horizontal boundaries of the pool, **SAVE AND EXCEPT** that no well shall be produced from the Morrow formation at a bottomhole location within 1650 feet horizontal distance from the outer boundary of said pool.

2. Except to the extent expressly provided in paragraph 1, Order R-3022, as amended by Orders R-3022-A and R-3022-B, shall remain in effect.
3. Jurisdiction of this case is retained for the entry of such further orders as the Commission may deem necessary.


DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.



SEAL

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION


MARK E. FESMIRE, P.E., CHAIR


JAMI BAILEY, CPG, MEMBER