

**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:**

**APPLICATION OF NEARBURG EXPLORATION
COMPANY L.L.C. FOR TWO NON-STANDARD
GAS SPACING AND PRORATION UNITS,
LEA COUNTY, NEW MEXICO.**

CASE NO. 12622 (*de novo*)

**APPLICATION OF THE OIL CONSERVATION
DIVISION FOR AN ORDER CREATING,
RE-DESIGNATING AND EXTENDING THE
VERTICAL AND HORIZONTAL LIMITS
OF CERTAIN POOLS IN LEA COUNTY,
NEW MEXICO.**

**CASE NO. 12908-A (*severed and
re-opened*)**

ORDER NO. R-11768-B

ORDER OF THE OIL CONSERVATION COMMISSION

BY THE OIL CONSERVATION COMMISSION:

This matter has come before the Oil Conservation Commission (hereinafter referred to as "the Commission") on application of Nearburg Exploration Company L.L.C. (hereinafter referred to as "Nearburg") and the Oil Conservation Division in a related nomenclature matter, opposed by Redrock Operating Ltd. Co. (hereinafter referred to as "Redrock") and Raptor Natural Pipeline L.L.C., formerly Louisville Gas & Electric Natural Pipeline L.L.C. (hereinafter referred to as "Raptor"), and the Commission, having conducted an evidentiary hearing on October 21 and 22, 2002, reviewed the exhibits and other materials submitted by the parties in support of the applications, on this 22nd day of November 2002,

FINDS:

1. Case No. 12622 concerns the application of Nearburg to create non-standard 160-acre spacing units comprising the northeast quarter and the southeast quarter of Section 34 (Township 21, Range 34 East, N.M.P.M., Lea County, New Mexico) or, in the

alternative, for creation of a single standard 320-acre spacing unit comprising the north half of Section 34. Case No. 12908-A is a related nomenclature case originally filed by the Division in which it is proposed that the East Grama Ridge-Morrow Gas Pool be contracted to exclude the east half of Section 34, and the Grama Ridge-Morrow Gas Pool be extended to include the east half of that section.

2. The applications concern Nearburg's Grama Ridge East "34" State Well (hereinafter referred to as "the Nearburg Well") located in the northeast quarter of Section 34, Township 21 South, Range 34 East, N.M.P.M. (API No. 30-025-34948). Nearburg proposes to dedicate the 160- or 320-acre spacing units described previously to this well.

3. In support of its application for a north half unit, Nearburg argued during the hearing of this matter that a small marine deposit exists in the north half of Section 34 and that this east-west oriented sand body dictates that a north half spacing unit be assigned. Nearburg argued that geologic evidence does not support the existence of a fault separating the east and west halves of Section 34. Nearburg agreed that such a feature was previously believed to be present, resulting in the division of Section 34 into two separate pools (the Grama Ridge-Morrow Pool and the East Grama Ridge-Morrow Pool). But Nearburg argued that the pressure communication across the section and the geologic data show that in Section 34 the Morrow formation is a single pool and a common source of supply and the fault does not in fact exist, and no justification exists to separate the pools.

4. Nearburg also responded to claims of Redrock and Raptor that previous administrative action prevents this body from creating a north half unit to dedicated to the Nearburg well. Nearburg argued that the east half spacing unit dedicated to the Llano 34 State Com. No. 1 (hereinafter referred to as "the Llano well") was terminated when the communitization agreement was terminated on March 31, 1991. Nearburg argued that the dedication of the west half of Section 34 to the Shell GRB State No. 1 (hereinafter referred to as "the Raptor well") was terminated when the underlying leases were terminated by the State Land Office in 1991. Nearburg argued that no administrative barriers exist to establishment of a north half unit except the pool boundary, and no administrative barrier exists to establishing a 160-acre nonstandard unit.

5. Redrock opposed the applications. During the hearing, Redrock (an overriding royalty interest owner in the southeast quarter of Section 34) argued that establishing a nonstandard 160-acre spacing unit would effectively segregate the GRE sand of the Morrow and disturb the historical development of the Morrow on 320-acre spacing units. Redrock also argued that since the Morrow sands at issue extend into the southeast quarter of Section 34, a 160-acre unit should not be created. Further, Redrock argued that the depositional orientation of the Morrow is north-south and that Nearburg's orientation of the sands in an east-west orientation is not persuasive both because of the overall depositional pattern and because of the northeast-southwest trending fault that bisects Section 34. Redrock claims the mud log it presented from the Llano well establishes all of these facts.

6. The Division, not an active participant in these proceedings, initiated Case No. 12908 as a nomenclature case. Case No. 12908-A was intended to adjust the boundaries of the Grama Ridge-Morrow Pool from the center of Section 34 to the eastern boundary of Section 34 and adjust the western boundary of the East Grama Ridge-Morrow Pool accordingly.

7. Three wells exist in Section 34. The first well in the section to produce from the Morrow formation was the Raptor well, which was drilled in 1966 in the southwest quarter of Section 34 and produced until about 1973 when it was converted to gas storage, its present function. The next well to produce was the Llano well in the southeast quarter of Section 34. It began producing around 1979 and ceased producing in 1991. The well was plugged by Nearburg in November 2001.

8. The third well is the well at issue: the Nearburg well. Great Western Drilling Co. acquired an oil and gas lease for the north half of Section 34 from the State of New Mexico on January 1, 2000 and a portion of that lease was assigned to Nearburg. In March of that year, Nearburg drilled the well in the northeast quarter of Section 34. The well was successfully completed in the Morrow and production ensued. The well produced from June 2000 to July 2001, when it was shut-in by order of the Division.

9. In July 2000, the Oil Conservation Division (hereinafter referred to as "the Division") notified Nearburg it had mistakenly approved the permit to drill because the dedication of a north half spacing unit places the well in two different pools.

10. Nearburg responded to the Division by filing an administrative application for creation of two 160-acre nonstandard units in the east half of Section 34. Redrock filed an objection to the application, and the case was ultimately heard by the Division. The Division denied the application and ordered the Nearburg well shut-in. Nearburg filed an application for hearing *de novo* to this body. The well remains shut-in.

11. This case raises the issue of the proper size and orientation of the spacing unit to be dedicated to the Nearburg well. Resolution of this issue requires us to review the geologic and engineering evidence presented and determine the size and orientation of the common source of supply in the Morrow formation.

12. It is well known that depositional patterns in the Morrow formation generally run north to south. However, it is also well known in any given area that the Morrow can be extremely complicated. For example, in Order No. R-6050, the Commission found that the Morrow producing interval in Section 34 is not a broad, continuous producing body, but instead contains numerous, isolated sand bodies from which production is drawn. This finding is consistent with the evidence presented by the parties in this case.

13. The parties generally agree that the overall depositional pattern and the regional dip of the Morrow in the vicinity of Section 34 are north-south trending. Redrock argues that the regional dip controls and it interprets the evidence to show a

common source of supply at the Nearburg well oriented in a north-south direction, extending from the northeast quarter into the southeast quarter. Nearburg argues that the specific sands in which the Nearburg well is perforated are marine and are characterized by paleo-strike depositional patterns, and therefore oriented east-west. Nearburg's geologic interpretation is of a small sand body oriented in an east-west direction that is almost entirely contained in the north half of Section 34.

14. Nearburg perforated its well in the sand it refers to as the "GRE sand." This sand is below the elastics marker and below the Morrow "B" Main sand in the Nearburg well. Nearburg's geological interpretation is that the Morrow "GRE" sands are a separate stringer of the Morrow "B" below the "B" sands and represent an offshore bar or beach, parallel to strike and perpendicular to dip.

15. Nearburg's position is the most reasonable and is supported by a number of factors.

16. Nearburg's net sand isopach is more consistent with the available data points and therefore more reliably illustrates the size and position of the sand body. Nearburg's use of an eight percent porosity cutoff to review logs of nearby wells was reasonable; using an eight percent cutoff, the Nearburg well has sixteen feet of "net" GRE sands (sands that are greater than eight percent porosity and therefore possibly productive of hydrocarbons). Using the same technology, other wells such as the Llano well in the southeast corner of Section 34 show only remnants of GRE sands. Similarly, the Raptor well in the southwest quarter of Section 34 also does not contain any discernable GRE sands. The well in Section 27 (immediately to the north of section 34) does show a small amount of GRE sand, as do several wells in Section 35 (immediately to the east of Section 34).

17. The resulting isopach graphically depicts these facts and shows that the possible orientation of the GRE sand body is more reasonably depicted as east-west oriented than north-south oriented. While it appears that lower Morrow "B" sand extends through all of Section 34, the productive GRE sands that exist in the north half of Section 34 do not appear to extend into the south half of the section at all.

18. The log data support a conclusion that the GRE sands are marine in origin or influence. The logs of GRE sands show a coarsening upward sequence, a marine pattern associated with delta front or deltaic systems or reworked marine bar systems. As non-

marine sands are deposited in the general north-south trend, a geologic interpretation that portrays the marine sand oriented in the direction of strike (west-east) is more reasonable. The net sand distribution seen in the isopach is west-east and consistent with the log of the Nearburg well (in that a large sand body is present) and in the logs of wells directly east and northwest.

19. The geologic interpretation described above is also supported by the engineering evidence. Nearburg's estimate of the recoverable reserves in the Nearburg well yielded 1.2 bcf using a decline curve, pressure data and volumetric analysis (or gas in place of 1.4 bcf). Thus, it seems that the reservoir being drained is a comparatively small one. Nearburg's Exhibit 22, by displaying the net pay isopach along with the estimated recoverable reserves from the wells used as data points, graphically displays the small size of the reservoir.

20. The presence of a fault within Section 34 was debated during the hearing, and its existence would certainly be significant in this matter and affect the geologic interpretations. The fault previously formed the rationale for the boundary between the Grama Ridge-Morrow Gas Pool and the East Grama Ridge-Morrow Gas Pool. However, the evidence shows that no such fault exists.

21. A regional fault trends from northwest to southeast through sections 22, 27, 33 of Township 21 South (Range 34 East) and Sections 4, 5 and 8 of Township 22. The feature is well known, and has a throw of approximately 500 to 1000 feet depending on the interpretation and location.

22. During the 1979 hearing in Case No. 6496, a subsidiary fault was depicted through sections 26 and 34 and on through sections 3, 10 and 15 to the south. However, log data show that the same formations exist within a few feet of one another in the Nearburg well, the Raptor well, the Getty "35" State Well No. 11 in the southwest quarter of Section 35, and the Llano well. If a fault bisects Section 34, some formations in the Nearburg and Llano wells should be found several hundred feet deeper in the well bores than they are actually seen. In fact, the Nearburg well on top of the Morrow elastics is approximately 13 feet higher than the Raptor well. If a fault exists, this evidence shows it has virtually no throw.

23. Moreover, the log of the Repeat Formation Tester (hereinafter referred to as "RFT log") performed on the Llano well in 1979 demonstrates pressure communication across Section 34. The log showed significant pressure depletion in the "B2" sands between 12,894 and 12,902 feet in that well. The only other well producing in Section 34 from that specific interval in 1979 was the Raptor well. The pressure information from the Raptor well and the other storage wells Raptor operates is consistent with the pressure found in the "B2" sand in the Llano well. The Morrow sand that is utilized for gas

storage by Raptor extends to the Llano well; if a fault bisects Section 34 no communication between the wells in this interval should be observed on the RFT log. The pressure communication across Section 34 certainly argues strongly against the notion that a fault bisects the section.

24. Finally, Mr. Wells, the engineering witness for Redrock (and, it turns out, an engineer employed by Raptor to assist with operation of the gas storage facility) testified that the gas storage facility operates as one common source of supply or reservoir in Section 34, and indeed, the gas storage unit encompasses all of Section 34. The gas storage unit does not seem to operate as though a fault were present.

25. Redrock relies heavily on the mud log from the Llano well, particularly the gas shows evident on the log, to establish the existence of a north-south trending channel system, and seems to argue that the productive GRE sands extend to the Llano well. But, as Nearburg's witness testified, the mud log appears to be demonstrating the existence of background gas throughout the Morrow interval, not just gas from the GRE sands, and many formations productive of natural gas exist in the Morrow formation which could have been the source of the background gas. The mud system itself could have been carrying gas after exposure to these formations. Furthermore, Nearburg's geological expert testified that the sands seen in the GRE sand interval in the Llano well contain inter-granular gummy shales that certainly would preclude the existence of a productive sand body. Thus, the mud log does not necessarily contradict the other evidence, discussed previously, of an east-west trending sand body.

26. Redrock also apparently advances an argument that the pressure depletion seen on the RFT log of the Llano well might have come from some other source other than the Raptor well, apparently to support an argument that Nearburg has not demonstrated the lack of a fault in Section 34. It seems undisputed that if no fault exists, the reservoir as interpreted by Redrock would exceed the volume that the engineering evidence suggests that it is. Redrock's geologic interpretation postulates the existence of separate pods, one in the east half of Section 34 and others in other sections, none of which, by Redrock's theory, communicate. As noted, the evidence in the well logs shows no fault exists, and Redrock's theories as to other wells that could have been the source of the pressure depletion in the Llano well seem a bit far fetched, given that some of the wells Redrock claims contributed to the depletion are in some cases miles from Section 34. Redrock's claim that separate small pods resulted from a break in deposition seems to detract from its other argument that pressure depletion can come from miles away. Redrock's arguments on this point are a bit strained and not persuasive.

27. Raptor apparently appeared in this case to ensure that its gas storage operations were not impeded by any order concerning the Nearburg well. Raptor presented a statement and exhibits to the Commission and subsequently forwarded a

Reply to Nearburg's Response to its statement during the hearing. Raptor claims it neither supports nor opposes the applications.

28. Raptor operates a natural gas storage unit within Section 34. The gas storage unit includes all of Section 34 but is confined by the unit agreement and amendments to the Morrow formation encountered between log depths of 12,722 feet and 13,208 feet in the Shell Oil Company State GRA Well No. 1 (API No. 30-025-21336), as shown on the Schlumberger Sonic Log B Gamma Ray Log of said well dated July 5, 1965, located 1980 feet from the North line and 660 feet from the West line (Unit E) of Section 3, Township 22 South, Range 34 East. See Order No. R-11611, finding no. 4. It appears from the evidence presented in this case that the interval actually being used for storage in Section 34 is the sand interval seen just below the 12,900 foot log level in the Raptor and the Llano wells, and not the entire Morrow formation.

29. Since a gas storage unit exists within the same formation as the Nearburg well, the primary concern should be with communication between the indigenous gas-producing formations and the gas storage interval. However, the evidence suggests that there is no communication between the Nearburg and Raptor wells, and Raptor appears to concede this point. Nearburg also presented evidence that the reservoir sands used by the storage unit do not appear in the Nearburg well, precluding the possibility of communication.

30. Because of the concern for communication, the Division promulgated special pool rules to protect the gas storage interval. In Order No. R-11611, the Division ordered that operators exploring and producing within the Morrow (or lower intervals) within the Grama Ridge Morrow Gas Storage Unit take special precautions to avoid the gas storage operation. Among other things, operators are required to provide Raptor with advance written notification of intent to drill, daily drilling reports and copies of logs. Operators penetrating the Morrow must isolate the formation into which storage is occurring and special cementing requirements and abandonment requirements apply.

31. During the hearing Raptor referred to an "administrative obstacle" to the creation of a north half unit in Section 34: the acreage dedication plat on form C-102 submitted by Llano in 1979 in response to Order No. R-5995. Raptor claimed that this document established a west-half spacing unit for the Raptor well, but also portrayed the problem as a minor administrative issue. After the hearing, a series of briefs were filed by Raptor and Nearburg on this issue. Judging from the rhetoric in both documents, a serious issue exists, yet just what issue is being presented is difficult to discern from the filings. Raptor's Reply suggests that a spacing unit dedicated to the Nearburg well may not extend into the northwest quarter because of the acreage dedication filed in 1979. In

essence, Raptor seems to say that the C-102 filed in 1979 is more than an administrative obstacle, but may constitute an absolute bar on the creation of a north half unit. Raptor's contradictory positions make it difficult to assess its position.

32. The geological and engineering evidence discussed previously demonstrate that a north half unit should be dedicated to the Nearburg well. Thus, the issue of the "administrative obstacle" is raised squarely. Redrock raises a similar administrative obstacle, that of the dedication of the east half of Section 34 to the now-plugged Llano well.

33. The obstacles referred to by Redrock and by Raptor are not obstacles to establishing a north half unit.

34. The positions of Nearburg and Redrock on the 1979 acreage dedication plat seem to stem from confusion about the nature of the gas storage unit. It appears from the evidence presented and the prior proceedings before the Division concerning the storage unit, that the storage unit is only used for the storage of gas in Section 34. Raptor and its predecessors-in-interest seem to have recognized the rights of other operators to produce indigenous gas from other intervals within Section 34¹ so long as it does not interfere with storage operations. The question thus presented is whether the storage unit's dedication of the west half of section 34 *for storage of natural gas* precludes a north half dedication by Nearburg *for production* of natural gas. The answer to this question is no.

35. The geology of the Morrow in this area permits production of indigenous gas and storage of gas within the same pool. Given this geologic situation, nothing should preclude coterminous production of indigenous gas and storage of extraneous gas so long as the gas storage interval is protected. Indeed, if this body were to preclude recovery of indigenous gas within the northwest quarter of Section 34, waste and violation of correlative rights would occur with respect to the indigenous gas. By the same logic, creation of spacing units within the Grama-Ridge-Morrow Unit and the East Grama Ridge-Morrow production pools should not affect a spacing unit created for purposes of gas storage by Raptor under Rule 701 (19.15.9.701 NMAC).

¹ The Second Amendment to the Unit Agreement with the State Land Office and others, Raptor's Exhibit 3, recites that the storage unit is unique in that it conveys an easement to inject, withdraw and store extraneous gas, and that these rights exist "independent[] of the oil and gas leases ..." Raptor, Exhibit 3, at page 2. And, the Second Amendment amended paragraph 10 of the Unit Agreement to provide that indigenous gas "... may only be produced from the unitized formation in accordance with an oil and gas lease ..." Raptor, Exhibit 3, at page 3.

36. Nearburg seems to read the 1979 acreage dedication as a dedication of the west half of Section 34 to the Raptor well *to production* rather than to storage. Nearburg's reading is justified because Raptor took the position during the hearing that the storage unit possesses attributes of both a production and a storage unit. On closer examination, it appears that Raptor was referring to production of cushion gas and possibly also to BTU enrichment of gas from the storage interval. Raptor's lease to produce indigenous gas in the north half of Section 34 was cancelled and another lease covering the entire north half of Section 34 was issued to Great Western/Nearburg by the State Land Office.² As the situation presently exists, the lease to Great Western, the Unit Agreement and the various letters between Raptor, Nearburg and the State Land Office do not seem to give Raptor the right to produce indigenous gas in any portion of the north half of Section 34 outside of the interval in the Morrow presently used for storage.

37. Thus, the parties, the Division and the State Land Office all seem to have taken the position over time that the gas storage activities of Raptor and the exploration and production activities of Nearburg *et al.* can exist within the Morrow without conflict. Nothing presented during the hearing or subsequently convinces this body that any changes to the status quo are needed. The dedication of a north half spacing unit to the Nearburg well respects the geology and engineering testimony and does not interfere with the gas storage unit, which is adequately protected by Order No. R-1 1611.

38. Redrock's assertion of an administrative obstacle is somewhat simpler to address. Redrock's point is that the dedication of the east half of Section 34 to the Llano well should preclude creation of a north half unit. However, the Llano well has not produced since 1991 and is now plugged. The cessation of production of the Llano well, the plugging of the well, and the termination of the communitization agreement by the State Land Office on March 31, 1991 terminated the east half dedication.

² The State Land Office cancelled Raptor's lease for nonpayment of rentals in 1999. The lease was subsequently offered at a public auction and a lease to the north half of Section 34 was acquired on February 1, 2000 by Great Western Drilling Company (an interest in the lease was subsequently acquired by Nearburg). Subsequent to the issuance of the new lease, Raptor asserted that despite the cancellation of the leases, the unit agreement was perpetuated by the continued storage of gas. The State Land Office contacted the operators of the newly issued leases and cautioned them that their rights to produce indigenous oil and gas were subject to the storage rights of Raptor (then LG&E).

39. Both Redrock and Raptor referred to a series of mistakes in judgment and procedure by Nearburg. It is true that Nearburg failed to discover that the proposed spacing unit crossed Division-designated pool boundaries, and this failure amounts to a lack of due diligence on its part. However, the lack of due diligence by Nearburg cannot serve as the basis for imposition of a spacing unit that is not supported by the geological and engineering evidence.

40. It apparent from the foregoing that the Morrow formation under Section 34 is one common source of supply and is not separated by a fault as previously believed. It is further apparent that the geological and engineering evidence establishes that the spacing unit that best reflects the actual drainage of the Nearburg well is a north half spacing unit, and that establishment of a north half spacing unit will prevent waste and protect correlative rights.

41. It is also apparent from the foregoing that an adjustment of pool boundaries of the Grama Ridge-Morrow and the East Grama Ridge-Morrow pools are necessary.

42. Nearburg has failed to provide a basis for creation of a nonstandard 160-acre spacing unit, and the findings herein make Nearburg's application for such a nonstandard spacing unit moot and that application should be dismissed.

IT IS THEREFORE ORDERED THAT:

1. Nearburg's application for a 320-acre spacing unit consisting of the north half of Section 34 shall be and hereby is approved. Nearburg's application for a nonstandard 160-acre spacing unit comprised of the northeast quarter of Section is denied as moot. The north half of Section 34 shall be and hereby is dedicated to Nearburg's Grama Ridge East "34" State Well located in the northeast quarter of Section 34, Township 21 South, Range 34 East, N.M.P.M. (API No. 30-025-34948).

2. The Division's application for an adjustment to the eastern boundary of the Grama Ridge-Morrow Pool from the center of Section 34 to the eastern boundary of Section 34 and for the concomitant contraction of the East Grama Ridge-Morrow Pool to the boundary of Section 34 and 35 shall be and hereby is approved.

3. The order to shut-in the Nearburg well issued by the Division shall be and hereby is vacated.

4. Jurisdiction of this matter shall be retained for such further orders as may be necessary.

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

**STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION**

LORI WROTENBERY, CHAIR

JAMIBAILEY, MEMBER

ROBERTLEE, MEMBER

SEAL