

**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 THE NEW MEXICO OIL
CONSERVATION DIVISION THROUGH THE
SUPERVISOR OF DISTRICT II FOR ADOPTION
OF SPECIAL RULES FOR DRILLING IN CERTAIN
AREAS, FOR THE PROTECTION OF FRESH WATER,
CHAVES AND EDDY COUNTIES, NEW MEXICO.**

Case No. 15,487

RESPONDENTS' JOINT STATEMENT OF REASONS

Pursuant to 19.15.3.12.A(2)(g) NMAC, COG Operating LLC, OXY USA Inc., Fasken Oil & Ranch, Ltd., Mack Energy Corporation, EOG Y Resources, Inc., Lime Rock Resources II-A, L.P., and the Independent Petroleum Association of New Mexico (collectively "Respondents") jointly submit their proposed statement of reasons supporting their position that (i) the Oil Conservation Commission (Commission") should deny the Oil Conservation Division's ("OCD" or "the Division") application requesting that the Commission amend 19.15.39 NMAC by adopting a new section 11 addressing casing and cementing requirements in a Designated Area that includes the Roswell Artesian Basin, or (ii) alternatively, the Commission should adopt Respondents' modifications to the Division's proposed rule.

Procedural Background

1. On or about April 1, 2016, OCD Personnel met with a group of state legislators and representatives of the Pecos Valley Artesian Conservancy District ("PVACD") to discuss oil and gas drilling in the Roswell Artesian Basin ("RAB"). Representatives of the oil and gas industry were not invited to attend the meeting. *Kautz testimony.*

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2. On April 6, 2016 the Division, through the Supervisor of District II, filed an amended application requesting (a) an emergency order suspending previously approved but undrilled Applications for Permit to Drill (“APDs”) within the Designated Area described therein, covering portions of Chaves and Eddy Counties, and (b) adoption of special rules for drilling in the Designated Area for the protection of fresh water. The Division’s application was set for hearing on May 10, 2016.

3. Division Emergency Order No. E-42 was entered on April 8, 2016, granting the request to suspend approved APDs, but allowing the Supervisor of District II to make exceptions thereto provided fresh water was protected.

4. On May 4, 2016 the Division filed a second amended application.

5. On May 4, 2016 Emergency Order No. E-42-A was entered, continuing the emergency order in effect until the May 10, 2016 hearing.

6. On May 10, 2016 a hearing was held before Division Hearing Examiner William V. Jones, at which time scheduling of a hearing on the merits was discussed. The case was continued to June 15, 2016.

7. Division Order No. R-14164 was entered on May 13, 2016, suspending approved APDs but allowing the Supervisor of District II to make exceptions thereto provided fresh water was protected, pending a hearing on the merits.

8. On May 26, 2016 the Division filed a third amended application.

9. Division Order No. R-14164-A was entered on June 10, 2016, continuing the hearing to June 23, 2016 to allow the parties to confer in order to recommend the time needed for hearing and determine specific dates when all parties would be available.

10. Division Order No. R-1416-B was entered on June 24, 2016, assigning the case to the Commission and continuing the hearing to August 8, 2016. The order also continued Order No. R-14164 in effect pending a full hearing on the merits.

11. On July 15, 2016 the Division filed a fourth amended application.

12. A hearing was held before the Commission on August 8, 2016 to discuss scheduling of the hearing on the merits.

13. Commission Order No. R-14164-C was entered on October 5, 2016, setting the case for a hearing on the merits starting at 1:00 p.m. on December 5, 2016. The order also required pre-hearing statements and exhibits to be filed with the Commission, and exchanged among the parties, no later than 5:00 p.m. on November 21, 2016.

14. On October 24, 2016 the Division filed a fifth amended application, changing the proceeding from a special pool rules case to a rulemaking proceeding. The fifth amended application also contained a proposed rule.

15. The parties who entered an appearance or filed a prehearing statement in the case are the Division, the PVACD, COG Operating LLC ("COG"), OXY USA Inc. ("OXY"), Fasken Oil & Ranch, Ltd. ("Fasken"), EOG Y Resources, Inc. ("EOG"), Lime Rock Resources II-A, L.P., ("Lime Rock"), Mack Energy Corporation ("Mack"), Devon Energy Production Company, L.P. ("Devon"), the Independent Petroleum Association of New Mexico ("IPANM") and the New Mexico Oil & Gas Association ("NMOGA").

16. On November 17, 2016 COG, OXY, Fasken, EOG, Lime Rock, Mack, Devon, IPANM, and NMOGA filed Respondents' Joint Notice of Modifications to "Special Rules".

17. This case was heard by the Commission commencing at 1:00 p.m. on December 5, 2016, continuing on December 6 and 7, 2016. At the hearing, the PVACD supported the Division's

proposed rule, while Respondents opposed the proposed rule or, alternatively, supported their modifications to the proposed rule.

18. The Commission has taken the case under advisement and is scheduled to deliberate in executive session on January 4, 2017 and announce its decision on January 11, 2017.

Roswell Artesian Basin

19. The RAB extends north-to-south from approximately 15 miles north of Roswell to the Seven Rivers Hills area north of Carlsbad, and west-to-east from the intersection of the regional water table with the top of the Glorieta sandstone to a no-flow boundary along the Pecos River.

Lime Rock ("Ex.") 10 at 2; see OCD Ex. 1, Figure 2.

20. An eastward-dipping carbonate aquifer (the "artesian aquifer"), which is overlain by a leaky confining unit, is found throughout the RAB. *Lime Rock Ex. 10 at 2; see OCD Ex. 1, Figure 2.*

21. In the eastern portion of the RAB, there also is a shallow aquifer contained within valley fill alluvium ("the shallow aquifer"). The area in which both aquifers appear constitutes approximately 22% of the RAB. *OCD Ex. 1, Figure 3; Lime Rock Ex. 10 at 5-6, 9.*

22. Because the RAB is a geologically complex basin, the tops and bottoms of the shallow and artesian aquifers vary throughout the RAB and have not been comprehensibly defined. The bottom of the artesian aquifer is generally accepted to be where the porous intervals in the top of the San Andres formation come into contact with the low porosity intervals of the middle and lower San Andres formation. *See Lime Rock Ex. 9 at 18.*

23. In the areas where both aquifers are present, they are separated by a moderately permeable confining unit that includes the Queen, Grayburg, and Seven Rivers formations. *Division Ex. 1, Figures 4 and 5; Lime Rock Ex. 2.*

24. There is naturally-occurring cross-flow of groundwater between the aquifers through the moderately permeable confining unit. *Lime Rock Ex. 2; Lime Rock Ex. 10 at 5.*

25. When water in the Artesian aquifer is drawn for irrigation purposes, groundwater from the shallow aquifer can flow downward into the artesian aquifer, while in the winter the flow of groundwater may be reversed, with groundwater from the artesian aquifer flowing into the shallow aquifer. *See Lime Rock Ex. No. 2; Lime Rock Ex. 10 at 10; Atkins testimony.*

26. State Engineer water well records reveal oil shows at 800 to 900 feet in areas of the RAB, and Roswell Geological Society Symposium documents reveal historical oil and gas production in the Queen Grayburg formation above and/or in the artesian aquifer. *Lime Rock Exs. 3 and 4; Maxey testimony.*

27. There has been oil production from the artesian aquifer northeast of Roswell, within the boundaries of both the shallow and artesian aquifers, from the correlative interval that provides water for City of Roswell. Mud logs for two Lime Rock producing oil and gas wells in the southeastern area of the RAB reveal oil shows in the Queen and Grayburg formations above the artesian aquifer. *Lime Rock Ex. 5; Maxey testimony.*

28. Division witnesses Phillip Goetz and Paul Kautz both acknowledged that they are not aware of any contamination of either aquifer in the RAB caused by oil and gas operations. PVACD witnesses Jack Atkins and Roger Perry similarly acknowledged that they are not aware of any such contamination.

The OCD and PVACD Have Failed to Demonstrate that Special Rules Are Necessary to Protect the Aquifers.

29. The Commission is tasked by statute to prevent waste, protect correlative rights and “afford reasonable protection against contamination of fresh water supplies designated by the state engineer.” *NMSA 1978, §70-2-11; §70-2-12(A)(15).*

30. The OCD's current rules require at least one protective casing string through the artesian aquifer that is cemented to the surface and authorize the Division to require an additional protective string "as may be necessary" to effectively seal off and isolate water bearing strata. *See NMAC 19.15.16.10.A (Respondents' Ex. 1); Kautz testimony.*

31. The Division's current rules contain "detailed requirements" relating to the cementing and testing of the protective string(s). *See NMAC 19.15.16.10.A; Kautz testimony.*

32. The evidence establishes that, since the early 1900's, more than 9,000 oil and gas wells have been drilled in the subject area. *See, e.g., Lime Rock Ex. 1; Kautz, Bird, Mullen and Maxey testimony.*

33. Most of these wells have been drilled with a single protective string cemented to surface that extends below the deepest aquifer. *See, e.g., EOG Ex. 2; Mullen testimony.*

34. Two protective strings are utilized when drilling hazards exist or problems are encountered during the drilling of the well. *See EOG Ex. 2; Kautz, Bird, Krogman, Mullen and Maxey testimony.*

35. The OCD and the PVACD, which is an advocate for the proposed special rules, presented testimony that the primary concern is the "theoretical possibility" of fluid movement between the aquifers during oil and gas drilling until the protective casing string is set. *See Kautz, Goetze, Atkins and Peery testimony; Brooks comments.*

36. If this "theoretical possibility" existed, it would manifest itself in the form of instances of fluid migration during drilling or instances of isolated degradation of water quality over the decades of oil and gas drilling in the subject area. *See observation by Commissioner Balch.*

37. Respondents presented testimony from qualified experts in petroleum drilling and engineering on the following:

- a. No evidence has been found indicating any degradation of the aquifers despite thousands of wells and decades of oil and gas drilling in the subject area;
- b. Fresh water used while drilling through the aquifers has a sufficient hydrostatic head to prevent fluid migration from one aquifer to the other during drilling;
- c. There are no known instances of water from the aquifers “flowing” during drilling operations;
- d. Any loss of circulation while drilling through the shallow aquifer will be “healed” with cuttings and mud by the time drilling extends into the artesian aquifer; and
- e. There are no known instances of failure to confine groundwater during oil and gas drilling in the subject area.

See Bird, Krogman, Mullen and Maxey testimony.

38. The qualified experts in petroleum drilling and engineering offered opinions that the current OCD rules have adequately protected the aquifers and will continue to adequately protect them during oil and gas drilling operations. *See Bird, Krogman, Mullen and Maxey testimony.*

39. Mr. Kautz, who is the longest-serving technical expert for the Division and has over 35 years of experience regulating oil and gas drilling in the subject area, testified that, in preparation for the hearing, the Division reviewed information and solicited evidence bearing on whether decades of oil and gas drilling in the subject area has resulted in a degradation of the aquifers and came to the following conclusions:

- a. The Division found no evidence of any contamination of the aquifers from oil and gas drilling in the subject area;
- b. The Division found no evidence of any degradation of the aquifers; and

c. The Division found no evidence of any failure to confine the groundwater during oil and gas drilling operations.

Kautz testimony; see also Goetze testimony.

40. The OCD's witnesses testified that the Division's application was filed after it discovered that recent drilling permits had been *mistakenly approved* without a protective casing string at a depth sufficient to isolate the artesian aquifer. *See Kautz and Goetze testimony.*

a. Drilling permits were approved by new employees in the Division's district office who were unfamiliar with the depth of the aquifers in the subject area. *See Goetze testimony (responding to question from Commissioner Padilla); and*

b. Mr. Kautz testified that special rules are not required to address this deficiency and that education on the requirements of the current division rules and the depth of the aquifers in the subject area should prevent similar mistakes. *Kautz testimony.*

41. Mr. Kautz further testified that the current Division rules, when properly applied, have proven to adequately protect the aquifers in the subject area.

42. The Division presented no evidence of any degradation of the aquifers after decades of oil and gas drilling in the subject area, nor did it present evidence of any failure to confine groundwater during oil and gas drilling in the subject area.

43. The PVACD likewise presented no evidence of any degradation of the aquifers after decades of oil and gas drilling in the subject area or any failure to confine groundwater during oil and gas drilling.

44. The PVACD's witnesses confirmed the absence of any evidence demonstrating a "systematic problem" with the current Division rules or the use of a single protective string through

the aquifers that is cemented to surface. *See Atkins and Peery testimony (responding to questions from Commissioner Balch).*

45. The evidence demonstrates that the “theoretical possibility” of fluid migration from one aquifer to the other has not occurred despite the drilling of more than 9,000 oil and gas wells in the subject area.

46. The evidence further demonstrates that (i) the current Division rules, which require at least one protective string through the aquifers cemented to surface, provide adequate protection of the aquifers in the subject area, and (ii) special rules are not required.

A “Theoretical Possibility” of Fluid Migration Exists Only in A Limited Area Where the Aquifers Overlap and Are Already Naturally Connected.

47. The Division and the PVACD presented testimony that the primary concern is the “theoretical possibility” of fluid movement between the aquifers during oil and gas drilling until the protective casing string is set. *See Kautz, Goetze, and Atkins testimony.*

48. This “theoretical possibility” only exists in a limited area where both aquifers are present and does not exist in the portion of the RAB where only the artesian aquifer is present.

49. The area of the RAB where both aquifers are present is well defined and identified by township and range in the exhibits presented at the hearing. *See OCD Ex. 1, Figures 1, 2 and 3; PVACD Exs. 1 and 8; Lime Rock Ex. 1.*

50. The testimony from qualified experts in geology and hydrology all agreed there is “minimal separation” between the two aquifers in portions of the subject area, that the confining barrier is “leaky” throughout the subject area, and that “commingling naturally occurs” between the two aquifers. *See Goetze, Atkins and Peery testimony; OCD Ex. 1, Figure 5; PVACD Ex. 2.*

**The Evidence Does Not Support the Additional Cost of a Second Protective Casing String
Absent a Drilling Hazard or Problems Encountered During Drilling.**

51. Respondents' witnesses testified that most of the oil and gas wells drilled in the subject area over the decades of drilling utilize a single protective string at a depth sufficient to cover the aquifers. *See, e.g., Lime Rock Ex. 1; EOG Ex. 2; Mullen testimony.*

52. Respondents presented testimony from qualified experts in petroleum drilling and engineering on the following:

a. It generally takes less than a day to drill and cement the protective string through the aquifers, and the hole is filled with fluid to prevent cross flow during the drilling process;

b. It generally takes less than an hour to commence the installation and cementing of the protective casing string once drilling has reached the artesian aquifer;

c. Fresh water is used while drilling through the aquifers;

d. The fresh water used while drilling through aquifers has a sufficient hydrostatic head or weight to prevent fluid migration from one aquifer to the other;

e. There are no known instances of water from the aquifers "flowing" during drilling operations;

f. A single protective string has been used for decades in the subject area without incidences of fluid migration;

g. A second protective string is utilized when drilling hazards exist or problems are encountered during drilling operations;

h. A second protective string increases the amount of fresh water necessary to drill the well, requires disposal of more drill cuttings, creates difficulty in cleaning the hole for cementing, and increases the drilling hazards;

i. A second protective string increases the cost of drilling a well by approximately 10% to 20%;

j. The costs associated with the Division's proposal for a second protective casing string will cause operators to expend drilling capital elsewhere and will decrease the number of wells that are currently planned to be drilled in the subject area;

k. A second protective string prevents the well from being subsequently used as a water well; and

l. In the absence of drilling hazards or problems encountered during drilling, a second protective string is not necessary to adequately protect the aquifers in the subject area.

See Bird, Krogman, Mullen and Maxey testimony; Mack Ex. 2; EOG Ex. 2; Lime Rock Ex. 8.

53. As previously noted, no evidence was presented of any "systematic problem" with fluid migration arising out of the use of a single protective string that is cemented to surface.

54. Mr. Kautz testified he has "mixed feelings" about mandating two strings of protective casing due to the cost, the existence of a hydrostatic head during drilling and the use of fresh water during drilling. *See Kautz testimony (responding to question from Commissioner Padilla).*

55. The evidence demonstrates that mandating two protective strings in the subject area will increase the costs of drilling a well and cause waste.

56. On balance, the evidence presented does not justify the increased cost and the potential waste that would occur as a result of the Division's proposal to mandate two protective strings in the subject area.

Cement Bond Logs Are Unnecessary Where Cement Is Circulated to Surface.

57. The OCD has proposed that operators submit cement bond logs to the Division's district office for approval after setting the protective casing strings and before commencing further drilling of the well. *See Proposed Rule C (4).*

58. If a negative reading is seen in a cement bond log, the only remedy is to perforate the casing and attempt to squeeze additional cement into the annulus. *See Testimony of Goetze, Kautz and Bird.*

59. Mr. Kautz testified that it is necessary to allow the cement to cure prior to running a cement bond log to avoid false readings, and agreed that it could take up to a week for cement to properly cure on the protective casing string. *See Kautz testimony (responding to question from Commissioner Balch).*

60. The Division's witnesses testified that while the Division anticipates having staff available to review cement bond logs, it is unknown how long it will take them to review and approve cement bond logs. *See Goetze testimony (responding to question from Commissioner Padilla) and Kautz testimony.*

61. Respondents presented testimony from qualified experts in petroleum drilling and engineering on the following:

- a. Reading cement bond logs is very subjective and can yield differing interpretations from qualified experts;
- b. False readings from cement bond logs will cause operators to perforate the casing unnecessarily and thereby harm the integrity of the protective casing system;
- c. To avoid false readings, it is necessary that the cement properly cure, which takes *at least* 72 hours;

- d. Cement bond logs are unnecessary when the cement is circulated to surface, where the quality, height and circulation of the cement can be observed;
- e. *Circulating* cement to surface prevents voids in the cement sheath;
- f. The Division's proposed requirement will add over \$160,000 to the cost of drilling a well due to the delay associated with curing the cement, obtaining a bond log, and submitting it for approval to the Division;
- g. A cement bond log is unnecessary and serves no purpose where cement is circulated to surface; and
- h. The cost increases associated with the Division's proposed Rule C(4) would cause operators not to drill in the subject area.

See Bird, Krogman, Mullen and Maxey testimony; Respondents' Ex. 8.

62. Mr. Kautz testified that during his 35 years of experience he has not observed any incidences of cement channeling in the protective casing strings. *Kautz testimony (responding to question from Chairman Catanach).*

63. The witnesses presented by the Division and the PVACD concurred that cement bond logs are unnecessary where the cement has been successfully circulated to surface. *See Kautz, Goetze, and Peery testimony.*

64. The Division's *existing* rules require the cement on the *protection* string to be circulated to the surface. *See NMAC 19.15.16.10.B; Kautz testimony.*

65. On balance, the evidence presented does not justify the cost and expense associated with the Division's proposal to halt the drilling process for the purpose of submitting for approval cement bond logs for the protective strings.

66. The witnesses presented by the parties agreed that cement bond logs and temperature surveys are tools used to determine the height of cement on the casing strings.

67. The modifications to the Division's proposed rule filed by the Respondents provide for the filing of cement bond logs or temperature surveys with the Division when the cement on the *production* string is not circulated to surface. *See Modifications to Proposed Rule C(6)*.

68. The evidence establishes that it is unnecessary to submit cement bond logs to the Division where the cement on the production string has been circulated to the surface.

The Proposed Annular Space Will Not Provide Additional Protection to the Aquifers.

69. The Division has proposed that the diameter of the hole in which the protective casing string is set shall be at least two inches greater than "the outer diameter of the *couplings* on the casing string." *Proposed Rule F (emphasis added)*.

70. The modifications to the Division's proposed rule filed by the Respondents agree that two inches is the proper spacing, but note that the two inches must be measured from "the nominal outer diameter of the *casing* string" rather than the "couplings." *Modifications to Proposed Rule F (emphasis added); Respondents' Exhibits 9-10; Bird testimony*.

71. The Division witnesses testified that two inches of annular space is the "maximum distance" appropriate for oil and gas wells and deferred to qualified drilling engineers regarding whether the two inches should be measured from the couplings or the casing of the protective string. *See Goetze testimony (responding to question from Commissioner Catanach) and Kautz testimony ("no opinion")*.

72. Mr. Kautz testified that increasing the annular space *does not* provide more protection for the aquifers because it decreases the turbulence necessary to clean the hole for good cement bonding.

73. Respondents presented testimony from qualified experts in petroleum drilling and engineering on the following:

a. The larger hole size required by the Division's proposed rule substantially increases the amount of fresh water and energy necessary to drill the well, requires the disposal of more drill cuttings, creates difficulty in cleaning the hole for cementing, and increases the drilling hazards;

b. The larger annular space proposed by the Division prevents use of standard ("off the shelf") drill bits, centralizers, casing, equipment and tools;

c. The larger annular spacing created by the Division's proposal would increase the chance of material, tools and equipment falling into the hole and make removal ("fishing") of that material more difficult;

d. The larger annular space proposed by the Division would run the risk of decreasing the turbulence necessary to properly clean the hole, properly distribute the cement and promote good cement bonding for effective isolation of the aquifers;

e. It is customary under the Division's current rules to design the hole size and the casing program to provide for two inches of annular space as measured from the nominal outer diameter of the *casing* rather than the "couplings";

f. Two inches of annular space between the diameter of the hole and the outer diameter of the casing has proven to be an effective distance for sealing off the aquifers; and

g. The increased annular spacing provided by the Division's proposed Rule F will result in less protection of the aquifers in the subject area.

See Bird and Mullen testimony; Respondents' Ex. 11.

74. No testimony or documentary evidence was offered in support of measuring the two inches of annular space from the “couplings” rather than the casing.

75. On balance, the evidence presented does not support adoption of a rule that requires the two inches of annular space to be measured from the “couplings” rather than the nominal outer diameter of the casing.

If Special Rules Are Necessary, the Evidence Supports the Modifications Filed By Respondents That Should Only Apply in the Overlapping Area.

76. The Division’s witnesses testified that the proposed rule reflects the “most conservative approach” to addressing a “theoretical possibility” of fluid movement between the aquifers during oil and gas drilling. *See Goetze and Kautz testimony; Brooks comments.*

77. Respondents’ proposed modifications would require the following with respect to the casing strings:

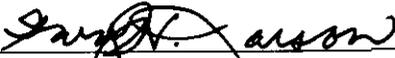
- a. A protective string cemented to surface that is at least 50 feet below the base of the deepest aquifer or not more than 50 feet above the first show of hydrocarbons on a mud log; and
- b. Cement on the production casing string that extends not less than 500 feet above the previous casing shoe.

See Respondents’ Ex. 2 (Modifications to Proposed Rule C).

78. The modifications further provide that the District Supervisor is authorized to require an additional protective string and other modifications to the casing program “if the district supervisor finds that the proposed casing program is not reasonably sufficient to prevent fluid movement into or out of the well bore from or to either designated aquifer.” *Modifications to Proposed Rule D.*

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on this 21st day of December, 2016, I served a true and correct copy of the foregoing *Respondents' Joint Statement of Reasons* via email to:

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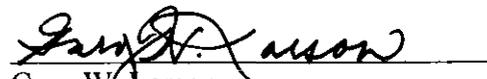
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