

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

**APPLICATION OF THE NEW MEXICO OIL CONSERVATION
DIVISION THROUGH THE SUPERVISOR OF DISTRICT II FOR
AN EMERGENCY ORDER SUSPENDING CERTAIN APPROVED
APPLICATIONS FOR PERMITS TO DRILL, AND FOR ADOPTION
OF SPECIAL RULES FOR DRILLING IN CERTAIN AREAS FOR THE
PROTECTION OF FRESH WATER, CHAVES AND EDDY COUNTIES,
NEW MEXICO**

**CASE NO. 15487
ORDER NO. R-14164-F**

AMENDED ORDER OF THE COMMISSION

This matter came before the Oil Conservation Commission (Commission) on an application submitted by the Oil Conservation Division through the Supervisor of District II (Division or OCD) to amend 19.15.39 NMAC by adding a new section 11 for special rules regarding casing and cementing of oil and gas wells drilled in a designated area including the Roswell Artesian Basin in Chaves and Eddy Counties. The Commission, having conducted a public hearing on December 5, 6, and 7, 2016, and a limited rehearing on May 18, 2017, and having considered the testimony and record in this case, withdraws Order No. R-14164-D, and enters this amended order.

THE COMMISSION FINDS THAT:

1. Under the Oil and Gas Act (the Act), NMSA 1978, Sections 70-2-6, 70-2-11, and 70-2-12, the Commission and the Division are granted the authority to adopt rules to carry out the purposes of the Act. The Act provides that no rule shall be adopted pursuant to the Act until after a hearing by the Commission. NMSA 1978, Section 70-2-12.2.

2. NMSA 1978, Section 70-2-12(B)(2) provides the Commission and the Division the authority "to prevent crude petroleum oil, natural gas or water from escaping from strata in which it is found into other strata."

Procedural Background

3. On or about April 1, 2016, representatives of the Division's Hobbs and Artesia District Offices met with a group of state legislators and representatives of the Pecos Valley Artesian Conservancy District (PVACD) to discuss concerns regarding oil and gas drilling in the Roswell Artesian Basin and potential impacts to the aquifers.

4. On April 6, 2016, the Division, through the acting Supervisor of District II, filed an amended application for (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 before a Division hearing examiner on May 10, 2016.

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

6. Emergency Order No. E-42 further ordered the Applicant to propose such special rules as necessary for the protection of sources of fresh water designated by the State Engineer in, and in the vicinity of, the Pecos Valley in Chaves and Eddy Counties, New Mexico.

7. The Division's existing rule, 19.15.16.9 NMAC requires operators to seal and separate the oil, gas, and water bearing strata, confine the fresh waters to their respective strata, take special precautions to guard against the loss of artesian water from the strata in which it occurs, and prevent the contamination of the artesian water by objectionable water, oil, or gas. 19.15.16.9 NMAC further requires operators to ensure water is shut off from oil and gas bearing strata by cementing the casing.

8. 19.15.16.10(A) NMAC further requires that "[t]he operator shall equip a well drilled for oil or gas with surface and intermediate casing strings and cement as may be necessary to effectively seal off and isolate all water-, oil- and gas-bearing strata and other strata encountered in the well . . ."

9. On April 25, 2016, the Director issued Extension Order No. E-42 extending the original Emergency Order for an additional 15 days and setting the matter for hearing on May 10, 2016.

10. On May 4, 2016, the Division Director issued Emergency Order No. E-42-A setting a hearing for May 10, 2016, in Santa Fe, New Mexico, reiterating that a hearing would be held in this matter before a Division Hearing Examiner to consider the Division request that the APDs continue in a suspended state until a full hearing on the merits was conducted, and waiving the 20-day required notice for a Division hearing to an interim order only.

11. On May 4, 2016, the Division filed a Second Amended Application requesting a restrictive order for the Designated Area, identifying the oil and gas bearing pools in the Designated Area, and requesting an Interim Order suspending all APDs for wells not yet drilled within the Designated Area until a full merits hearing was held on the matter, and allowing the Division to approve exceptions to such suspensions upon demonstration that fresh water sources will be adequately protected.

12. On May 10, 2016, a hearing was held before Division Hearing Examiner William V. Jones on the Division's request for an interim order to continue the suspension of all APDs for wells not yet drilled within the Designated Area until a full merits hearing was held on the matter and allowing the Division to approve exceptions to such suspensions upon demonstration that fresh water sources will be adequately protected. The case was continued to June 15, 2016.

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

14. On May 26, 2016, the Division filed its Third Amended Application.

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

16. Pursuant to NMSA 1978, Section 70-2-6(B) the Division Director entered Order No. R-14164-B 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.

17. On July 15, 2016, the Division filed its Fourth Amended Application.

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

19. The Commission entered Order No. R-14164-C 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 prehearing statements and exhibits be filed with the Commission, and exchanged among the parties, no later than 5:00 p.m. on November 21, 2016.

20. On October 25, 2016, the Division filed its 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. The rule applies to an area defined in the rule and establishes drilling requirements.

21. On October 27, 2016, notice of the rulemaking hearing was posted on the Division's website.

22. On October 28, 2016, notice of the rulemaking hearing was published in the Artesia Daily Press, a newspaper of general circulation in Eddy County, New Mexico; on October 29, 2016, notice of the rulemaking was published in the Roswell Daily Record, a newspaper of general circulation in Chaves County; and on November 15, 2016, notice of the rulemaking was published in the New Mexico Register.

23. On November 15, 2016, notice of the rulemaking hearing was delivered by electronic mail to each person who had requested in writing to be notified of such hearings.

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

25. On December 1, 2016, prior to 10:00 a.m., notice of the rulemaking was posted on the door of Porter Hall in the Wendell Chino Building at 1220 South St. Francis Drive, Santa Fe, New Mexico.

26. The parties who entered an appearance or filed a prehearing statement in the case are the Division, 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).

27. The Commission heard the Division's application for rulemaking at a public hearing on December 5, 6, and 7, 2016. At the hearing, the PVACD supported the Division's proposed rule, while COG, OXY, Fasken, EOG, Lime Rock, Mack, Devon, IPANM, and NMOGA opposed the proposed rule or, alternatively, supported their modifications to the proposed rule.

28. The Division appeared through counsel and presented expert testimony from Paul Kautz (Kautz), District Geologist from the Division's Hobbs District Office, and Phillip Goetze (Goetze), the Division's Geologic Specialist.

29. PVACD appeared through counsel and presented expert testimony from Jack Atkins, P.E. (Atkins) and Roger Peery, C.P.G., P.G. (Peery) on the hydrology and geohydrology of the designated area. The designated area is most commonly known as and referred to as the Roswell Artesian Basin (RAB), per the Office of the State Engineer Declared Underground Water Basins.

30. COG, Fasken, and OXY jointly appeared through counsel and presented expert testimony from Carl Bird (Bird), a petroleum and drilling engineer with COG.

31. EOG, formerly known as Yates Petroleum Corporation, appeared through counsel and presented expert testimony from Jeremiah Mullen (Mullen), an engineer with EOG.

32. Lime Rock appeared through counsel and presented expert testimony from John Maxey (Maxey), an engineer retained for the purposes of the hearing.

33. Mack appeared through counsel and presented expert testimony from Jim Krogman (Krogman), a drilling supervisor with Mack.

34. IPANM appeared through counsel, but did not present evidence or testimony.

35. Devon and NMOGA had counsel enter on their behalf, respectively, prior to the hearing. Neither appeared at the hearing.

36. The Commission deliberated on the proposed rule in open session on January 4, 2017 and on January 9, 2017.

37. On February 8, 2017, the Commission entered Order No. R-14164-D adopting 19.15.39.11 NMAC. Pursuant to NMSA 1978, Section 70-2-12.2, the revised rule was not filed with the State Records Center and Archives while the rehearing period was available.

38. On February 28, 2017, PVACD, COG, Fasken, OXY, Mack, Devon, Lime Rock, and NMOGA (joint applicants) filed a joint application for rehearing regarding two issues: (a) the breadth of the designated area, and (b) the language comprising 19.15.39.11(C)(2) NMAC as adopted by the Commission in Order No. R-14164-D. The Commission Chair granted the application.

39. On April 4, 2017, the Commission ratified the rehearing and provided a schedule for the rehearing. On April 5, 2017, the scheduling order for the rehearing on the two issues raised in the joint application was issued.

40. On May 18, 2017, the Commission held the rehearing.

41. EOG and Lime Rock appeared at the rehearing through counsel and presented testimony from Maxey.

42. The Division appeared through counsel and presented testimony from Goetze.

43. PVACD appeared through counsel and presented testimony from Peery.

44. On June 13, 2017, the Commission deliberated on the evidence and testimony presented at the rehearing.

Roswell Artesian Basin

45. 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. 9 at 2; OCD Ex. 1, Figure 2.

46. 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 5; OCD Ex. 1, Figure 2.

47. The artesian aquifer begins in the north in Township 5 South and extends south for more than 100 miles to Township 23 South and from just east of the Pecos River to approximately 30 miles west of the Pecos River.

48. In the eastern portion of the RAB, there is also 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, Figures 2 and 3; Lime Rock Ex. 10 at 5-6, 9.

49. The shallow aquifer overlies the artesian aquifer, and extends from north of Bitter Lakes National Wildlife Refuge in Township 9 South to the south for approximately 65 miles to the Seven Rivers area in Township 20 South, and from just east of the Pecos River to approximately 12 miles west of the Pecos River.

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

51. 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. Lime Rock Ex. 9 at 18. The bottom of the artesian aquifer is generally accepted to be where the porous intervals in the top of the San Andres formation are in contact with the low porosity intervals of the middle and lower San Andres formation.

52. 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. OCD Ex. 1, Figures 4 and 5; Lime Rock Ex.2.

53. There is naturally-occurring cross-flow of ground water between the aquifers through the moderately permeable confining unit. Lime Rock Exs. 2 and 10 at 5.

54. When water in the artesian aquifer is drawn for irrigation purposes, ground water from the shallow aquifer can flow downward into the artesian aquifer, while in the winter the flow of ground water may be reversed, with ground water from the artesian aquifer flowing into the shallow aquifer. See Lime Rock Exs. 2 and 10 at 10; Atkins testimony.

55. Peery testified the communication from the shallow aquifer to the artesian aquifer is six orders of magnitude less than the communication of the artesian aquifer to the shallow aquifer. Meaning the communication that occurs between the two aquifers is a negligible amount of aquifer-to-aquifer water transfer. The shallow aquifer is mainly

recharged by surface sources of recharge, while the artesian aquifer is recharged by inflow from the mountains to the west of the designated area.

56. Approximately 4.2 billion barrels per annum is diverted from the two aquifers for municipal, domestic, industrial, commercial, and irrigation uses throughout the designated area. Atkins and Peery testimony.

57. Atkins and Peery testified that the water in both aquifers is considered potable.

58. Atkins testified that artesian wells typically produce water at the rate of 1,000 gallons per minute (gpm) to 2,000 gpm; shallow wells typically produce at a rate of 200 gpm to 1,000 gpm.

59. Hydrocarbons are present in certain areas in the San Andres formation.

Division's Proposed Rule

60. The Division proposed to amend 19.15.39 NMAC by adding a new section 11 titled Special Provisions for a Selected Area of the Roswell Artesia Basin.

61. The Division's proposed Subsection A of 19.15.39.11 NMAC defines a designated area that includes certain townships in Chaves and Eddy Counties and provides all oil and gas wells drilled after the effective date of the rule from surface locations within the designated area or that will penetrate the designated area above the base of the San Andres formation should be permitted, drilled, and operated per the requirements in the proposed new section 11. Fifth Amended Application for Rulemaking.

62. The Division proposed certain requirements for wells that penetrate both the shallow aquifer and the artesian aquifer in its Subsection C of 19.15.39.11 NMAC.

63. The Division proposed in its Paragraph (1) of Subsection C of 19.15.39.11 NMAC that if an operator uses a conductor pipe, the operator will adequately cement the conductor pipe in place to prevent drainage of fluids from the surface or other shallow formations into the shallow aquifer.

64. The Division proposed in its Paragraphs (2) and (3) of Subsection C of 19.15.39.11 NMAC that an operator set two water protection casing strings. The Division proposed that the operator set the surface casing string at least 50 feet below the base of the shallow aquifer with cement circulated to the surface and an intermediate casing string in the San Andres formation at a depth of approximately 1,200 feet below the surface.

65. The Division proposed in its Paragraph (5) of Subsection C of 19.15.39.11 NMAC that the operator cement the production casing string to a depth not less than 500 feet above the intermediate casing shoe.

66. The Division proposed in its Paragraph (4) of Subsection C of 19.15.39.11 NMAC that after setting each water protection casing string, the operator furnish a cement bond log to the Division's Artesia District Office and not continue drilling until the Division approves the cement bond log.

67. The Division proposed in its Paragraph (6) that after setting the production casing string, the operator furnish a cement bond log to the Division's Artesia District Office and not proceed with completion until the Division approves the cement bond log.

68. The Division proposed in its Subsection D of 19.15.39.11 NMAC to allow the District Supervisor of the Division's Artesia District Office to approve a casing program for a well that penetrates both aquifers that requires only one water protection casing string if the District Supervisor finds that it will be reasonably sufficient to prevent fluid movement into or out of the well bore from or to either aquifer.

69. The Division proposed in its Subsection E of 19.15.39.11 NMAC to require only one water protection casing string for wells that only penetrate the artesian aquifer, but require cement on the production casing string to be circulated to surface.

70. The Division proposed in its Subsection F of 19.15.39.11 NMAC that the diameter of the hole in which a casing string is set shall be at least two inches greater than the outer diameter of the couplings on the casing string.

Proposed Modifications to the Division's Proposed Rule

71. COG, OXY, Fasken, EOG, Lime Rock, Mack, Devon, IPANM, and NMOGA filed proposed modifications to the Division's proposed rule.

72. The proposed modifications require only one water protection casing string when both aquifers are present and require that an operator set the surface casing string 50 feet below the base of the artesian aquifer or not more than 50 feet above the first show of hydrocarbons on a mud log. The operator shall cement the production casing string to a depth not less than 500 feet above the previous casing shoe.

73. The proposed modifications remove the requirement for furnishing cement bond logs and replace it with a requirement to furnish a temperature survey or cement bond log if cement is not circulated to surface on the production casing string.

74. The proposed modifications proposed allowing the District Supervisor to require two water protection casing strings if the District Supervisor finds that a single water protection casing string will not be reasonably sufficient to prevent fluid movement into or out of the well bore from or to either aquifer.

75. The proposed modifications proposed that the diameter of the hole in which a casing string is set shall be at least two inches greater than the outer diameter of the casing string rather than the coupling.

Rule Adopted by the Commission after Rehearing

76. The Commission adopts Subsection A of 19.15.39.11 NMAC describing the designated area as initially proposed by the Division. The designated area includes the Roswell Artesian Basin.

77. The Commission does not adopt a designated area that only includes both the shallow and artesian aquifers as COG, Fasken, OXY, Mack, Devon, Lime Rock, and IPANM proposed at rehearing.

78. Evidence at the initial hearing identified the artesian aquifer as having very good water quality and sufficient recharge as to be the primary water source for domestic, municipal, industrial, and agricultural uses within the Roswell Artesian Basin. Atkins, Goetze, Kautz, and Peery testimony.

79. While the Commission finds below that the evidence does not support the Division's proposal for two water protection casing strings and that the single water protection casing string set below the deeper aquifer, and a production casing string, both with proper cementing where both the shallow and artesian aquifer are present, the Commission does not find that the production string alone provides sufficient protection for the artesian aquifer if surface casing were not set.

80. Therefore, the requirement for a single water protection casing string below the artesian aquifer is based upon the occurrence of the deeper artesian aquifer, and not the presence of both aquifers, in the drilling area. Thus, the designated area is properly defined to include the entire areal extent of the artesian aquifer as identified by the State Engineer. Peery testimony.

81. In addition, the requirement for setting casing in wells that penetrate only the artesian aquifer is not merely duplicative of 19.15.16.10(B) NMAC. 19.15.16.10(b) NMAC provides only that water zones shall be isolated, not how they shall be isolated. 19.15.39.11(C) NMAC prescribes that a particular, identified fresh water zone (the artesian aquifer) must be isolated in a particular manner (by setting surface casing 50 feet, at a minimum, below its base). Thus, 19.15.16.10(B) NMAC does not obviate the need for 19.15.39.11 NMAC to apply wherever the artesian aquifer is found.

82. The Commission adopts Paragraph (1) of Subsection C of 19.15.39.11 NMAC regarding cementing of the conductor pipe substantially as proposed by the Division.

83. Kautz testified that cementing of the conductor pipe prevents fluid flow to shallow formations.

84. The Commission finds that the evidence does not support adopting the Division's initial proposal to require two water protection casing strings where both aquifers are present.

85. Instead the Commission finds that a single water protection casing string protects the aquifers when both the surface casing string and the production casing string are cemented to surface.

86. As proposed by the Division in its closing statement for the rehearing, the operator shall set a surface casing string, at a minimum, 50 feet below the base of the artesian aquifer provided in areas where the artesian aquifer is not present at depth, or if the well will not be drilled through the artesian aquifer, the hole shall be drilled to the first show of hydrocarbons on a mud log, and the surface casing set no more than 50 feet above of first show. In areas where the artesian aquifer is present, and the well will be drilled through the artesian aquifer, the operator shall determine the depth for setting of the surface casing string with the concurrence of the district supervisor of the Division's Artesia District Office. The operator, in its proposed casing program, shall identify the criteria used to locate the base of the artesian aquifer and the information supporting the criteria.

87. The joint applicants proposed in their application for rehearing that any option to set a shallower casing above the first show of hydrocarbons in lieu of casing through the artesian aquifer would apply only in "areas of known hydrocarbon shows or production from the confining unit or the artesian aquifer". However, it is not clear whether the shallower casing the second sentence requires in such areas is in lieu of, or in addition to, the casing required below the artesian aquifer.

88. Lime Rock proposes that the Commission adopt the joint applicant's proposal language in modified form that unambiguously requires only one casing string (above the artesian aquifer) in areas of shallow hydrocarbon shows. If only one casing string is required, it should be set below the base of the artesian aquifer wherever that aquifer is present and protectible, not above the artesian aquifer, so that the artesian aquifer is protected.

89. Therefore, the Commission adopts the language the Division proposed at rehearing.

90. The operator shall circulate to surface the cement for the surface casing covering all aquifers. By cementing to surface on the water protection casing string and the production casing string there are two layers of steel and cement between the aquifer(s) and the well bore. Mullen and Maxey testimony.

91. In addition, operators shall immediately notify the Division if they encounter significant loss of circulation during drilling within an aquifer or if they observe significant inflow of fresh water into the mud pit.

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

93. In addition, testimony was presented that 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.

94. The Division's current rules require an operator to "equip a well drilled for oil or gas with surface and intermediate casing strings and cement as may be necessary to effectively seal off and isolate water bearing strata . . .". See 19.15.16.10(A) NMAC (Respondents' Ex. 1). It does not require that the production casing be cemented to surface.

95. Since the early 1900s, more than 9,000 oil and gas wells have been drilled in the designated area. Lime Rock Ex. 1; Kautz, Bird, Mullen, and Maxey testimony.

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

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

98. The Division and PVACD presented no evidence of any degradation of the aquifers after decades of oil and gas drilling in the subject area, nor did they present evidence of any failure to confine ground water during oil and gas drilling in the designated area.

99. Although ground water monitoring is not required, Division witnesses Goetze and 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 Atkins and Peery similarly acknowledged that they are not aware of any such contamination.

100. Kautz, who is the longest-serving technical expert for the Division and has more than 35 years of experience regulating oil and gas drilling in the subject area, testified that the Division reviewed information and solicited evidence bearing on whether decades of oil and gas drilling in the designated area has resulted in a degradation of the aquifers and found no evidence of any contamination of the aquifers from oil and gas drilling in the designated area.

101. Bird, Krogman, Mullen, and Maxey testified that they knew of no instances of failure to confine ground water during oil and gas drilling in the designated area.

102. 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 casing string through the aquifers that is cemented to surface.

103. The Division and PVACD presented testimony that there is a concern about the possibility of fluid movement between the aquifers during oil and gas drilling until the protective casing string is set. Kautz, Goetze, Atkins, and Peery testimony. This 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.

104. The Division and PVACD presented no testimony showing fluid movement between the aquifers during oil and gas drilling until the protective casing string is set. Krogman, Bird, and Mullen testified that they knew of no instances of water from the aquifers "flowing" during drilling operations.

105. Bird, Krogman, and Mullen testified that fresh water is used while drilling through the aquifers.

106. Bird, Maxey, Mullen, and Krogman testified that 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.

107. Additionally, it generally takes less than a day to drill and cement the protective casing string through the aquifers, and the hole is filled with fluid to prevent cross flow during the drilling process. 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. Bird and Krogman testimony.

108. The evidence demonstrates that mandating two protective casing strings in the subject area will increase the costs of drilling a well. Evidence was presented that a second protective casing string increases the cost of drilling a well by approximately 10% to 20%. EOG Ex. 3; Mullen testimony.

109. A second protective casing 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. Bird testimony.

110. The Division 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.

111. The Commission does not adopt the Division's proposed Paragraphs (4) and (6) of Subsection C of 19.15.39.11 NMAC requiring the operator to run a cement bond log after setting the water protection casing string and the production casing string as the evidence does not support the proposal.

112. Instead, the Commission adopts a requirement that if cement is not circulated to surface on the surface casing string, the operator shall furnish a cement bond log to the Division's Artesia District Office and shall not proceed with completion until the Division approves the cementing. If cement is not circulated to surface on the production

casing string, or if applicable, an intermediate casing string, the operator shall determine the cement top and report it to the Division's Artesia District Office.

113. Testimony was presented that 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. Goetze, Kautz, and Bird testimony.

114. 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.

115. 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. Goetze and Kautz testimony.

116. Reading cement bond logs is very subjective and can yield differing interpretations from qualified experts. Krogman testimony.

117. False readings from cement bond logs may cause operators to perforate the casing unnecessarily and thereby harm the integrity of the protective casing system. Krogman testimony.

118. To avoid false readings, it is necessary that the cement properly cure, which takes at least 72 hours. Krogman and Mullen testimony.

119. Cement bond logs are unnecessary when the cement is circulated to surface, where the quality, height and circulation of the cement can be observed. Krogman and Mullen testimony. The witnesses presented by the Division and PVACD concurred that cement bond logs are unnecessary where the cement has been successfully circulated to surface. Kautz, Goetze, and Peery testimony.

120. Circulating cement to surface prevents voids in the cement sheath. Bird testimony.

121. Testimony was provided the Division's proposed requirement will add more than \$130,000 to \$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. Respondents' Ex. 8; EOG Ex. 3; Bird and Mullen testimony.

122. Testimony was provided the cost increases associated with the Division's proposed rule would cause operators not to drill in the designated area. Bird, Krogman, Mullen, and Maxey testimony; Respondents' Ex. 8.

123. Kautz testified that during his 35 years of experience he has not observed any incidences of cement channeling in the protective casing strings.

124. The evidence presented does not justify the cost and expense associated with the Division's proposal to halt the drilling process to submit cement bond logs for approval.

125. 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. Bird testimony.

126. In its Subsection D of 19.15.39.11 NMAC, the Division proposed to allow the District Supervisor to make exception to its proposed requirement for two water protection casing strings. COG, OXY, Fasken, EOG, Lime Rock, Mack, Devon, IPANM, and NMOGA in their proposed modifications provide for the District Supervisor to require two water protection casing strings in certain circumstances. The Commission is not requiring two water protection casing strings, but finds that if the District Supervisor determines that a proposed casing program is not reasonably sufficient to prevent fluid movement into or out of the well bore from or to aquifers in the designated area, the District Supervisor may require an additional water protection casing string, or approve a casing program that allows for the setting of the shoe for the water-protection casing string at a different depth than required in Paragraph (2) of Subsection C of 19.15.39.11 NMAC if the district supervisor finds, based on information and data the operator provides, that the proposed casing program will adequately protect all fresh water formations the well can reasonably be expected to encounter.

127. The Division proposed in its Subsection D of 19.15.39.11 NMAC that where only the artesian aquifer is present that an operator may use only one water protection casing string, which shall be cemented to surface. As the Commission is not adopting the Division's proposed requirement for two water protection casing strings where both aquifers are present, adoption of Subsection E as proposed is unnecessary.

128. The Division proposed in its Subsection F of 19.15.39.11 NMAC 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.

129. The Commission does not adopt the Division's proposal to require the diameter of the hole in which the protective casing string is set be at least two inches greater than the outer diameter of the couplings on the casing string, as the evidence does not support the proposal.

130. 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. Goetze and Kautz testimony.

131. 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.

132. Bird testified 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 drilling hazards.

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

134. 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. Bird testimony.

135. 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. Bird testimony.

136. 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".

137. 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.

138. The Commission adopts the Division's proposed Subsection G of 19.15.39.11 NMAC as Commission Subsection E, and substantially adopts the proposed Subsection H of 19.15.39.11 NMAC as Subsection F, as they are unopposed and should be adopted as proposed. The Commission modifies the Division's proposal that an operator may amend an application to drill that was suspended by the emergency order within 90 days after the effective date of the rule to one year so that sufficient time is provided for the operator to amend the application and for the Division to review and approve applications.

139. The existing rules and the amendment in Attachment 1 ensure the viability and integrity of fresh water in the Roswell Artesia Basin.

THE COMMISSION CONCLUDES THAT:

1. The Commission has the authority to enact the proposed rule amendment.
2. The Commission and Applicant are empowered to make rules to prevent crude petroleum oil, natural gas, or water from escaping strata in which it is found into other strata. See NMSA 1978, § 70-2-12(B)(2).
3. Proper notice and procedures were followed in this rulemaking.

4. The amendment to 19.15.39 NMAC, as provided in Attachment 1, is supported by substantial evidence in the record.

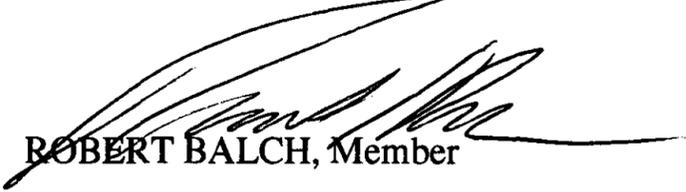
5. The Commission concludes the adoption of the amendments to 19.15.39 NMAC as provided in Attachment 1 will prevent crude petroleum oil, natural gas, or water from escaping strata in which they are found into other strata, while preventing waste and protecting correlative rights.

IT IS THEREFORE ORDERED THAT:

19.15.39 NMAC will be amended to add a new section 11 as provided in Attachment 1 and that all actions necessary to make the rule amendment effective be taken, including filing with the State Records and Archives Center and publication in the New Mexico Register. As provided in NMSA 1978, Section 70-2-12.2(B), the rule amendment shall not be filed until the later of 20 days after this Order is entered or the Commission has refused a rehearing application pursuant to NMSA 1978, Section 70-2-25.

Done in Santa Fe, New Mexico, this 13th day of July 2017.

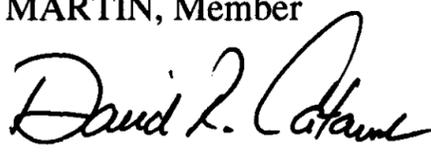
STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION



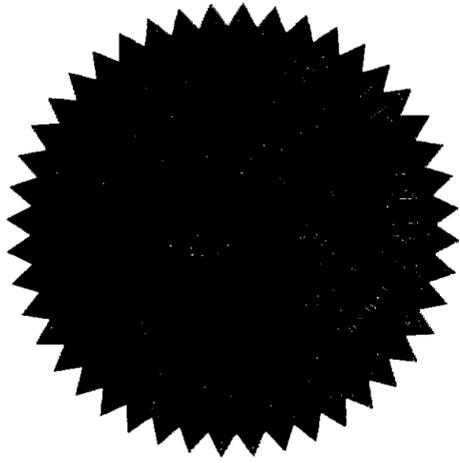
ROBERT BALCH, Member



ED MARTIN, Member



DAVID R. CATANACH, Chair



SEAL

This is an amendment to 19.15.39 NMAC, adding new section 11, effective / /2017.

19.15.39.11 SPECIAL PROVISIONS FOR A SELECTED AREA OF THE ROSWELL ARTESIAN BASIN:

A. Designated area. The designated area shall comprise:

- (1) the area within the following townships and ranges in Chaves county:
- (a) township 5 south, ranges 22 and 23 east;
 - (b) township 6 south, ranges 22 east through 24 east;
 - (c) township 7 south, ranges 22 east through 24 east;
 - (d) township 8 south, ranges 21 east through 25 east;
 - (e) township 9 south, ranges 21 east through 25 east;
 - (f) township 9½ south, range 24 east;
 - (g) township 10 south, ranges 21 east through 25 east;
 - (h) township 11 south, ranges 21 east through 26 east;
 - (i) township 12 south, ranges 21 east, 21½ east, and 22 east

through 26 east;

- (j) township 13 south, ranges 21 east through 27 east;
 - (k) township 14 south, ranges 21 east through 27 east;
 - (l) township 15 south, ranges, 21 east through 27 east;
 - (m) township 18 south, range 20 east;
 - (n) township 19 south, range 20 east; and
- (2) the area within the following townships and ranges in Eddy county:
- (a) township 16 south, ranges 21 east and 23 east through 27 east;
 - (b) township 17 south, ranges 21 east and 23 east through 27 east;
 - (c) township 18 south, ranges 21 east and 23 east through 27 east;
 - (d) township 19 south, ranges 21 east and 23 east through 27 east;
 - (e) township 20 south, ranges 21 east and 23 east through 27 east;
 - (f) township 20½ south, ranges 21 east through 23 east;
 - (g) township 21 south, ranges 22 east through 25 east;
 - (h) township 22 south, ranges 22 east through 24 east; and
 - (i) township 23 south, ranges 22 east and 23 east.

B. Applicability. All wells drilling commenced after _____ (*effective date of rule*), 2017 from surface locations within the designated area, or which will penetrate the designated area above the base of the San Andres formation, shall be permitted, drilled and operated in accordance with 19.15.39.11 NMAC.

C. Wells that penetrate the designated area. For wells that will penetrate the designated area defined in Subsection A of 19.15.39.11 NMAC, the operator shall include in the casing program at least the following.

(1) If a conductor pipe is used, it shall be adequately cemented in place to prevent drainage of fluids from the surface to shallow formations.

(2) The operator shall set a surface casing string, at a minimum, 50 feet below the base of the artesian aquifer, provided:

(a) in areas where the artesian aquifer is not present at depth, or if the well will not be drilled through the artesian aquifer, the hole shall be drilled to the first show of hydrocarbons on a mud log, and the surface casing set no more than 50 feet above the first show;

(b) in areas where the artesian aquifer is present, and the well will be drilled through the artesian aquifer, the operator shall determine the depth for setting of the

surface casing string with the concurrence of the district supervisor of the division's Artesia district office; the operator, in its proposed casing program, shall identify the criteria utilized to locate the base of the artesian aquifer and the information supporting the criteria;

(c) the operator shall circulate to surface the cement for surface casing covering all aquifers;

(d) if the cement is not circulated to the surface, the operator shall furnish a cement bond log to the division's Artesia district office, and shall not proceed with drilling until the division approves the cementing;

(e) if the operator encounters significant loss of circulation during drilling within an aquifer, the operator shall immediately notify the division's Artesia district office;

(f) if the operator observes significant inflow of fresh water into the mud pit, the operator shall immediately notify the division's Artesia district office.

(3) If the well is equipped with an intermediate casing string, the operator shall circulate cement on the intermediate casing string to the surface. If the well is not equipped with an intermediate casing string, the operator shall circulate cement on the production casing string to the surface. If cement is not circulated to surface on the intermediate casing string or the production casing string, as applicable, the operator shall determine the cement top and report it to the division's Artesia district office.

D. District supervisor discretion. Notwithstanding Subsection C of 19.15.39.11 NMAC, the district supervisor of the division's Artesia district office may:

(1) require a modification of a casing program that provides for an additional water-protection casing string, 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 aquifers in the designated area; or

(2) approve a casing program that allows for the setting of the shoe for the water-protection casing string at a different depth than required in Paragraph (2) of Subsection C of 19.15.39.11 NMAC if the district supervisor finds, based on the information and data provided by the operator, that the proposed casing program will adequately protect all fresh water formations the well can reasonably be expected to encounter; and

(3) in either case, attach such conditions of approval as, in the district supervisor's judgment, are reasonably necessary to prevent such fluid movement.

E. Compliance with statewide rules. 19.15.39.11 NMAC shall not be construed to relieve the operator of any well from the obligation to comply with any applicable statewide rules, including, but not limited to 19.15.16.9, 19.15.16.10 and 19.15.16.11 NMAC.

F. Transitional provisions. Any APD for a proposed well within the designated area that was previously approved and suspended by emergency order of the division shall be reinstated if it meets the requirements of 19.15.39.11 NMAC. Any operator may amend any such APD within one year after the effective date of 19.15.39.11 NMAC to comply with 19.15.39.11 NMAC. If the division reinstates or approves as amended a previously suspended APD, the APD shall continue in force for two years from the date of original approval, plus the number of days that such APD was suspended.

[19.15.35.11 NMAC - N, / /17]