

Entered December 8, 1982  
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STATE OF NEW MEXICO  
ENERGY AND MINERALS DEPARTMENT  
OIL CONSERVATION DIVISION

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

CASE NO. 7598  
Order No. R-7147

APPLICATION OF ANR PRODUCTION  
COMPANY AND YATES PETROLEUM CORPORATION  
FOR DESIGNATION OF A TIGHT FORMATION IN  
SAN MIGUEL, TORRANCE, GUADALUPE, DE BACA,  
LINCOLN, AND CHAVES COUNTIES, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on May 26 and June 23, 1982, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 8th day of December, 1982, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) That, pursuant to Section 107 of the Natural Gas Policy Act of 1978, and CFR Section 271.703, applicants ANR Production Company and Yates Petroleum Corporation seek the designation as a "tight formation" of the Abo formation underlying the following described lands:

SAN MIGUEL COUNTY, NEW MEXICO, NMPM

All of: Townships 10 and 11 North, Ranges 14 and 15 East

TORRANCE COUNTY, NEW MEXICO, NMPM

All of: Townships 1 through 9 North, Ranges 14 and 15 East

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GUADALUPE COUNTY, NEW MEXICO, NMPM

All of: Townships 2 through 4 North, Ranges 16 through 19 East,  
Township 5 North, Ranges 16 through 23 East,  
Township 6 North, Ranges 16 through 24 East,  
Township 7 through 11 North, Ranges 16 through 26 East

DE BACA COUNTY, NEW MEXICO, NMPM

All of: Townships 1 through 4 North, Ranges 20 through 27 East  
Township 5 North, Ranges 24 through 26 East,  
Township 6 North, Ranges 25 and 26 East,  
Township 1 South, Ranges 20 through 27 East,  
Township 2 South, Ranges 20 and 21 East,  
Township 3 South, Range 21 East,

LINCOLN COUNTY, NEW MEXICO, NMPM

All of: Township 1 North, Ranges 16 through 19 East,  
Townships 1 through 5 South, Ranges 14 through 19 East,  
Township 6 South, Ranges 15 through 20 East,  
Township 7 through 9 South, Ranges 15 through 20 East, excepting, however, all lands within the Capitan Wilderness Area,  
Townships 10 and 11 South, Ranges 15 through 20 East,  
Townships 12 and 13 South, Ranges 17 through 20 East

CHAVES COUNTY, NEW MEXICO NMPM

All of: Township 3 South, Range 20 East,  
Township 4 and 5 South, Ranges 20 and 21 East,  
Township 14 South, Ranges 17 through 21 East

containing some 5,775,360 acres, more or less, provided however, that the applicant seeks to delete from consideration for the tight formation area those lands to be in the Capitan Wilderness Area, which had not been defined at the time of the hearing.

(3) That in Case No. 7093, heard November 25, 1980, consideration was given to the recommendation of the Abo formation underlying some 5.76 million acres in Chaves, De Baca, Guadalupe, Lincoln, and Torrance Counties, New Mexico.

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(4) That by Order No. R-6602 dated February 23, 1981, it was recommended to the Federal Energy Regulatory Commission that the Abo formation underlying approximately 1.54 million acres in the applied-for lands in said Case No. 7093 be approved as a tight formation; but that no recommendation was made as to the remaining 4.22 million acres.

(5) That by Docket No. RM-79-76 (New Mexico-3) Order No. 157, the Federal Energy Regulatory Commission designated the Abo formation underlying the aforesaid 1.54 million acres as a tight formation, and said tight formation area will hereinafter be referred to as the "Pecos Slope Area."

(6) That the lands under consideration in this case include, among other lands, those lands which were applied for but for which no recommendation was made in the previous case, and abut the Pecos Slope Area on the north and west sides of said area.

(7) That due to the sparsity of wells drilled in portions of the lands under consideration in this case, it is necessary to consider the reservoir characteristics not only of the lands under consideration in this case, but also in the Pecos Slope Area to determine overall average conditions in the Abo formation in the general area.

(8) That the Abo formation, as the term is broadly used in the general area, consists not only of rocks of Permian Leonardian age, but also, in certain portions, rocks of Permian Wolfcampian age; that while the top of the Abo is easily picked, the base of the Abo in some instances is difficult to ascertain and considerable discussion occurred at the hearing regarding the definition of the vertical limits.

(9) That the applicants subsequently withdrew Exhibit 2, being a structural map contoured on the top of the Abo formation, and Exhibits 4 through 8, inclusive, in this case, being cross-sections A-A', B-B', C-C', D-D', and E-E', respectively, to be amended, and re-submitted them as Exhibits 2-1 and 4-1 through 8-1, inclusive, together with a new cross-section F-F' as Exhibit 8-C and also two other new exhibits being excerpts from certain geological papers and identified as Exhibits 8-A and 8-B in this case.

(10) That the Abo formation, of Lower Permian age, is composed of a sequence of dark, reddish brown and gray mudstones and shales interbedded with red and pink lenticular, elongated, and irregular sand lenses deposited in a fluvial environment probably river channels.

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(11) That for the purpose of this order, and to facilitate future identification of Abo production, the Abo formation underlying the lands being considered in this case is defined as extending from the base of the Yeso formation vertically downward to the top of the Hueco limestone, or in the absence of said Hueco lime, to the top of the Pennsylvanian limestone, or in the absence of both Hueco lime and Pennsylvanian lime, to the top of the Pre-Cambrian, provided however, that tongues of the Hueco lime overlain and underlain by the Abo mudstones, sand or shales, shall be considered to be part of the Abo formation.

(12) That the depth to the top of the Abo formation underlying the lands described in Finding No. (2) above ranges from approximately 1560 feet on the west to approximately 4500 feet on the east, and averages approximately 3025 feet throughout the area.

(13) That from the wells depicted on the cross-sections submitted in this case (Exhibits 4-1 through 8-1, inclusive and Exhibit 8-C), it would appear that the Abo formation as defined in Finding No. (11) above ranges in thickness in the area from 240 feet to 2090 feet, and that the average thickness throughout the area would be in the vicinity of 1058 feet.

(14) That there have been a total of 172 wells drilled in the proposed tight formation area, of which approximately 55 penetrated the Abo formation.

(15) That there have been approximately 868 wells drilled in the Pecos Slope Area, of which about 400 are Abo completions with about 350 of these Abo completions having taken place since the original hearing on the Pecos Slope Area in November, 1980. Also included in the 868 wells are some 260 wells which have been drilled and abandoned, 180 San Andres formation oil producers, a few shallower Queen oil producers, and a few deep Pennsylvanian gas tests.

(16) That the Abo wells completed near the center of the Pecos Slope Area generally have higher potentials than wells on the north and west sides of the area; that it is logical to assume that the trend toward poorer potentials continues some distance outside the Pecos Slope Area into the proposed tight sand area.

(17) That since the November, 1980, hearing, 17 wells have tested the Abo formation in the proposed area (Exhibit 13). Of these, 11 have been abandoned as dry holes, two have been completed as Abo producers, and the remainder are being worked on in an attempt to complete in the Abo.

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(18) Of the two wells which have been completed as producers in the Abo, the potentials after stimulation were 88 MCF of gas per day, and 600 MCF of gas per day, respectively. That the average potential, after stimulation, of the 13 wells completed in the Abo, including the dry holes, is 53 MCF/day.

(19) That the average rate of flow from said wells prior to stimulation would surely be less than the aforesaid 53 MCF per day and definitely less than the 91 MCF of gas per day permitted under the FERC guideline for wells of this depth (3025 feet).

(20) That one of the applicants in this case, Yates Petroleum Company, has drilled 155 Abo wells since 1979, all but one being in the Pecos Slope Area; that the one well not in the Pecos Slope Area (White Flat LO State No. 1) was drilled in the proposed area (Exhibit 14).

(21) That of said 155 wells, the 31 wells that were tested natural and were subsequently treated and made capable of Abo production after the second treatment had an average natural flow rate of 70 MCF of gas per day; that after the second treatment said wells had an average potential of 1918 MCF per day.

(22) That if wells in the Pecos Slope Area whose natural potential averages 70 MCF per day will yield an average of 1918 MCF per day after two treatments, then it would appear that the wells in the proposed area whose average potential was 53 MCF per day after treatment (Finding No. 18 above) would have had a very low average natural flow rate prior to stimulation, perhaps as low as two MCF per day.

(23) That core data are available for only two wells in the general area: the Transwestern Five Mile Tank Federal No. 1 (Exhibit 18) inside the Pecos Slope Area and the Amoco State GK No. 1 (Exhibit 20) in the proposed area.

(24) That routine permeability for the Abo formation in the aforesaid wells averages 0.049 md and 8.4 md, respectively, while the in situ permeability calculates to 0.0065 md and 0.067 md, respectively.

(25) That the in situ permeability for the McKay Sherri No. 1 (Exhibit 21) just inside the Pecos Slope Area close to the proposed area as calculated from pressure build-up tests run after acid treatment calculated to 0.022 md; that the in situ permeability for this well would probably have been lower prior to acid treatment.

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(26) That the evidence cited in Findings Nos. (23) through (25) above, together with the evidence presented in Exhibits 22 through 25 indicates that the in situ gas permeability throughout the pay section of the average well in the proposed area, as well as in the Pecos Slope Area, is expected to be 0.1 millidarcy or less.

(27) That the liquid production from the Abo formation in the proposed area as well as the Pecos Slope Area varies from a low of zero barrels of condensate per day to a high of 1.73 barrels of condensate per day after stimulation (Exhibit 26).

(28) That no well drilled into the Abo formation in the proposed area can be expected to produce, without stimulation, more than five barrels of crude oil per day.

(29) In summary, that the data presented on the Abo wells in the proposed area is correlative to data available on the Abo wells in the Pecos Slope Area, and that the data on the wells in the two areas indicate that the Abo formation in the proposed area meets all the criteria set forth in 18 C.F.R. Section 271.703(c)(2) (A), (B), (C), and (D), viz:

- (A) the estimated in situ gas permeability throughout the pay section is expected to be less than 0.1 millidarcy;
- (B) the stabilized production rate, against atmospheric pressure, of wells completed for production in the formation, without stimulation, is not expected to exceed 91 MCF of gas per day (the average depth to the top of the formation is 3025 feet);
- (C) no well drilled into the formation is expected to produce more than five barrels of crude oil per day; and
- (D) the Division has not authorized the formation or any part thereof to be developed by infill drilling.

(30) That there are fresh water sands in the proposed area and that these sands range in depth from very shallow to almost 900 feet beneath the surface.

(31) That a typical casing and cementing program in the proposed area calls for approximately 900 feet of surface casing cemented to the surface; an intermediate string of casing set near 1500 feet and cemented if brine flows are encountered in

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the San Andres formation; and a production casing string set at total depth, cemented with 300 to 500 sacks of cement and perforated in the Abo formation.

(32) That the above-described casing and cementing programs for Abo wells drilled in the proposed area are in conformance with existing State and Federal regulations and will assure that development of the Abo formation in the area will not adversely affect the fresh water aquifers (during both hydraulic fracturing and waste disposal operations) that are or are expected to be used as a domestic or agricultural water supply.

(33) That the following lands within the applied-for area as described in Finding No. (2) above have been defined as comprising the Capitan Wilderness Area and should be deleted from the lands recommended for designation as a tight formation:

LINCOLN COUNTY, NEW MEXICO

TOWNSHIP 7 SOUTH, RANGE 15 EAST, NMPM  
Portions of Sections 35 and 36

TOWNSHIP 7 SOUTH, RANGE 16 EAST, NMPM  
Portions of Section 31

TOWNSHIP 8 SOUTH, RANGE 15 EAST, NMPM  
All or Portions of:  
Sections 1 through 3 and  
Sections 9 through 16

TOWNSHIP 8 SOUTH, RANGE 16 EAST, NMPM  
All or Portions of:  
Sections 2 through 18  
Sections 21 through 27 and  
Section 36

TOWNSHIP 8 SOUTH, RANGE 17 EAST, NMPM  
All or Portions of:  
Sections 7 through 11 and  
Sections 13 through 36

TOWNSHIP 8 SOUTH, RANGE 18 EAST, NMPM  
All or Portions of:  
Sections 19, 30, and 31

TOWNSHIP 9 SOUTH, RANGE 17 EAST, NMPM  
All or Portions of:  
Sections 1 and 2 and  
Sections 11 and 12

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containing 35,822 acres, more or less, and more particularly described in the Certification of the Capitan Mountains Wilderness on the Lincoln National Forest, signed by M. J. Hassell, Regional Forester, United States Forest Service, on November 5, 1982.

(34) That the Abo formation underlying the lands described in Exhibit "A" attached hereto and made a part hereof less those lands described in Exhibit "B" attached hereto and made a part hereof should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

IT IS THEREFORE ORDERED:

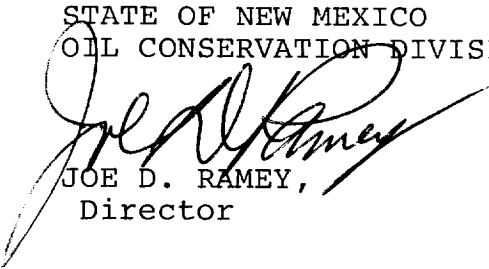
(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Policy Act of 1978, and 18 C.F.R. 271.703, that the Abo formation underlying approximately 5,739,538 acres, more or less in San Miguel, Torrance, Guadalupe, De Baca, Lincoln, and Chaves Counties, New Mexico, being those lands described in Exhibit "A" attached hereto and made a part hereof less those lands described in Exhibit "B" attached hereto and made a part hereof be designated as a tight formation to be known as the Pecos Slope Extension Area.

(2) That the Abo formation, for designation as a tight formation in the Pecos Slope Extension Area, shall be defined as being from the base of the Yeso formation vertically downward to the top of the Hueco limestone, or in the absence of said Hueco lime, to the top of the Pennsylvanian limestone, or in the absence of both Hueco lime and Pennsylvanian lime, to the top of the Pre-Cambrian, provided however, that tongues of the Hueco lime overlain and underlain by the Abo mudstones, sand or shales, shall be considered to be part of the Abo formation.

(3) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

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

STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

  
JOE D. RAMEY,  
Director

S E A L



SAN MIGUEL COUNTY, NEW MEXICO, NMPM

All of: Townships 10 and 11 North, Ranges 14 and 15 East

TORRANCE COUNTY, NEW MEXICO, NMPM

All of: Townships 1 through 9 North, Ranges 14 and 15 East

GUADALUPE COUNTY, NEW MEXICO, NMPM

All of: Townships 2 through 4 North, Ranges 16 through 19 East,  
Township 5 North, Ranges 16 through 23 East,  
Township 6 North, Ranges 16 through 24 East,  
Township 7 through 11 North, Ranges 16 through 26 East

DE BACA COUNTY, NEW MEXICO, NMPM

All of: Townships 1 through 4 North, Ranges 20 through 27 East,  
Township 5 North, Ranges 24 through 26 East,  
Township 6 North, Ranges 25 and 26 East,  
Township 1 South, Ranges 20 through 27 East,  
Township 2 South, Ranges 20 and 21 East,  
Township 3 South, Range 21 East

LINCOLN COUNTY, NEW MEXICO, NMPM

All of: Township 1 North, Ranges 16 through 19 East,  
Townships 1 through 5 South, Ranges 14 through 19 East,  
Township 6 South, Ranges 15 through 20 East,  
Township 7 through 9 South, Ranges 15 through 20 East,  
excepting, however, all lands within the Capitan  
Wilderness Area,  
Townships 10 and 11 South, Ranges 15 through 20 East,  
Townships 12 and 13 South, Ranges 17 through 20 East

CHAVES COUNTY, NEW MEXICO, NMPM

All of: Township 3 South, Range 20 East,  
Township 4 and 5 South, Ranges 20 and 21 East,  
Township 14 South, Ranges 17 through 21 East

containing some 5,775,360 acres, more or less.

EXHIBIT "A"  
Order No. R-7147

LINCOLN COUNTY, NEW MEXICO

TOWNSHIP 7 SOUTH, RANGE 15 EAST, NMPM  
 Portions of Sections 35 and 36

TOWNSHIP 7 SOUTH, RANGE 16 EAST, NMPM  
 Portions of Section 31

TOWNSHIP 8 SOUTH, RANGE 15 EAST, NMPM  
 All or Portions of:  
 Sections 1 through 3 and  
 Sections 9 through 16

TOWNSHIP 8 SOUTH, RANGE 16 EAST, NMPM  
 All or Portions of:  
 Sections 2 through 18  
 Sections 21 through 27 and  
 Section 36

TOWNSHIP 8 SOUTH, RANGE 17 EAST, NMPM  
 All or Portions of:  
 Sections 7 through 11 and  
 Sections 13 through 36

TOWNSHIP 8 SOUTH, RANGE 18 EAST, NMPM  
 All or Portions of:  
 Sections 19, 30, and 31

TOWNSHIP 9 SOUTH, RANGE 17 EAST, NMPM  
 All or Portions of:  
 Sections 1 and 2 and  
 Sections 11 and 12

containing 35,822 acres, more or less, and more particularly described in the Certification of the Capitan Mountains Wilderness on the Lincoln National Forest, signed by M. J. Hassell, Regional Forester, United States Forest Service, on November 5, 1982.

EXHIBIT "B"  
 Order No. R-7147