

Entered February 23, 1981  
JMK

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. 7093  
Order No. R-6602

APPLICATION OF MESA PETROLEUM COMPANY  
AND YATES PETROLEUM CORPORATION FOR  
DESIGNATION OF A TIGHT FORMATION,  
TORRANCE, GUADALUPE, DeBACA, LINCOLN,  
AND CHAVES COUNTIES, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on November 25, 1980, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 23rd day of February, 1981, 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 Mesa Petroleum Company and Yates Petroleum Corporation seek the designation as a "tight formation" of the Abo formation underlying the following described lands:

CHAVES COUNTY, NEW MEXICO

All of Township 3	South, Range 20 East, NMPM
All of Township 3	South, Range 27 East, NMPM
All of Township 4	South, Ranges 20 through 27 East, NMPM
All of Township 5	South, Ranges 20 through 27 East, NMPM
All of Township 6	South, Ranges 21 through 28 East, NMPM
All of Township 7	South, Ranges 21 through 28 East, NMPM
All of Township 8	South, Ranges 21 through 28 East, NMPM

CHAVES COUNTY, NEW MEXICO con'd

All of Township 9 South, Ranges 21 through 27 East, NMPM  
All of Township 9 1/2 South, Range 24 East, NMPM  
All of Township 10 South, Ranges 21 through 27 East, NMPM  
All of Township 11 South, Ranges 21 through 25 East, NMPM  
All of Township 12 South, Range 21 East, NMPM  
All of Township 12 South, Range 21 1/2 East, NMPM  
All of Township 12 South, Ranges 22 through 24 East, NMPM  
All of Township 13 South, Ranges 21 through 23 East, NMPM  
All of Township 14 South, Ranges 18 through 22 East, NMPM

DeBACA COUNTY, NEW MEXICO

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

GUADALUPE COUNTY, NEW MEXICO

All of Township 2 North, Ranges 16 through 19 East, NMPM  
All of Township 3 North, Ranges 16 through 19 East, NMPM  
All of Township 4 North, Ranges 16 through 19 East, NMPM  
All of Township 5 North, Ranges 16 through 23 East, NMPM  
All of Township 6 North, Ranges 16 through 24 East, NMPM  
All of Township 7 North, Ranges 16 through 26 East, NMPM

LINCOLN COUNTY, NEW MEXICO

All of Township 1 North, Ranges 16 through 19 East, NMPM  
All of Township 1 South, Ranges 14 through 19 East, NMPM  
All of Township 2 South, Ranges 14 through 19 East, NMPM  
All of Township 3 South, Ranges 14 through 19 East, NMPM  
All of Township 4 South, Ranges 14 through 19 East, NMPM  
All of Township 5 South, Ranges 14 through 19 East, NMPM  
All of Township 6 South, Ranges 14 through 20 East, NMPM  
N/2 of Township 7 South, Range 14 East, NMPM  
N/2 of Township 7 South, Range 15 East, NMPM  
N/2 of Township 7 South, Range 16 East, NMPM  
N/2 of Township 7 South, Range 17 East, NMPM

LINCOLN COUNTY, NEW MEXICO con'd

All of Township 7 South, Ranges 18 through 20 East, NMPM  
All of Township 8 South, Ranges 18 through 20 East, NMPM  
All of Township 9 South, Ranges 18 through 20 East, NMPM  
All of Township 10 South, Ranges 18 through 20 East, NMPM  
All of Township 11 South, Ranges 18 through 20 East, NMPM  
All of Township 12 South, Ranges 18 through 20 East, NMPM  
All of Township 13 South, Ranges 18 through 20 East, NMPM

TORRANCE COUNTY, NEW MEXICO

All of Township 1 North, Ranges 14 and 15 East, NMPM  
All of Township 2 North, Ranges 14 and 15 East, NMPM  
All of Township 3 North, Ranges 14 and 15 East, NMPM  
All of Township 4 North, Ranges 14 and 15 East, NMPM  
All of Township 5 North, Ranges 14 and 15 East, NMPM  
All of Township 6 North, Ranges 14 and 15 East, NMPM  
All of Township 7 North, Ranges 14 and 15 East, NMPM

containing some 5,760,000 acres, more or less.

(3) That the Abo sandstone of Lower Permian age in the so-called "Pecos Slope" of Southeast New Mexico consists of a series of fluvial deposits derived from the Pedernal Uplift to the Northwest which were laid down as elongate lenticular sand bodies of irregular shape and areal extent interbedded with red and green shales.

(4) That the top of the Abo formation underlying the lands described in Finding No. (2) above ranges from an estimated 4500 feet above sea level to 500 feet below sea level, thus demonstrating a regional relief in said formation of some 5,000 feet, dipping from north-northwest to south-southeast in the area of interest.

(5) That the known thickness of the Abo formation in the aforesaid lands (as shown by the cross-sectional diagrams presented at the hearing) varies from some 350 feet to some 818 feet.

(6) That the depth to the top of the Abo formation in the aforesaid lands varies from approximately 1800 feet in the western portion to approximately 4500 feet in the east.

(7) That although the area encompassed by the lands described in Finding No. (2) above totals some 5,760,000 acres, more or less, only 123 wells have been drilled into or through

the Abo formation on said lands, and of these 44 were completed or being completed as gas wells in said formation as of October 31, 1980, and 79 had been plugged and abandoned.

(8) That although none of the aforesaid 44 wells is known to have encountered what could be termed as "good" natural in situ permeability or high reservoir pressures, some of said wells have, after massive stimulatory treatment, yielded gas on initial potential test in what appears to be commercial quantities, while others continue to produce at low rates even after stimulation. Four have not yet been perforated nor tested.

(9) That considering all of the variables in reservoir rock characteristics, structural position, reservoir thickness, depth from surface, and producing characteristics encountered in the applied-for lands as interpolated from the 123 wells which have been drilled, it is apparent that from the available information, due to the sparsity of wells drilled, it would be difficult, if not impossible to arrive at a definitive interpretation which could be applied to said lands as a whole, and to arrive at a determination as to whether the Abo formation underlying all of the lands described in Finding No. (2) above should be recommended as a tight formation.

(10) That considering all such variables and the aforesaid difficulty of making a definitive interpretation, it is reasonable and proper in this case to consider for recommendation only that portion of the applied-for lands where sufficient wells have been drilled and sufficient information is available, and to eliminate the remainder of the lands from further consideration at this time.

(11) That a reasonable line of demarcation is the line that separates Township 1 South from Township 2 South, so that consideration may be given only to those lands lying south of said line, and the line that separates Range 21 East, NMPM, from Range 22 East, NMPM, so that consideration may be given only to those lands lying east of said line, except that in Township 12 South, the line separating the lands to be considered from the lands to be eliminated would be the line separating Range 21 1/2 East, NMPM, from Range 22 East, NMPM.

(12) That no recommendation for designation as a tight formation of the Abo sandstone lying north and west of the above-described lines of demarcation should be made at this time.

(13) That the following findings refer only to that portion of those lands described in Finding No. (2) above which lie south and east of the above-described lines of demarcation and which shall be referred to hereinafter as the "area."

(14) That the Abo formation underlies all of the area under consideration; that said formation comprises a sandstone consisting of very fine-grained sandstone to siltstone containing subangular to subrounded silt-sized grains of quartz, feldspar, and mica, cemented with calcite and argillaceous material.

(15) That the top of the formation in the area may be found at depths ranging from about 2800 feet to 4500 feet, while the thickness of the formation in the area may vary from approximately 535 feet to 818 feet.

(16) That a total of some 98 wells have been drilled to or through the Abo formation in the area, and of these, some 44 have been or are being completed to produce gas from said formation.

(17) That of the 44 wells in the area which have been or are being completed to produce from the Abo formation, 39 have actually been perforated in the Abo. Of these, tests were conducted prior to stimulation on only 20 wells with a total of 24 individual zone tests being conducted.

(18) That of the 24 zone tests conducted, 18 were swabbed dry or could not be made to flow or flowed gas TSTM (too small to measure), while six flowed gas at rates varying from seven MCF per day to 521 MCF per day.

(19) That the average rate of flow from the 24 zones tested prior to stimulation (including those which swabbed dry, which could not be made to flow, and which flowed gas TSTM) was 51 MCF of gas per day.

(20) That the aforesaid average rate of flow of 51 MCF of gas per day, when corrected to stabilized conditions at one atmosphere of pressure, equals 35 MCF of gas per day.

(21) That the average depth to the top of the formation in the aforesaid 39 wells is 3878 feet, and the maximum stabilized production rate for wells of this depth set forth in 18 C.F.R. Section 271.703 (c)(2)(B) is 105 MCF per day.

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(22) That of the 39 wells in the area which have been perforated in the Abo formation, none was capable of sustained commercial production without substantial reservoir stimulation to enhance the poor natural permeability of the Abo sandstone.

(23) That the stimulation required to produce a commercial flow of gas from Abo wells in the area often consists of two separate treatments, the first consisting of an acid treatment of from 500 to 4,000 gallons of acid, and the second consisting of a fracture treatment with from 20,000 to 40,000 gallons of jelled water and sand.

(24) That only two wells (both of which are considered typical) have been cored in the Abo sandstone in the area, and routine core analysis of said wells indicated a permeability in the Abo of 0.048 and 0.074 millidarcies, respectively, for said wells, or an average routine permeability of 0.061 millidarcies.

(25) That said routine permeability for the aforesaid two wells, when corrected for the overburden pressure of some 2060 pounds, indicate an in situ Abo permeability for the two wells of 0.0069 millidarcies and 0.0065 millidarcies, respectively, or an average in situ permeability of 0.0067 millidarcies.

(26) That the in situ permeability of the Abo formation underlying the area, as calculated from bottom-hole pressure build-up data on four wells in the area, ranges from a low of 0.01 millidarcies to a high of 0.12 millidarcies, and averages 0.051 millidarcies; however these pressure build-up tests were conducted after each of the wells had been treated with acid and probably yielded higher in situ permeability values than are truly representative of the formation.

(27) That of the 39 wells in the area which have been perforated in the Abo formation, none has produced more than a trace of liquid hydrocarbons.

(28) That the data available from the aforesaid 39 wells indicate that the Abo formation in the 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 average in situ permeability throughout the pay section is expected to be less than 0.1 millidarcy;

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- (B) the stabilized production rate, against atmospheric pressure, of wells completed for production in the formation, without stimulation, is not expected to exceed 105 MCF per day (the average depth to the top of the formation is 3878 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 portion thereof to be developed by infill drilling.

(29) That there are certain fresh water sands existent in the area, and these are usually encountered at depths ranging from 300 to 400 feet and from 800 to 900 feet.

(30) That the usually required casing and cementing programs for oil and gas wells in the area require surface casing to be set below the uppermost of said water sands with cement circulated to the surface and a string of intermediate casing to be set anywhere from 1200 to 1500 feet with cement circulated to the surface. Production casing is usually set at total depth and cemented back to the intermediate casing.

(31) That the above-described casing and cementing programs for oil and gas wells drilled in the 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.

(32) That the Abo formation underlying the lands described in Exhibit "A" 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. Section 271.703, that the Abo formation underlying approximately 1,536,000 acres,

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more or less, in Chaves and DeBaca Counties, New Mexico, as described in Exhibit "A" attached hereto and made a part hereof, be designated as a tight formation.

(2) That no recommendation is made as to those lands described in Finding No. (2) of this Order which are not included in Exhibit "A" attached hereto.

(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

dr/



EXHIBIT "A"  
ORDER NO. R-6602

DeBACA COUNTY, NEW MEXICO

All of Township 2 South, Ranges 22 through 27 East, NMPM  
All of Township 3 South, Ranges 22 through 26 East, NMPM

CHAVES COUNTY, NEW MEXICO

All of Township 3 South, Range 27 East, NMPM  
All of Township 4 South, Ranges 22 through 27 East, NMPM  
All of Township 5 South, Ranges 22 through 27 East, NMPM  
All of Township 6 South, Ranges 22 through 28 East, NMPM  
All of Township 7 South, Ranges 22 through 28 East, NMPM  
All of Township 8 South, Ranges 22 through 28 East, NMPM  
All of Township 9 South, Ranges 22 through 27 East, NMPM  
All of Township 9 1/2 South, Range 24 East, NMPM  
All of Township 10 South, Ranges 22 through 27 East, NMPM  
All of Township 11 South, Ranges 22 through 25 East, NMPM  
All of Township 12 South, Ranges 22 through 24 East, NMPM  
All of Township 13 South, Ranges 22 and 23 East, NMPM  
All of Township 14 South, Range 22 East, NMPM