

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

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

Case No. 10273
Order No. R-9506

APPLICATION OF JACK A. COLE
FOR DESIGNATION OF A TIGHT FORMATION,
SAN JUAN, RIO ARRIBA AND SANDOVAL
COUNTIES, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on April 18, 1991 at Santa Fe, New Mexico, before Examiner Jim Morrow.

NOW, on this 20th day of May, 1991, the Division Director, having considered the testimony, the record and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

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

(2) The applicant, Jack A. Cole, requests that the Division recommend to the Federal Energy Regulatory Commission (FERC) that the Gallup formation underlying the following lands be designated as a "tight formation" in accordance with Section 107 of the Natural Gas Policy Act, FERC Regulations in title 18 CFR Section 271.703 and Oil Conservation Division Order No. R-6388-A:

Rio Arriba, Sandoval and San Juan Counties, New Mexico

Township 23 North, Range 6 West, NMPM
Sections 1 through 36: All

Township 23 North, Range 7 West, NMPM
Sections 1 through 36: All

Township 23 North, Range 8 West, NMPM
Section 1: All

Township 24 North, Range 6 West, NMPM
Sections 18 and 19: All
Sections 29 through 32: All

Township 24 North, Range 7 West, NMPM
Sections 6 through 8: All
Sections 12 through 36: All

Township 24 North, Range 8 West, NMPM
Sections 5 through 8: All
Sections 12 and 13: All
Sections 16 through 30: All
Sections 35 and 36: All

(3) The proposed "tight formation" area contains 83,200 acres, more or less, and includes portions of the Alamito-Gallup, Counselors Gallup-Dakota, Devil's Fork-Gallup Associated, Dufers Point Gallup-Dakota, Escrito-Gallup Associated and Lybrook-Gallup Pools. The applicant proposes to designate the area as the "Lybrook Tight Formation Area" (Lybrook Area). It lies at the juncture of Rio Arriba, San Juan and Sandoval Counties.

(4) The type log presented by the applicant to represent the Gallup formation in the Lybrook Area is the Density Log run in the Bannon Energy Inc. State 16 Well No. 2 located 1672 feet from the North line and 1722 feet from the West line (Unit F) of Section 16, Township 23 North, Range 6 West, NMPM, Rio Arriba County, New Mexico.

(5) The type log was submitted as applicant's Exhibit No. 3. It shows four Gallup producing zones which are (from top to bottom) the Skelly zone, and the Marye 1, Marye 2, and Marye 3 zones. Also shown on the log is the Gallup Marker at 6302 feet. Based on the testimony of the applicant's witness, the vertical limits of the Lybrook Area should include that interval from the Gallup Marker found to occur at 5302 feet on the type log to a point 300 feet below the Gallup Marker.

(6) Applicant submitted data to show that there are 326 active wells in the Lybrook area.

(7) The applicant included a geological description of the Gallup formation in his application and a witness reviewed the description at the hearing. A summary of the geological information is as follows:

The Gallup formation in the Lybrook Area consists of shales, sandstones, and siltstones. Production has been established in four zones, the Skelly, Marye 1, Marye 2, and Marye 3 which span a stratigraphic interval of approximately 250 feet. Average depth to the top of the Gallup is 5377 feet. The top of the Gallup dips 75 feet

per mile from Northeast to Southwest. The skelly zone consists of very fine to fine grained sandstone, well sorted, with abundant calcareous cement. Porosity varies from 5% to 10% and thickness from 0 to 14 feet. The Marye 1 zone was deposited in a northwest to southeast trend. It consists of very fine to very coarse sand which is very poorly sorted and contains abundant calcareous cement. Porosity varies from 6% to 14% and thickness varies from 5 to 22 feet.

The Marye 2 and Marye 3 zones consist of very fine to fine-grained sandstones and siltstones which are well sorted but have significant calcareous cement which reduces porosity and permeability. Porosity varies from 5% to 14% in the Marye 2 zone and thickness from 0 to 14 feet. In the Marye 3 zone, pay thickness varies from 0 to 18 feet and porosity from 5% to 13%.

There is no structural closure mappable in the area and all production is accounted for by stratigraphic entrapment.

(8) Applicant's witness testified that average in situ gas permeability for the Lybrook Area is less than 0.1 millidarcys (md) and presented testimony and exhibits concerning four methods (Findings 9 and 10 below) for determining average in situ permeability. Core data was the primary source of permeability data. Calculations based on well performance, pressure measurements, and reservoir data were used to confirm and supplement the core measurements.

(9) Core data from all four Gallup Zones was obtained from 16 wells which are well distributed over the Lybrook Area. Lab measured permeabilities from the net pay sections (greater than 6% porosity) of the 16 wells averaged 0.2346 md. These permeabilities were corrected for the effects of overburden pressures and fluid saturations using accepted engineering procedures explained in applicant's Exhibits 6 and 7. After applying the corrections, average in situ permeability was determined to be 0.0243 md.

(10) Applicant's witness submitted testimony and exhibits to explain Lybrook Area permeability calculations based on well performance and reservoir and pressure information. The results of these studies are as follows:

A Holditch Model history match on 2 wells in Section 3, Township 23 North, Range 7 West resulted in average in situ permeability determinations of 0.0181 md and 0.0156 md.

The Darcy radial flow formula was used to calculate permeabilities for 21 wells. The highest calculated permeability for a well was 0.01882 md and the average was 0.00743 md.

Pressure build-up analysis on the Jack A. Cole Rincon Well No. 21 indicated average permeability of 0.003 md in the drainage area of the well.

(11) To show that the unstimulated producing rates for Lybrook Area wells are not expected to exceed FERC "tight formation" limits (5 BOPD and 163 MCFD), the applicant submitted the results of pre-stimulation swab tests from 11 wells. Each well was swabbed down to within approximately 100 feet of the perforations. In each case, there was no flow at the surface or fluid build-up into the well bore after the wells were swabbed down.

The applicant also submitted radial flow calculations which showed that the well of highest known core permeability (0.0531 md) could be expected to produce a maximum of 3.08 BOPD and 48 MCFD.

(12) Fresh water sands in the area occur from the surface to 1,500 feet. Existing State and Federal regulations relating to drilling, casing, and cementing wells and the disposal of produced water will provide protection for the fresh water aquifers in the area.

(13) A review of the rules for pools within the Lybrook Area shows that special pool rules have not been adopted to authorize infill drilling in the various pools.

In one pool, the Lybrook-Gallup, temporary rules adopted in 1962 providing for 320-acre gas and 80-acre oil spacing were abolished in 1964, returning the pool to statewide 160-acre gas and 40-acre oil spacing. This should not be considered as authorization for infill drilling since evidence presented at the 1964 hearing did not support development on the 320-acre gas and 80-acre oil spacing pattern. Evidence indicated the pool should be developed on 160-acre gas units and 40-acre oil units to prevent waste and reduced recovery.

(14) Pool rules for some of the pools in the Lybrook Area allow for completion in the Dakota and Graneros formations as well as the Gallup. Applicant's request for designation of the Lybrook Area as a "tight formation" area includes only the Gallup formation and would not be applicable to gas production from any formation(s) other than the Gallup interval described in Findings (2), (4), and (5) of this order.

(15) Previously designated "tight formations" in New Mexico have been primarily gas productive. The pools in the Lybrook Area are classified as oil pools or associated pools. The applicant submitted information to show that oil productive "tight formations" have been designated in other states.

(16) Applicant's witness stated that the tax credit available for wells drilled and completed in "tight formations" is necessary under current conditions for the continued development of hydrocarbons in the Lybrook Area.

(17) Based on evidence and testimony submitted by the applicant's witnesses, the Gallup formation within the vertical interval described in Findings Nos. (4) and (5), underlying the area described in Finding No. (2), meets the criteria set forth in FERC Regulations in Title 18 CFR, Section 271.703 and should be recommended for designation as a "tight formation".

IT IS THEREFORE ORDERED THAT:

(1) A recommendation to the Federal Energy Regulatory Commission is hereby submitted pursuant to Section 107 of the Natural Gas Policy Act of 1978 and FERC Regulations in Title 18 CFR, Section 271.703, that the Gallup Formation within the vertical limits described in Findings (4) and (5) of this order, underlying the following described lands, be designated as a "tight formation".

Rio Arriba, Sandoval and San Juan Counties, New Mexico

Township 23 North, Range 6 West, NMPM
Sections 1 through 36: All

Township 23 North, Range 7 West, NMPM
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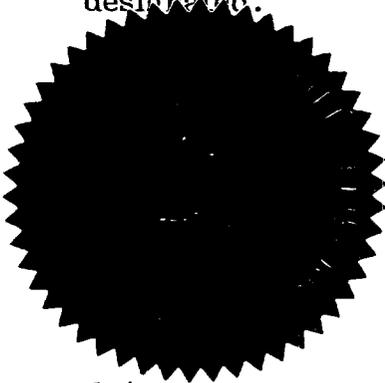
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The above lands contain 83,200 acres, more or less, and are to be designated the Lybrook Tight Formation Area.

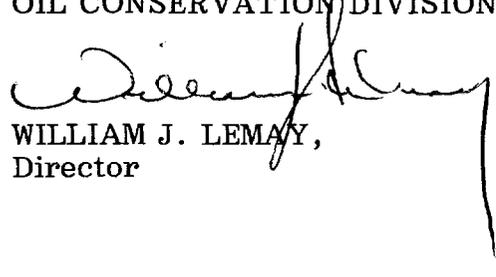
(2) Jurisdiction is hereby retained for the entry of such further orders as the Division may deem necessary.

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



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STATE OF NEW MEXICO
OIL CONSERVATION DIVISION


WILLIAM J. LEMAY,
Director