CAMPBELL & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
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JEFFERSON PLACE
SUITE I - 110 NORTH GUADALUPE
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SANTA FE, NEW MEXICO 87504-2208
TELEPHONE: (505) 988-4421

April 2, 1991

RECEIVED
APR 2 1991
OIL CONSERVATION DIVISION

HAND-DELIVERED

William J. LeMay, Director
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
State Land Office Building
Santa Fe, New Mexico 87501

Re: New Mexico Oil Conservation Division Case No. 10273:
Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Rio Arriba and Sandoval Counties, New Mexico

Dear Mr. LeMay:

Enclosed are the exhibits of Jack A. Cole for the April 18, 1991 hearing which we are pre-filing with you in compliance with OCD regulations.

Very truly yours,

William F. Carr

WILLIAM F. CARR
ATTORNEY FOR JACK A COLE
WFC:mlh
Enclosure

CAMPBELL & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
BRUCE D. BLACK
MICHAEL B. CAMPBELL
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BRADFORD C. BERGE
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March 13, 1991

HAND-DELIVERED

William J. LeMay, Director
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
State Land Office Building
Santa Fe, New Mexico 87503

Re: Oil Conservation Division Case No. 10273:
Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Rio Arriba and Sandoval Counties, New Mexico

Dear Mr. LeMay:

Jack A. Cole hereby requests that the above-referenced case scheduled for hearing before a Division Examiner on March 21, 1991 be continued to the Examiner hearings scheduled for April 18, 1991.

Your attention to this request is appreciated.

Very truly yours,

WILLIAM F. CARR

WFC:mlh
cc: Mr. Neel Duncan

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

March 11, 1991

Cole Production Company
P.O. Box 191
Farmington, NM 87499

Attention: Neil L. Duncan,
Engineering and Production Manager

RE: Case No. 10273: Application of Jack A. Cole for designation of a tight formation in the Gallup formation; San Juan, Rio Arriba and Sandoval Counties, New Mexico.

Dear Mr. Duncan:

Some time ago we discussed over the telephone the matter of representation at the March 21, 1991 hearing by an attorney. Under New Mexico State Law, an individual may represent himself and can examine witnesses on the stand, however, an individual can not represent another party or a corporation. Therefore, either a licensed New Mexico attorney or Jack Cole himself can represent the case before this agency. We believe however, that by retaining counsel who is familiar with the New Mexico Oil and Gas Law and proceedings before the Oil Conservation Division, this case may be more adequately presented.

In another related matter concerning your case, Rule C.4. of Division Order No. R-6388-A (Special Rules and Procedures for Tight Formation Designation Under Section 107 of the Natural Gas Policy Act of 1978) requires you to provide this agency and the U.S. Bureau of Land Management in Albuquerque copies of a complete set of exhibits to be offered or introduced at the hearing at least fifteen days in advance.

Should you have any questions concerning this matter, please contact me.

Sincerely,

Michael E. Stogner
Chief Hearing Officer/Engineer

MES/ag

cc: US Bureau of Land Management - Albuquerque: Allen Buckingham

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
P. O. Box 2088
SANTA FE, NEW MEXICO 87501

SPECIAL RULES AND PROCEDURES FOR TIGHT FORMATION DESIGNATIONS UNDER SECTION 107 OF THE NATURAL GAS POLICY ACT OF 1978

Amended 2-1-81

A. General

Applications for tight formation designations under Section 107 of the NGPA and applicable FERC rules and regulations shall be accepted by the Division at its Santa Fe, New Mexico office after June 30, 1980. These special rules apply only to tight formation designations and do not apply to individual well filing requirements for price category determination.

B. Definitions

1. "Crude Oil" means a mixture of hydrocarbons that exists in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separation facilities.

2. "Division" means the Oil Conservation Division of the Energy and Minerals Department of the State of New Mexico.

3. "FERC" means the Federal Energy Regulatory Commission.

4. "USGS" means the office of the United States Geological Survey in Albuquerque, New Mexico.

5. "Formation" means any geological formation or portion thereof described by geological as well as geographical parameters which is the subject of a tight formation designation application.

6. "Infill drilling" means any drilling in a substantially developed formation (or a portion thereof) subject to requirements respecting well-spacing or proration units which were amended by the Division or the Oil Conservation Commission after the formation (or portion thereof) was substantially

developed and which were adopted for the purpose of more effective and efficient drainage of the reservoirs in such formation. Such amendment may provide for the establishment of smaller drilling or production units or may permit the drilling of additional wells on the original units.

C. Procedure

1. To the extent that the Division's general rules of procedure for public hearings are not altered or amended by these special rules, such general rules of procedure shall be applicable and are incorporated herein by reference.

2. All applications for tight formation designation in the State of New Mexico, in which Federal, Indian, state, or fee lands, or any combination thereof, are involved, shall be filed with the Division.

3. All applications for tight formation designation shall be set for public hearing.

4. A complete set of exhibits which an applicant proposes to offer or introduce at a hearing, together with a statement of the meaning and purpose of each exhibit, shall be submitted to the Division (and to the USGS when federal or Indian lands are involved) when the application is filed or at least 15 days prior to a hearing. These exhibits shall cover all aspects of the required evidentiary data described in Section D below. Three additional complete sets of such exhibits and statements, enclosed in an unsealed postage-paid packet, shall also accompany the application or be presented at the hearing; this packet and its contents will be forwarded to the FERC by the Division after the hearing, together with the Division order recommending disposition of the application.

5. Where practicable, applications may be consolidated for hearing at the discretion of the Director of the Division.

6. Within 15 days after its issuance, any order promulgated by the Division pursuant to these special rules shall be submitted by the Division to the FERC in accordance with Section 271.705 of the FERC rules

and regulations applicable to NGPA for approval or disapproval of a tight formation designation.

D. Evidence

1. Evidence offered by an applicant at a hearing shall include:

   a. a map and geographical and geological descriptions of the area and formation for which the designation is sought; and

   b. geological and engineering data to support the application; and

   c. a map or list which clearly locates or describes wells which are currently producing oil or gas, or both, from the formation within the geographical area of the formation, and

   d. a report of the extent to which an applicant believes existing State and Federal regulations will assure that development of the formation will not adversely affect or impair any fresh water aquifers (during both hydraulic fracturing and waste disposal operations) that are being used or are expected to be used in the forseeable future for domestic or agricultural water supplies; and

   e. if the formation has been authorized to be developed by infill drilling prior to the date of recommendation, information and data demonstrating that the formation cannot be developed without the incentive price established in 18 CFR §271.703(a).

   f. any other information which the Division may require.

2. Evidence shall be based on each of the following geological and engineering guidelines:

   a. The estimated average in situ gas permeability, throughout the pay section, is expected to be 0.1 millidarcy or less.

      (1) Permeability may be established and demonstrated by any customary or acceptable methods, techniques, or testing acceptable in the oil and gas industry.

   b. The stabilized production rate, either at atmospheric pressure or calculated against atmospheric pressure, of wells completed for production in the formation, without stimulation, is not expected to exceed the production rate determined in accordance with the following table:

If the average depth to the top of the formation (in feet):		The maximum allowable production rate (in Mcf/day) may not exceed:
exceeds:	but does not exceed:	
0	1000	44
1000	1500	51
1500	2000	59
2000	2500	68
2500	3000	79
3000	3500	91
3500	4000	105
4000	4500	122
4500	5000	141
5000	5500	163
5500	6000	188
6000	6500	217
6500	7000	251
7000	7500	290
7500	8000	336
8000	8500	388
8500	9000	449
9000	9500	519
9500	10000	600
10000	10500	693
10500	11000	802
11000	11500	927
11500	12000	1071
12000	12500	1238
12500	13000	1432
13000	13500	1655
13500	14000	1913
14000	14500	2212
14500	15000	2557

   c. No well drilled into the recommended tight formation is expected to produce, without stimulation, more than five barrels of crude oil per day.

d. If an application meets the guidelines contained in subparagraphs 2 b and 2 c above, but does not meet the guidelines contained in subparagraph 2 a, an applicant may, in the alternative, show that the formation exhibits low permeability characteristics and that the incentive price is necessary to provide reasonable incentive for production of the natural gas from the formation due to extraordinary risks or costs associated with such production.

   (1) An application based on the guidelines outlined in subparagraph 2 d above shall include data to support the contention that the guidelines contained in paragraph 2 b and 2 c above are met, and in addition thereto, shall contain:

      (a) the types and extent of enhanced production techniques which are expected to be necessary, and

      (b) the estimated expenditures necessary for employing those techniques, and

      (c) an estimate of the degree of increase in production from use of such techniques together with engineering and geological data to support that estimate.

e. If the formation or any portion thereof was authorized to be developed by infill drilling prior to the date of recommendation and the Division has information which in its judgment indicates that such formation or portion subject to infill drilling can be developed absent the incentive price established in 18 CFR §271.703(a), then the Division shall not include such formation or portion thereof in its recommendation.

dr/

'ole Production Co.

(505) 325-1415
P.O. Box 191
3001 Northridge Dr.
Farmington, New Mexico 87499

12 February 1991

Mike Stogner
Oil Conservation Division
State of New Mexico
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

Re: Confirmation of Hearing
Tight Sand Designation
Lybrook Area Gallup

Dear Mike:

Jack A. Cole wishes to appear before the New Mexico Oil and Gas Conservation Commission on 21 March 1991 to seek FERC Section 107 tight formation designation for certain Gallup acreage. The attached list details the proposed tight sand area by section, township, and range. The area will include portions of the Alamito, Counselors, Devil's Fork, Escrito, and Lybrook Gallup regulatory pools.

Other companies participating in the proceedings and/or providing evidence are BCO, Incorporated of Santa Fe, Dugan Production Corporation of Farmington, and Bannon Energy, Incorporated of Houston, Texas.

Please let me know if you will need any additional information prior to the hearing date. We are open to any suggestions you may have to streamline the procedure.

Very Truly Yours,

Neel L. Duncan
Engineering & Production Mgr.

cc: J. A. Cole
R. A. Chabaud - Bannon Energy, Inc.
E. B. Keeshan - BCO, Incorporated
J. D. Roe - Dugan Production Corp.

attachment (1)

Surface Description
Lybrook Area Gallup Tight Sands

Township 23 North

Range 6 West:	All Sections
Range 7 West:	All Sections
Range 8 West:	Section 1

Township 24 North

Range 6 West:	Sections 18, 19, 29, 30, 31, 32
Range 7 West:	Sections 6, 7, 8, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
Range 8 West:	Sections 5, 6, 7, 8, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 35, 36

Cole Production Co.

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

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

PRE-HEARING STATEMENT

This Prehearing Statement is submitted by William F. Carr, as required by the Oil Conservation Division.

APPEARANCES OF PARTIES

APPLICANT	ATTORNEY
Jack A. Cole	William F. Carr
Cole Production Co.	Campbell & Black, P.A.
Post Office Box 191	Post Office Box 2208
Farmington, New Mexico 87449	Santa Fe, New Mexico 87504
(505) 325-1415	(505) 988-4421
name, address, phone and contact person	

OPPOSITION OR OTHER PARTY	ATTORNEY
name, address, phone and contact person	( )

STATEMENT OF CASE

APPLICANT

Applicant in the above-styled cause seeks the designation of the Gallup formation underlying portions of Townships 23 and 24 North, Ranges 6, 7, and 8 West, containing 81,920 acres, more or less, as a "Tight Formation" pursuant to Section 107 of the Natural Gas Policy Act of 1978 and 18 C.F.R. Section 271.701-705.

OPPOSITION OR OTHER PARTY

(Please make a concise statement of the basis for opposing this application or otherwise state the position of the party filing this statement.)

PROPOSED EVIDENCE

APPLICANT

WITNESSES (Name and expertise)	EST. TIME	EXHIBITS
Neel Duncan, Petroleum Engineer	30 Min.	Approximately 17 (Previously filed with the Division)

OPPOSITION

WITNESSES (Name and expertise)	EST. TIME	EXHIBITS

PROCEDURAL MATTERS

None.

Signature

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

RECEIVED
APR 15 1991
OIL CONSERVATION DIVISION

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

Case No. 10273

Applicant.

PRE-HEARING STATEMENT

This Pre-Hearing Statement is submitted on behalf of Gas Company of New Mexico ("GCNM") as required by the Oil Conservation Division.

APPEARANCES OF PARTIES

Opponent: Gas Company of New Mexico
2444 Louisiana Blvd., N.E.
Albuquerque, New Mexico 87110

Contact Person: Ann Bolton
Manager Contract Compliance
(505) 880-7921

Attorney: Clyde F. Worthen
Keleher & McLeod, P.A.
Post Office Drawer AA
Albuquerque, New Mexico 87103
(505) 842-6262

OPPONENT'S STATEMENT OF OPPOSITION

GCNM is presently purchasing gas from Applicant from wells producing from the formation that is the subject matter of this Application. GCNM may be adversely affected by the designation of this formation as entitled to NGPA 107 pricing.

OPPONENT'S PROPOSED EVIDENCE

GCNM must first analyze Applicant's evidence to see if any basis exists to support or oppose the Application.

PROCEDURAL MATTERS

GCNM respectfully requests a continuance so that discovery can be held on this matter and a full, complete and adequate basis in opposition of this Application can be made.

Respectfully submitted,

KELEHER & McLEOD, P.A.

BY _____
CLYDE F. WORTHEN
Post Office Drawer AA
Albuquerque, New Mexico 87103
Telephone: (505) 842-6262

Attorneys for Gas Company of New Mexico, a division of Public Service Company of New Mexico

CERTIFICATE OF SERVICE

I certify that on the 16th day of April, 1991, a copy of this Pre-Hearing Statement was hand delivered to:

William F. Carr, Esq.
Campbell & Black
110 North Guadalupe, Suite 1
P.O. Box 2208
Santa Fe, New Mexico 87504

_____
Clyde F. Worthen

HWC/87

CAMPBELL & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
BRADFORD C. BERGE
MARK F. SHERIDAN
WILLIAM P. SLATTERY
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POST OFFICE BOX 2208
SANTA FE, NEW MEXICO 87504-2208
TELEPHONE: (505) 988-4421
TELECOPIER: (505) 983-6043

April 17, 1991

HAND-DELIVERED

Mr. Jim Morrow
Hearing Examiner
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
State Land Office Building
Santa Fe, New Mexico 87503

Re: Case No. 10273:
Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Rio Arriba and Sandoval Counties, New Mexico

Dear Mr. Morrow:

This letter is in response to the request of Gas Company of New Mexico for continuance of the above-referenced case contained in its Pre-Hearing Statement filed on April 16, 1991.

Jack A. Cole's application for designation of a tight formation was originally scheduled for hearing on March 21,1991. The case has already been continued once for the hearing currently scheduled for April 18th.

As Gas Company of New Mexico noted in its Pre-Hearing Statement, it is presently purchasing gas from the formation that is the subject of this application. It is my understanding that the parties are negotiating certain additional contracts for the purchase of gas from the area, but it is our position that the questions between these parties concerning this tight formation designation are contractual in character and do not raise questions which are properly within the jurisdiction of the Oil Conservation Division.

The applicants are prepared to go forward on April 18, 1991 and request that the Examiner deny Gas Company of New Mexico's application for a continuance of this case.

Your attention to this matter is appreciated.

Very truly yours,

WILLIAM F. CARR
WFC:mlh
cc: Ward Camp
Keleher & McLeod

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

NGPA SECTION 107 TIGHT FORMATION RECOMMENDATION	)	Docket No. _____
STATE OF NEW MEXICO OIL CONSERVATION DIVISION OF THE ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT	)	

RECOMMENDATION FOR TIGHT FORMATION DESIGNATION UNDER SECTION 107 OF THE NGPA.

Jack A. Cole, pursuant to Section 107 of the Natural Gas Policy Act, 18 CFR §271.703 of the FERC regulations and the New Mexico Oil Conservation Division's Special Rules and Procedures for Tight Formation Designations under Section 107 of the Natural Gas Policy Act of 1978, as promulgated by Order No. R-6388-A, petitioned the New Mexico Oil Conservation Division for tight formation designation of the Gallup formation underlying the proposed Lybrook Tight Formation Area in San Juan, Sandoval and Rio Arriba Counties, New Mexico.

After notice and hearing on the Application of Jack A. Cole, the New Mexico Oil Conservation Division hereby recommends that portion of the Gallup formation as described on page 5 of Exhibit "A", being New Mexico Oil Conservation Division Order No. R-9506 attached hereto and incorporated by reference, be designated a tight formation. Additionally, the Oil Conservation Division submits herewith Exhibit "B", a copy of the transcript and exhibits presented to the Division in Case 10273, and Exhibit "C", a copy of a letter of the Bureau of Land Management, dated July 19, 1991, attached hereto and incorporated herein by reference, which are supporting data required under 18 CFR §271.703(c)(3) of the FERC regulations, respectively.

Respectively submitted this 24th day of July, 1991.

Michael E. Stogner
Chief Hearing Officer/Engineer

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
ALBUQUERQUE DISTRICT OFFICE
435 MONTANO N.E.
ALBUQUERQUE, NEW MEXICO 87107

TAKE PRIDE IN AMERICA

3160 (015)

July 19, 1991

Marilyn Rand, Director
Division of Producer Regulation
Federal Energy Regulatory Commission
825 North Capitol Street NE
Washington, DC 20426

Jim Morrow, Examiner
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504

Dear Ms. Rand and Mr. Morrow:

This letter is to be included with the submission to the Federal Energy Regulatory Commission (FERC) by the New Mexico Oil Conservation Division (NMOCD) of the enclosed tight formation area designation. The area designated is described in Case No. 10273, Order No. R-9506, dated May 20, 1991, located at the juncture of Rio Arriba, San Juan, and Sandoval Counties, New Mexico.

This jurisdictional agency concurs with the NMOCD and hereby designates the lands described in Order No. R-9506 consisting of 83,200 acres, more or less, as the Lybrook Tight Formation Area.

It is requested that this jurisdictional agency be advised in writing when the 45 day review period will end and the appropriate FERC Order No. and/or State No. (NM-__) assigned to this tight formation area be included.

Persons objecting to this determination may file a protest directly with the Federal Energy Regulatory Commission, in accordance with 18 CFR Part 275.203 and 275.204, within 20 days after the notice is published in the Federal Register by the FERC.

If you have any questions contact Allen F. Buckingham at FTS 479-8765 or (505) 761-8765.

Sincerely yours,

Allen F. Buckingham

for Assistant District Manager
Mineral Resources

Enclosures

cc:
Jack A. Cole
William F. Carr, Attorney
Bannon Energy Inc.
BCO Inc.
Dugan Production Corporation
WO-611 (Donnie Shaw)
NM-922 (Joe Chesser)

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

May 23, 1991

US Bureau of Land Management
Albuquerque District Office
435 Montaño Road
Albuquerque, NM 87107

Attention: Allen Buckingham

RE: Division Case No. 10273. Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Sandoval and Rio Arriba Counties, New Mexico.

Dear Mr. Buckingham:

Enclosed, please find a copy of Division Order No. R-9506 issued in said Case No. 10273 and dated May 20, 1991, recommending to the Federal Energy Regulatory Commission that the Gallup formation underlying the proposed Lybrook Tight Formation Area in San Juan, Sandoval and Rio Arriba Counties, New Mexico, be designated as a "tight formation" under Section 107 of the Natural Gas Policy Act of 1978.

Enclosed, also find a copy of the April 18, 1991 hearing transcript and copies of Exhibits presented by the applicant.

Should you require additional information, please contact me at (505) 827-5811.

Sincerely,

Michael E. Stogner
Examiner/Engineer

MES/ag

cc: Case File 10273
Jack A. Cole - Farmington
Jim Morrow - Oil Conservation Division, Santa Fe

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

July 24, 1991

Federal Energy Regulatory Commission
U.S. Department of Energy
825 North Capitol Street, N.E.
Washington, D.C. 20426

Attn: Marilyn Rand, Director
Division of Producer Regulations

RE: Division Case No. 10273. Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Sandoval and Rio Arriba Counties, New Mexico.

Dear Ms. Rand:

Pursuant to FERC Rule 271.703(c)(3), please find enclosed three copies of Division Order No. R-9506, issued in said Case No. 10273 and dated May 20, 1991, recommending to the Federal Energy Regulatory Commission that the Gallup formation underlying the proposed Lybrook Tight Formation Area in San Juan, Sandoval and Rio Arriba Counties, New Mexico, be designated as a "tight formation" under Section 107 of the Natural Gas Policy Act of 1978.

Enclosed, also find copies of the hearing transcript and Exhibits presented by the applicant at the April 18, 1991 public hearing.

Please note concurrence of the U.S. Department of the Interior, Bureau of Land Management with our recommendation for said area by letter dated July 19, 1991 from Allan F. Buckingham, Manager of Mineral Resources, Albuquerque District Office.

Should you have any questions or require additional information, please contact me.

Sincerely,

Michael E. Stogner
Chief Hearing Examiner/Engineer

MES/jc

cc: Case File: 10273
Jack A. Cole - Farmington
Jim Morrow - Oil Conservation Division, Santa Fe
William F. Carr - Santa Fe
U.S. BLM - Albuquerque, Allan Buckingham
NMOCD - Aztec

KELEHER & McLEOD, P. A.
ATTORNEYS AND COUNSELORS AT LAW
414 SILVER AVENUE, S. W.
SUITE 1200
P. O. DRAWER AA
ALBUQUERQUE, NEW MEXICO 87103
TELEPHONE
(505) 842-6262
FAX
(505) 764-9643

RUSSELL MOORE
WILLIAM B. KELEHER
MICHAEL L. KELEHER
PATRICK W. HURLEY
CHARLES A. PHARRIS
RICHARD B. COLE
ARTHUR O. BEACH
JOHN M. KULIKOWSKI
THOMAS F. KELEHER
PETER H. JOHNSTONE
HENRY F. NARVAEZ
CHARLES L. MOORE
ROBERT H. CLARK
BRIAN J. O'ROURKE
RONALD F. HORN
PHIL KREHBIEL
CLYDE F. WORTHEN
SPENCER REID
ELIZABETH E. WHITEFIELD
ROBERT C. CONKLIN
REBECCA A. HOUSTON
BARBARA ALBIN
KATHRYN J. KUHLEN
MARK STYLES
EVAN S. HOBBS
PATRICK V. APODACA
RANDOLPH L. HAMBLIN
P. SCOTT EATON
MARGARET E. DAVIDSON
THOMAS C. BIRD
THOMAS HOTCHKISS
RIKKI D. MONTOYA
WILLIAM M. CASEY
RICHARD L. ALVIDREZ
JONATHAN M. DUKE
THOMAS F. BLUEHER
KURT WIHL
MARGARET C. CAUSEY
THOMAS G. SCARVIE
JOHN O. PHILLIPS
HELEN G. HILLEGASS
CAROL LISA SMITH
LYNDA LATTA
TERESA M. JOHNSON
LARRY HEYECK
SUSAN G. LOWREY
ERIC R. BURRIS
JERE K. SMITH
PATRICIA A. BRADLEY
DUANE A. DAHNKE
S. CHARLES ARCHULETA
JAMES R. BREWSTER
JEFFREY A. JENKINS
M. GLORIA TRISTANI
JUDY M. MELTON
NIKKI J. MANN

W. A. KELEHER (1886-1972)
A. H. McLEOD (1902-1976)
JOHN B. TITTMANN
OF COUNSEL
CITY PLACE OFFICE
2155 LOUISIANA BLVD., NE
SUITE 3000
ALBUQUERQUE, NM 87110
TELEPHONE (505) 884-8282
FAX (505) 889-8579

(1140-001)

May 20, 1991

Mr. Jim Morrow
Hearing Examiner
Oil Conservation Division
New Mexico Department of Energy
Mineral and Natural Resources
State Land Office Building
Santa Fe, New Mexico 87503

Re: Case No. 10273: Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Rio Arriba and Sandoval Counties, New Mexico

Dear Mr. Morrow:

Gas Company of New Mexico ("GCNM") filed a pre-hearing statement in opposition to Case No. 10273. At the hearing, in light of the representations made by the Applicants regarding their desire for tax credits only under NGPA 107, GCNM did not present any evidence.

Pursuant to agreements made by the Applicants and GCNM, GCNM formally withdraws its opposition to the requested relief.

Thank you for your consideration in this matter.

Sincerely yours,

KELEHER & McLEOD, P.A.

By H. Ward Camp

H. Ward Camp

HWC/ld
cc: Mr. Tommy Sanders
Ms. Ann Bolton
Mr. Robert D. Johnson
Mr. Jack A. Cole

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

May 23, 1991

US Bureau of Land Management
Albuquerque District Office
435 Montaño Road
Albuquerque, NM 87107

Attention: Allen Buckingham

RE: Division Case No. 10273. Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Sandoval and Rio Arriba Counties, New Mexico.

Dear Mr. Buckingham:

Enclosed, please find a copy of Division Order No. R-9506 issued in said Case No. 10273 and dated May 20, 1991, recommending to the Federal Energy Regulatory Commission that the Gallup formation underlying the proposed Lybrook Tight Formation Area in San Juan, Sandoval and Rio Arriba Counties, New Mexico, be designated as a "tight formation" under Section 107 of the Natural Gas Policy Act of 1978.

Enclosed, also find a copy of the April 18, 1991 hearing transcript and copies of Exhibits presented by the applicant.

Should you require additional information, please contact me at (505) 827-5811.

Sincerely,

Michael E. Stogner
Examiner/Engineer

MES/ag

cc: Case File 10273
Jack A. Cole - Farmington
Jim Morrow - Oil Conservation Division, Santa Fe

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

May 21, 1991

CAMBELL & BLACK
Attorneys at Law
P. O. Box 2208
Santa Fe, New Mexico 87504

RE: CASE NO. 10273
ORDER NO. R-9506

Dear Sir:

Enclosed herewith are two copies of the above-referenced Division order recently entered in the subject case.

Sincerely,

Florene Davidson

Florene Davidson
OC Staff Specialist

FD/sl

cc: BLM Farmington Office
P. Pearce
Aztec OCD Office

Cole Production Co.

(505) 325-1415
P.O. Box 191
3001 Northridge Dr.
Farmington, New Mexico 87499

29 April 1991

Mr. Michael E. Stogner
Chief Hearing Officer/Engineer
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
P.O. Box 2088
Santa Fe, New Mexico 87504

Re: Case No. 10273
Designation of Lybrook Tight Formation Area
Jack A. Cole, et. al.

Dear Mike:

Enclosed are the two additional copies of our exhibits for the subject case which you requested for forwarding to FERC with your decision.

It has been a pleasure to work with you and your colleagues on this matter. Should you need any additional information please advise.

Sincerely,

Neel L. Duncan
Engineering & Production Manager

NLD/njs

Attachments (2)

Cole Production Co.

(505) 325-1415
P.O. Box 191
3001 Northridge Dr.
Farmington, New Mexico 87499

14 May 1991

VIA FACSIMILIE

Mr. Jim Morrow, Chief Engineer
Oil Conservation Division
New Mexico Department of Energy, Minerals
and Natural Resources
State Land Office Building
Santa Fe, New Mexico 87503

Re: Exhibit 9 - Permeability from History Match
Tight Formation Hearing Case No. 10273
Jack A. Cole

Dear Mr. Morrow:

Pursuant to your request regarding the validity of Exhibit 9 because of the presence of Guaneros and Dakota data, I thought a written response would be easier for both of us.

Your question is a valid one because both wells do have perforations in the Guaneros (or Dakota "A") and Dakota (or Dakota "B") formations, and the presence of these zones does contaminate the data. If a significant portion of the pay in the two wells was found in the Dakota (a term I will use to include both the "A" and "B" zones), then lower-than-average permeabilities in the Dakota zones could serve to pull the overall average permeability down.

A worst case would be one where the Dakota had zero permeability. If, for example the Gallup had an average permeability of 5 md and a net thickness of 10 feet and the Dakota had an average permeability of 0 md and a net thickness of 80 feet, combining the two together would result in an average permeability of .55 md. To make an assumption about Gallup permeability based on this average permeability value would be incorrect.

In our case, however, the amount of net pay each well has in the Dakota is small in relation to the amount of Gallup net pay, so the potential for distortion is small. To demonstrate this I will take each well through a worst case scenario and calculate permeability values which correct for the possibility of a zero permeability Dakota section.

Dunn No. 10

This well was completed with limited entry and the Gallup perfs 5286'- 5472' (individually 5286, 5290, 5294, 5306, 5374, 5404, 5413, 5417, 5421, 5437, 5453, and 5472) open 66 feet of net pay to production. This represents 78 percent of the well's total net pay. The Dakota perfs 6160'- 6250' (individually 6160, 6168, 6240, 6243, 6246, 6249, and 6258) open 19 feet or 22 percent of the well's net pay to production.

Since the weighted average permeability of the two zones is .0188 millidarcys (from the production history match) the aggregate conductivity of the rock is 85 feet times .0188 millidarcys, or 1.598 millidarcy-feet.

If we use our worst case assumption and assume that none of the flow came from the Dakota but the average was calculated using the combined net pay of both zones, we can calculate a maximum possible permeability for the Gallup. We can do this by dividing the aggregate conductivity of 1.598 millidarcys by the net pay in the Gallup zone (66 feet). This yields a maximum possible Gallup permeability of .0242 millidarcys which is still lower than 0.1 millidarcy as required by regulations.

Dunn No. 11

This well is similar in that the Gallup perfs 5348'- 5584' (individually 5348, 5356, 5368, 5436, 5470, 5474, 5478, 5482, 5518, 5534, and 5584) open 57 feet of net pay to production. This represents 67 percent of the well's total. The Dakota perfs 6232'- 6343' (individually 6232, 6244, 6303, 6306, 6309, 6312, 6321, 6324, and 6343) open 28 feet or 33 percent of the well's net pay to production.

Using the same math, the aggregate conductivity is the history match permeability (.0256 md) times 85 feet, which equals 2.176 millidarcy-feet.

Going back to our worst case assumption, the maximum possible Gallup permeability would be the aggregate conductivity (2.176 md-ft) divided by the amount of Gallup net pay (57 feet). This yields a maximum possible Gallup permeability of .0382 millidarcys which is still below the limit.

I hope this answers your question regarding Exhibit 9. If I can provide any further explanation, please call.

Sincerely,

Neel L. Duncan

CAMPBELL & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
BRADFORD C. BERGE
MARK F. SHERIDAN
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April 25, 1991

HAND-DELIVERED

RECEIVED
APR 25 1991
OIL CONSERVATION DIVISION

Mr. Jim Morrow, Chief Engineer
and Hearing Examiner
Oil Conservation Division
New Mexico Department of Energy,
Minerals and Natural Resources
State Land Office Building
Santa Fe, New Mexico 87503

Re: Case No. 10273:
Application of Jack A. Cole for Designation of a Tight Formation, San Juan, Rio Arriba and Sandoval Counties, New Mexico

Dear Mr. Morrow:

Pursuant to your request at the April 18, 1991 hearing on the above-referenced application, I am enclosing a well count by formation for all wells in the proposed Lybrook Tight Formation Area.

As you will recall, certain questions were raised concerning designation of a tight formation in an oil pool. Enclosed for your consideration are Recommendations, Examiner Reports and Orders in which the Texas Railroad Commission has previously designated as tight formations portions of pools classified as oil pools. They include portions of the Cleveland Formation, Northwest Texas Panhandle, in Wheeler and Hemphill Counties, Texas; the Anacacho Formation, Atascosa County, Texas and the A.W.P. (Olmos) Field in Mullen County, Texas.

Also enclosed is a copy of the March 20, 1991 Notice of Proposed Rulemaking from the Federal Energy Regulatory Commission which supports designation of formations such as that involved in this application as a tight formation.

If you need anything further from me to proceed with your consideration of this matter, please advise.

Very truly yours,

WILLIAM F. CARR
WFC:mlh
Enclosures
cc w/enc.: Neel L. Duncan
c/o Cole Production Company
Post Office Box 191
Farmington, New Mexico 87499

ACTIVE WELL COUNT
LYBROOK TIGHT FORMATION AREA
Case #10273

REGULATORY POOL	# ACTIVE WELLS IN TIGHT FORMATION AREA BOUNDARY
Counselors Gallup-Dakota	38
Escrito Gallup	77
Lybrook Gallup	177
Devil's Fork Gallup Assoc.	12
Alamito Gallup	16
Dufer's Point Gallup	3
Undesignated Gallup	3
	326

Special Request Exhibit No. 1

RAILROAD COMMISSION OF TEXAS

OIL AND GAS DIVISION

JAMES E. (JIM) NUGENT, Chairman
MACK WALLACE, Commissioner
BUDDY TEMPLE, Commissioner

BOB R. HARRIS, P.E.
Director

1124 S. IH 35 | CAPITOL STATION — P. O. DRAWER 12967 | AUSTIN, TEXAS 78711

UNITED STATES OF AMERICA

Before the

FEDERAL ENERGY REGULATORY COMMISSION

High-Cost Gas Produced from Tight Formations

Docket No. 1-78,434

RECOMMENDATION OF THE RAILROAD COMMISSION OF TEXAS FOR DESIGNATION OF THE ANACACHO FORMATION AS A TIGHT FORMATION

The Railroad Commission of Texas (Railroad Commission) hereby recommends the Anacacho Formation, Atascosa County, Texas, for designation as a tight sand in Texas. Authority for designation of a tight formation is under § 107(b) of the Natural Gas Policy Act of 1978 (NGPA), 15 U.S.C. 3317(b). Procedure for this recommendation is found in 18 C.F.R. § 271.203(c).

The Railroad Commission conducted a public hearing on July 6, 1982 in order to obtain information concerning designation of the Anacacho Formation as a tight formation. Prefiled testimony and exhibits were entered into evidence at this hearing. Further, witnesses appearing at the hearing were examined orally by counsel for the applicant, Abraxas Petroleum Corporation, and were examined by the presiding examiner. See transcript of testimony, Docket No. 1-78,434. The data presented was subsequently analyzed and verified by the presiding examiner.

In support of its recommendation, the Railroad Commission will show that the formation meets all guidelines required by law. 18 C.F.R. § 271.703(c)(2). Calculations will show that estimated in situ gas permeability through the pay section of the formation is expected to be 0.1 millidarcy (md) or less. Stabilized production rate of the well completed in the formation, as well as those in which the formation was tested, will be shown to be within the scale set out in 18 C.F.R. § 271.703(c)(2)(i)(B). Production history and test data will demonstrate that no well drilled into the Anacacho zone is expected to produce in excess of five barrels of crude oil per day. A list of wells which are currently producing natural gas from the recommended formation is included.

Existing state and federal regulations are discussed to the extent to which they will assure that development of this formation will not adversely affect any fresh water aquifers that are or are expected to be used as a domestic or agricultural water supply. Finally, conclusions are stated based on the data discussed.

I.

GEOGRAPHICAL AND GEOLOGICAL DESCRIPTION

The recommended formation is located in the northwestern part of Atascosa County, Texas, in Railroad Commission District 1, and is comprised of the following geographic areas:

F. Brockinzen	A - 90
Abram Cole	A - 158
Abram Cole	A - 159
W. J. Viser	A - 873
W. J. Viser	A - 874
Craner Ford	A - 248
Craner Ford	A - 247
John C. Held	A - 368
John Sharp	A - 761
Robert C. Rogers	A - 721
J. S. Joline	A - 500
H. P. Benningfield	A - 97
Wm. H. Morris	A - 899
Nepomucinco Flores	A - 244

The Benton City Area lies at the updip edge of the Gulf Coast Basin near the Balcones Fault System. Numerous faults genetically related to the Balcones System bisect the area and form a series of northeast-southwest trending horsts and grabens. These faults have throws ranging up to 150' at the Anacacho level.

The Anacacho Formation is a low-permeability limestone that is typically hydrocarbon-bearing wherever reservoir porosity is developed. The Anacacho is a bioclastic limestone that depends on winnowing of the lime mud cementing material from the low-energy, deep water or lagoonal micrite to create intergranular porosity. The higher energy depositional environments are due to positive topographic features on the ocean floor or elevation of the limestone bank on the Cretaceous shelf above wave base.

In the Benton City Area the Anacacho Formation is encountered at depths ranging from 1,600 feet to 2,100 feet.

II.

ENGINEERING DATA

A. Permeability

To date Abraxas Petroleum Corporation has drilled eleven wells to test the Anacacho in the proposed tight gas designation area. Of these eleven wells, the Anacacho was diamond cored in seven and in the remaining four wells, cores were not attempted, however, density porosity logs were run. Density porosity logs were also run in five of the seven diamond cored wells. Average permeability from the diamond cored wells was determined directly from laboratory-derived permeabilities in the core data. To add the additional four data wells which were not cored, a core porosity versus density porosity plot was made on the five wells in which both sets of data were available. A plot of core porosity versus core permeability was also made using data from the seven diamond cored wells. Trends were established in both sets of plotted data. On wells where only density logs were available, density porosities were taken from the logs in one foot intervals and entered into the graph to determine an average equivalent core porosity which was then entered into the other graph to determine an average equivalent core permeability. The summary of the results of this procedure is presented in Exhibit 2 filed in the hearing record.

Arithmetic average permeabilities of the Anacacho Limestone derived directly from the seven wells in which diamond core data is available was .0772 md. The logarithmic (geometric) average permeability amounted to .0271 md. The arithmetic average permeability of the Anacacho Limestone derived from the density logs using the procedure outlined above for four wells in which only density logs are available is .0903 md. The logarithmic (geometric) average permeability for these four wells is .0233 md. Combining all eleven wells, the arithmetic average permeability is .082 md. and the logarithmic (geometric) average permeability is .0257 md.

In six of the seven diamond cored wells, the entire Anacacho Formation was cored and evaluated. In the seventh well a portion of the core was lost, however, it is believed that the data is sufficient and widespread enough to give an accurate representation of the true average permeability for the entire Anacacho Limestone Formation in the Benton City Area.

B. Stabilized Production Rates

Production rates on the eight wells which have been completed in the area to date by Abraxas had gas production rates prior to stimulation of from zero to a trace of gas too small to measure. No wells produced oil prior to stimulation. Stimulation has consisted of 500 - 2,000 gallons of hydrochloric acid followed by a gelled water sand frac using up to 40,000 pounds of sand. Post-stimulation production rates have ranged from a low

of 15 MCFPD to a maximum of 348 MCFPD. Post-stimulation oil production rates have ranged from zero to 5 BOPD although some wells had initial potentials which were slightly higher.

At the present time there are only three producing wells in the entire Benton City tight gas designation area. These wells are pumping oil completions with various amounts of casinghead gas which is currently being vented to the atmosphere. In addition to the three pumping oil completions, there are an additional two shut-in Anacacho gas wells, as well as three additional wells that have been temporarily abandoned due to a lack of gas market. This production data is summarized in Exhibit 2.

III.

WELLS IN RECOMMENDED FORMATION

Exhibit 4 is a structure map drawn on the top of the Anacacho Formation covering the entire Benton City tight gas designation area. On this map all data wells are designated by a "triangle" surrounding the well location. Surrounding field names and producing horizons are also shown on this map. The fields involved include the Benton City (Anacacho), Benton City, South (Anacacho), and Verna (Anacacho) Fields.

IV.

PROTECTION OF FRESH WATER

Existing state or federal regulations will assure that development of the Anacacho formation will not adversely affect fresh water aquifers that are or are expected to be used as a domestic water supply. In Texas, the Railroad Commission has statutory responsibility for the protection of surface and subsurface water from oil and gas production-associated activities. TEX. WATER CODE ANN. § 26.131 (Vernon Supp. 1982). The Railroad Commission is required by statute to enforce proper casing and plugging that will protect surface and subsurface fresh water. TEX. NAT. RES. CODE ANN. §§ 91.011, 91.012 (1978). The Railroad Commission is also empowered to adopt and enforce rules and orders relating to the prevention of pollution in drilling and operating oil and gas wells. Id., § 91.191. The Railroad Commission has adopted rules of statewide application in accordance with this authority. See, 16 T.A.C. §§ 3.7, 3.8, 3.13, 3.14, and 3.15. Additionally, federal statutes promote the protection of fresh water from a wide range of activities, some of which are oil and gas-related.

In the area under consideration, the deepest base of a fresh water sand occurs at 600 feet. See, Exh. 3. Further, a recommendation from the Texas Department of Water Resources is required concerning the protection of fresh water sands for each well drilled. 16 T.A.C. § 3.13. Finally, there exists over 1000 feet of overburden between the shallowest portion of the subject sand and the deepest fresh water sand. Accordingly, no fresh water will be affected by drilling in the recommended tight formation.

V.

CONCLUSION

Pursuant to 18 C.F.R. § 271.703(c)(3), the contents of this recommendation evidence that the Anacacho formation is within the FERC guidelines for designation as a tight sand as that term is defined in 18 C.F.R. § 271.703(c)(2). Estimated in situ permeability throughout the pay section is expected to be 0.1 md or less. The stabilized production rate has been determined to be in accordance with the table set out in 18 C.F.R. § 271.703(c)(2)(B). No well drilled into this formation is expected to produce crude oil in excess of five barrels per day. In summation, this recommendation contains the required information demonstrating that the guidelines for a tight formation under 18 C.F.R. § 271.703(c)(2) are met by the subject formation. Based on the research and analysis conducted in the preparation of this recommendation, the Railroad Commission has no knowledge or information which is inconsistent with this conclusion.

Wherefore, the Railroad Commission of Texas hereby recommends to the Federal Energy Regulatory Commisison that the Anacacho formation be designated as a tight formation in the area of the Benton City (Anacacho), Benton City, South (Anacacho) and Verna (Anacacho) Fields. The area defined is shown on Exhibits 4 and 4A.

Issued at Austin, Texas on September 27, 1982.

James E. Nugent, Chairman

Mack Wallace, Commissioner

Buddy Temple, Commissioner

ATTEST:

Lola Wilson
Secretary

EDT/rl

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

RECOMMENDATION OF THE RAILROAD COMMISSION OF TEXAS THAT THE CLEVELAND FORMATION IN THE NORTHEAST TEXAS PANHANDLE BE DESIGNATED AS A TIGHT FORMATION IN TEXAS	§	DOCKET NO. 10-77,222

TO THE HONORABLE FEDERAL ENERGY REGULATORY COMMISSION:

NOW COMES THE RAILROAD COMMISSION OF TEXAS (hereinafter referred to as "Commission") and hereby files this recommendation that the FEDERAL ENERGY REGULATORY COMMISSION (hereinafter referred to as "FERC") designate the CLEVELAND FORMATION in the Northeast Texas Panhandle (hereinafter referred to as the "Cleveland") as a tight formation in Texas. Authority for designation of a tight formation is under Section 107(b) of the Natural Gas Policy Act of 1978. 15 U.S.C. §3317(b) (1980). Procedure for this recommendation is pursuant to regulations promulgated to implement Section 107(b) and set out in 18 C.F.R. §271.703(c) (Final Rule originally issued in FERC Docket No. RM 79-76 on August 15, 1980).

The Railroad Commission of Texas held a public hearing on October 9, 1981, for the purpose of obtaining information on the Cleveland as a proposed tight formation in Texas. Pre-filed testimony was entered into evidence at the hearing. See Transcript of Testimony, Docket No. 10-77,222. The examiner subsequently analyzed and verified the data and prepared this recommendation. (All references to exhibits

herein are to exhibits received into evidence during the hearing in Docket No. 10-77,222.)

Initially, a geographical and geological description of the Cleveland is presented. Geological and engineering data that support the recommendation are set forth, indicating the source of that data. In support of its recommendation, the Commission will show that the recommended portion of this formation meets all guidelines required by law. 18 C.F.R. §271.702(c)(2) (1980). Calculations will show that estimated average in-situ gas permeability throughout the pay section of the formation is expected to be 0.1 millidarcy (md) or less. The stabilized production rate of wells completed for production in the Cleveland, without stimulation, will be shown to be within the scale set forth at 18 C.F.R. §271.702(c)(i)(B) (1980). Production history will demonstrate that no well drilled into the Cleveland is expected to produce more than five barrels of crude oil per day. A list of wells which have produced from the recommended formation is submitted (See Exhibit 12). Also discussed are existing state and federal regulations and the extent to which they will assure that development of the Cleveland will not adversely affect any fresh water aquifers that are or are expected to be used as a domestic or agricultural water supply. Finally, conclusions are stated based on the data discussed.

I.

GEOGRAPHICAL AND GEOLOGICAL DESCRIPTION

Geographically, the recommended formation is located in the Northeast Texas Panhandle, Railroad Commission District 10. The geographic area recommended by the Railroad Commission (hereinafter "Study Area") includes all of Lipscomb, Ochiltree and Hansford Counties, approximately the northern halves of Hutchinson and Roberts Counties, virtually all of Hemphill County, and approximately the northeast quarter of Wheeler County. (See Exhibit 1).

The Cleveland is a continuous geologic formation present everywhere within the Study Area. (See Exhibits 5, 6 and 7) The actual northern and eastern limits of the Cleveland lie beyond the Texas-Oklahoma border outside the Study Area. The western limit, along the Hansford-Sherman and Hutchinson-Moore County lines, corresponds to the approximate western edge of the Anadarko basin where the Cleveland pinches out. The southern limit represents a facies change in which the Cleveland loses its identity in a large build-up of Granite Wash.

The Cleveland is the basal formation in the Kansas City group and overlies the Marmaton group (See Exhibit 3). The general structure of the Cleveland is that of an east to southeast dipping homocline, with tops near 2,500' subsea to the west in Hansford County and near 9,700' subsea in Wheeler County to the southeast. (See Exhibit 8). The Cleveland was

deposited in a quiet water, marine shelf environment. The Cleveland sandstone is fine-grained, well-sorted and tightly packed. Cementations, overgrowths, secondary alterations, and concentrations of clays and minerals in oriented bedding planes have reduced primary porosity, have caused a lack of permeability, and have led to the formation of a tight sandstone. (See Exhibit 11). To produce hydrocarbons from this tight sandstone requires modern expensive drilling and completion techniques, including massive fracturing.

From a geological standpoint, the Cleveland formation, throughout the Study Area, can accurately be described exactly as the FERC has defined "tight formation" - "a sedimentary layer of rock composed of very fine and irregularly shaped grains of sand cemented together in a way which greatly hinders the flow of gas through the rock." (FERC Docket No. RM79-76, Order No. 99 at page 2).

II.

GEOLOGICAL AND ENGINEERING DATA

INTRODUCTION

Most of the available production data from the Cleveland formation within the Study Area comes from Lipscomb and Ochiltree Counties. (See Exhibit 13). Some data from Hansford, Hutchinson, Roberts and Hemphill Counties is available and was studied. No Cleveland production data is available from Wheeler County. Results of the in-situ permeability and stabilized production rate determinations have

been reviewed and the Commission finds that data representation to be a valid statistical sampling of the Cleveland formation in the Study Area. The lack of available data, particularly from Wheeler and Hemphill Counties is because there has been little or no Cleveland production in those counties where the formation is particularly tight. This lack of development confirms that incentive pricing is necessary for future exploration and development.

PERMEABILITY

Average in-situ permeability throughout the pay sections of the Cleveland formation in the Study Area is expected to be 0.1 md or less. In-situ permeability data was supplied by various operators for some of the wells. For other wells, permeability was calculated by Core Laboratories, Inc. from data submitted by the operators. Core Lab used flow equations to perform its calculations. (See Exhibit 14) The validity of this method and of these equations has been acknowledged by the Commission and the FERC (e.g. Texas/Cotton Valley). Results for permeability were obtained from 391 successful completions in the Cleveland formation (See Exhibit 15). Although there were a total of 396 wells from which specific data was studied, permeability data was not available for five of those wells. From these results in-situ permeability versus cumulative frequency was plotted (See Exhibit 16). The results show that seventy-eight percent of the permeability values fall below 0.1 millidarcy. The median calculated permeability value for the

391 wells is .028 md. From these results, the expected value of permeability to be found in a well drilled to and completed in the Cleveland in the Study Area is less than 0.1 millidarcy.

STABILIZED PRODUCTION RATES

The stabilized flow rate at atmospheric (wellhead) pressure prior to any treatment was supplied by various operators for some of the wells. For other wells, the stabilized flow rate was computed by Core Laboratories, Inc. from data submitted by the operators. After determining permeability, various equations were utilizied in determining stabilized flow rates prior to stimulation. (See Exhibit 14). In the absence of pre-stimulation data, post-treatment production data was used to determine formation permeability and stabilized flow rate.

Results for the stabilized flow rate were obtained from 396 successful completions in the Travis Peak formation (See Exhibit 15). Stabilized flow rate versus cumulative frequency was plotted, and the data shows that eighty four percent of these 396 completions have stabilized flow rates below the maximum permissible rate. (See Exhibit 17) The median stabilized production rate for the 396 wells is only 28% of the maximum permissible rate. Based on this study, the expected stabilized flow rate for a well drilled to and completed in the Cleveland will be less than the maximum permissible rate.

PERMEABILITY AND STABILIZED FLOW RATE ADJUSTMENTS

In addition to wells that have been completed in the

Cleveland, there have been approximately 6,000 additional wells which penetrated the Cleveland. (See Exhibit 2). Many of these wells were not completed in the Cleveland because it was too tight. Sufficient test data to determine in-situ permeability and stabilized flow rate are not generally available for these wells. However, to the extent additional wells penetrated but were not completed in the Cleveland because it is too tight, the percentage of wells encountering permeability of less than .1 md would be even greater than the calculated seventy-eight percent. Similarly, the chance of completing a well with a stabilized flow rate of less than the maximum permissible rate would be even greater than the calculated eight-four percent.

OIL PRODUCTION RATES

The majority of completions in the Cleveland formation in the Study Area are gas wells. Virtually all Cleveland wells are fracture stimulated prior to testing and production. Only one well from among all of the wells examined had a pre-stimulation oil flow rate of more than five barrels per day. Based on a study of available data, ninety-seven percent of the oil wells produce at an average rate of less than five barrels of oil per day. (See Exhibit 19) Based on the available data, the Commission finds that a well drilled to the Cleveland would not be expected to produce five barrels or more of crude oil per day.

III.

WELLS IN RECOMMENDED FORMATION

A list of wells which have produced from the recommended formation has been compiled (See Exhibit 12).

IV.

PROTECTION OF FRESH WATER

Existing state or federal regulations will assure that development of the Cleveland will not adversely affect any fresh water aquifers that are or are expected to be used as a domestic or agricultural water supply. In Texas, the Railroad Commission has the statutory responsibility for protecting surface and subsurface water from oil and gas production-associated activities. TEX. WATER CODE ANN. §26.131 (Supp. 1990) ("The Railroad Commission of Texas is solely responsible for the control and disposition of waste and the abatement and prevention of pollution of surface and subsurface water resulting from activities associated with the exploration, development, and production of oil or gas or geothermal resources.") The Commission is required by statute to enforce proper casing and plugging that will protect surface or fresh water. TEX. NAT. RES. CODE ANN. §§91.011, 91.012 (1979). Legislation also allows the Commission to adopt and enforce rules and orders which relate to the prevention of pollution in regard to drilling, producing, and operating oil and gas wells. Id. at §91.191. The Commission has done so through adoption of statewide rules with safeguards for protection of any fresh

water aquifers that are presently being used or are expected to be used as a domestic or agricultural water supply. See Statewide rules, Tex. RR. Comm'n., Oil and Gas Div. Additionally, federal statutes promote the protection of waters from a wide range of activities, including some which are oil and gas related. Together, state rules in Texas and federal regulations will protect any fresh water supply that may be affected by drilling in the aforementioned recommended tight formation.

The maximum depth at which usable-quality water occurs in the recommended area is 920 feet. In that same area, the maximum depth to which usable-quality water is protected is 3,606 feet (Ochiltree-Roberts County line). The top of the recommended formation ranges from 2500' to 9700' subsea. The extensive impermeable strata between any usable-quality water and the Cleveland formation will prevent communication. No usable-quality water supply will be affected by drilling in the aforementioned recommended tight formation.

V.

CONCLUSION

In alignment with the procedures outlined at 18 C.F.R. §271.703(c)(3) (1980), the contents of this recommendation evidence that the Cleveland formation in the Study Area is within FERC guidelines for being designated as a tight formation as that term is outlined at 18 C.F.R. §271.703(c)(2) (1980). Estimated average in-situ permeability throughout the

pay section is expected to be 0.1 md or less. The stabilized production rate of wells in the Cleveland has been determined to be in accordance with the table set forth at 18 C.F.R. §271.702(c)(2)(B) (1980). No well drilled into this formation is expected to produce more than five barrels of crude oil per day. In summation, this recommendation contains the required information which proves that the guidelines for a tight formation under 18 C.F.R. §271.702(c)(2) are met by the subject formation. Based on the research and analysis conducted in the preparation of this recommendation, the Commission has no knowledge of information which is inconsistent with this conclusion.

THEREFORE, the RAILROAD COMMISSION OF TEXAS hereby recommends to the FEDERAL ENERGY REGULATORY COMMISSION that the CLEVELAND FORMATION in the Northeast Texas Panhandle be designated as a tight formation.

Issued in Austin, Texas on November 30, 1981.

RAILROAD COMMISSION OF TEXAS

Chairman James E. (Jim) Nugent

Commissioner Mack Wallace

Commissioner Buddy Temple

ATTEST:

Secretary

OIL AND GAS DOCKET NO. 1-86,560

THE APPLICATION OF ROYAL OIL AND GAS CORPORATION FOR THE COMMISSION'S RECOMMENDATION BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION THAT THE OLMOS RESERVOIR UNDERLYING CERTAIN PORTIONS OF THE A.W.P. (OLMOS) FIELD BE RECOGNIZED AS A TIGHT GAS SAND, A.W.P. (OLMOS) FIELD, McMULLEN COUNTY, TEXAS

HEARD BY: Gregg Cloud on December 5, 1985

APPEARANCES:

John Soule David Webster Don Kersting Alan T. Costello Jeff Atwood Thomas C. Huebinger	Royal Oil & Gas Corporation
Joe Tamez	Fargo Trading Company

EXAMINERS REPORT

STATEMENT OF THE CASE

Royal Oil and Gas Corporation (Royal) asks that the Commission recommend to the Federal Energy Regulatory Commission (FERC) that certain portions of the Olmos reservoir underlying the A.W.P. (Olmos) Field be recognized as a tight formation for purposes of category determination pursuant to the Natural Gas Policy Act (NGPA), 18 CFR § 271.703(c) (1980).

The area for which the Tight Sand recommendation is sought consists of approximately 7,506 acres and is located to the east and southeast of Tilden, in McMullen County, Texas. This area contains four leases: the 3480.6 acre Bracken Ranch Lease; the 320 Dan Foster Lease; the 2431.46 R.P. Horten Lease; and the 1274 acre R.P. Horton "C" Lease.

The area of application is contiguous to an area for which Shell Western Exploration and Production, Inc. (Shell) recently received approval for tight gas sand designation. Shell's application is reported in Oil and Gas Docket No. 1-85,978. The application was approved by FERC on May 23, 1986, in Order No. 452, 18 CFR § 271 (1986), effective June 23, 1986. Royal's area of application and Shell's designated area of tight sand gas formation are both part of the same Olmos reservoir.

DISCUSSION OF THE EVIDENCE

GEOLOGICAL CHARACTERISTICS

The geological characteristics of the Olmos Reservoir were discussed by Wayne M. Ahr, Ph.D. in Shell's application. Royal has adopted the discussion of geological characteristics of this reservoir as presented by Dr. Ahr in the Shell proceeding. Dr. Ahr is a professor in the Department of Geology at Texas A&M University and an industry consultant. The following is a synopsis of the geological evidence which he presented at Shell's proceeding.

The Olmos Sandstone is the youngest (uppermost) of three formations comprising the Taylor Group of Cretaceous Age. In south Texas, rocks of the Taylor Group, including the Olmos, conformably overlie the Austin Chalk and are uncomformably overlain by rocks of the Navarro Group, principally the Escondido formation. The Olmos can be correlated as a continuous unit over the entire area of application and is present at depths below mean sea level ranging from -9100' to -9600'. It is recognized in two sections, known as the Massive Olmos and the Second Olmos Stringer.

In the area of application, the Olmos reservoir is controlled by both structural and stratigraphic mechanisms. Three major faults have been recognized on well logs. Several other smaller faults have been detected but do not appear to be a controlling factor in reservoir fluid migration. Primarily, the reservoir is controlled by a stratographic unconformity where the Olmos is erosionally truncated and then overlain by an impermeable shale.

Geological analyses of Olmos core samples done by David K. Davies and Associates determined that the average Olmos Sand in the area of application is a very fine grained, clayey, glauconitic, feldspathic quartz sand with accessory mica, rock fragments, heavy minerals and planktonic foraminifera. Detrital clay matrix makes up from 33 to 53 percent of the total rock volume and the clay has been admixed with the sand by burrowing organisms.

Depositionally, the Olmos Sands in the area of application have been lain down in an open marine type environment transported by storm currents and then extensively reworked by shelf currents and burrowing organisms. The area of application coincides with what has been characterized as the downdip Olmos as opposed to the updip Olmos. Separated by the Stuart City Reef

which runs from Mexico to Florida, these two areas of the Olmos are stratigraphically equivalent but differ in the depositional characteristics and, hence, their porosity and permeability.

The Stuart City Reef has acted as a fulcrum over which the Olmos flexed and underwent extensional faulting in the downdip regions as the basin subsided. These regions were characteristically open shelf type deposits, whereas on the other side of the flexure the Olmos sands are typical of deltaic deposits with greater porosity and permeability than that seen in the area of application.

Borehole log correlations, exhibited by cross-sections and mapping, indicate that the reservoir sand is continuous over the area of application, that the reservoir is mainly a stratigraphic trap, and that there are many faults that cut the reservoir unit but do not break the continuity of hydrocarbon migration and "fill up". There is a nominal to moderate amount of variation in rock properties across the area of application depending on depositional environment, proximity to faults and proximity to the unconformity. These variations are only moderate and Dr. Ahr concluded that there should be no great variations in the engineering properties of the Olmos Reservoir.

ENGINEERING CHARACTERISTICS

The engineering characteristics of the Olmos Sand for the purposes of this application were presented by David Webster, a petroleum engineer with Royal. Mr. Webster has a Bachelor of Science degree in petroleum engineering from Texas A&M University. He has handled the A.W.P. Olmos field for Royal for the past two and one half years. Mr. Webster testified at the hearing, offering evidence in support of the conclusion that the area of application qualifies for a tight gas sand designation.

The NGPA requires: 1) that there be proof that the wells producing from the area of application are completed satisfactorily to protect the ground water; 2) that the average in-situ, pre-stimulation permeability not exceed 0.1 millidarcies; 3) that the average stabilized gas production rate not exceed a depth dependent standard without stimulation; 4) that the average, pre-stimulation, associated oil production not exceed five barrels of oil per day; and 5) that there should not have been any infill drilling authorized prior to the date of the recommendation.

Ground Water Protection:

The Texas Department of Water Resources recommends that useable quality ground water be protected from the ground surface to a depth of as much as 5550' within the area of application. Applicant has used two types of casing procedures to complete its wells. One method involves setting between 1200' and 2200' of surface casing and then using a multi-stage cementing tool in the production string to divert cement from below the deepest fresh waters to the ground surface. The other method involves setting the same amount of surface-casing (usually 1500' of 9 5/8") and then cementing the entire production string from its shoe to the ground surface. This latter option requires that a cement bond log be reviewed by the Commission to ensure that the quality of the cement job is adequate to protect the interval from the base of the surface casing to the depth specified by the Department of Water Resources.

Permeability Criteria:

There are 51 producing wells within the area of application. Of these, 44 are classified as oil wells and 7 are classified as gas wells. Horner analyses of pressure transient testing were performed on two gas wells and three oil wells. The arithmetic average in-situ permeability as determined by the Horner analysis was .044 millidarcies. Calculations could not be performed for the other gas wells because they would not flow adequately prefracture to get a Horner plot. Conventional core analyses were performed on the oil wells. The arithmetic average in-situ permeability as determined by the conventional core study was .011 millidarcies. This analysis indicates that the expected effective in-situ permeability at any location within the area of application will not be more than the FERC limit of 0.1 millidarcy.

Production Standard:

Of the seven gas wells in the area of application, only four would flow naturally prior to stimulation. The absolute open flow rate of these four wells ranged from 57 to 160 mcf/d, for an average of 54.8 mcf/d. The depth of the seven gas wells ranges from 9396' to 9503'. The average depth of the Olmos Reservoir is 9454'. The FERC's maximum allowable production rate at this depth for gas wells is 519 mcf/d. The average pre-stimulation oil production rate for the area of application is 2.8 stb/d. FERC allows a maximum production of 5 stb/d of oil from a tight gas sand formation.

Infill Drilling Criteria:

The rules controlling development in this area as it pertains to the Olmos formation are set out in Final Order No. 1-78,135. The original rules provide for a spacing limitation of no less than 467' from lease or property lines and 1320' between wells; a unit density maximum of 80 acres per producing well with a tolerance of 40 acres for the last well on a lease; and a maximum allowable daily production rate based on the acreage assigned to the individual well as a percent of the maximum permitted. These rules were amended in Final Order No. 1-82,599. The amendment allows for a spacing of 933' between wells, and an optional fractional unit of 40 acres.

The density of the area of application is 147 acres per well. Royal had not drilled down to final density under the 80 acre rule before the adoption of the 40 acre option nor have they yet drilled down to the final density of 80 acres per well.

The amendment of the field rules for the A.W.P. Olmos field does not fall under FERC's definition of "infill drilling" in 271.703(b)(6). Large portions of the field have not yet been developed under the original 80 acre proration unit density rule. Royal has actually developed the area of application less densely than would have been authorized under the original rules. FERC Final Order No. 99 in Docket No. RM 79-76, issued August 15, 1980, emphasizes that amending the field rules to provide for optional proration units only constitutes an authorization for infill drilling if the field is substantially developed prior to such amendment. Therefore, the examiner does not believe that amending the rules to include an optional unit size constitutes "an authorization to infill drill". The Commission, upon reviewing temporary field rules, frequently will reduce the maximum allowable unit size in a field at the operator's option in order to maximize ultimate recovery. The Commission is not, therefore, authorizing infill drilling, but rather it is mandating the appropriate primary density of development for that field.

Secondly, if the Commission is convinced that there are sections of the field that are ineffectively drained by existing wells, it may amend the rules to allow smaller, but optional, unit sizes so that operators can have the flexibility to drill wells within those undepleted areas. This does not necessarily constitute infill drilling authority. There has been no infill drilling authorized as of the date of the recommendation.

FINDINGS OF FACT

1. Notice was issued to all operators in the field on October 30, 1985 that a hearing would be held on December 5, 1985.

2. The application is to consider a tight gas sand recommendation for the Olmos Formation beneath approximately 7506 acres of land within McMullen County, Texas.

3. The Olmos Formation is a member of the Taylor Group of Cretaceous age and is recognized as a continuous geologic section over the entire area of application.

   a. The Olmos Sandstone is unconformably overlain by the Escondido Formation of the Navarro Group and it conformably overlies the Austin Chalk.

   b. Within the area of application, the Olmos is composed of a very fine grained sand and detrital clay matrix with clay minerals making up between 33% to 53% of the total rock volume.

4. The average effective in-situ permeability throughout the pay section anywhere within the area of application should will not exceed 0.1 millidarcy.

   a. The calculated average effective in-situ permeability from pressure buildup analysis is 0.044 md.

   b. The calculated effective in-situ permeability from conventional core analysis is 0.011 md.

5. No well within the area of application is capable of producing at stabilized production rates of more then 5 BOPD or 519 MCFG/D.

   a. The average pre-stimulated stabilized gas flow rate calculated from 4 out of 7 wells was 54.8 MCF/D.

   b. The highest initial gas flow rate detected upon completion for any one well was 160 MCF/D.

   c. The average amount of measureable oil production from any of the 44 oil wells within the area of application was 2.8 BOPD upon initial completion.

6. There has been no infill drilling authorized within the area of application.

a. The area of application consists of 7506 acres and has 51 producing wells which constitutes an average density of development equivalent to 147 acres/well.

b. Field rules allow for one well per 80 acres, with an optional 40 acre unit, and a tolerance of 40 acres for the last well on a lease.

7. All wells within the area of application are completed in a manner to comply with Commission rules requiring the protection of useable quality groundwater.

8. The Railroad Commission of Texas is the jurisdictional agency authorized to review application for recommendations to the Federal Energy Regulatory Commission to recognize a particular formation as a tight gas sand.

CONCLUSIONS OF LAW

A. Proper notice was issued to all affected persons as required by the applicable codes and regulatory statutes.

B. The Commission is the appropriate agency to make a determination concerning tight gas sand pursuant to the Natural Gas Policy Act, 18 CFR § 271.703(c)(1980).

C. The area of application complies with the provisions of section 107 of the NGPA, and the Commission recommends that the Federal Energy Regulatory Commission recognize the area of application as complying with those requirement sufficiently to support a determination that all wells within that area are producing from a tight gas sand.

EXAMINER'S RECOMMENDATION

The examiner recommends that the attached order be entered and forwarded to FERC to recommend that the area of application be recognized as a tight gas sand.

Respectfully submitted,

Gregg Cloud
Technical Examiner

/tmd

Date of Commission Action: 8-18-86

RAILROAD COMMISSION OF TEXAS

OIL AND GAS DIVISION

August 18, 1986

Royal Oil & Gas Corporation
MBank Center, Suite 807 North
500 North Water Street
Corpus Christi, Texas 78471

Re: Oil and Gas Docket No. 1-86,560
The Application of Royal Oil & Gas Corporation to Classify Gas Produced from four leases as Section 107 Tight Gas in the A.W.P. (Olmos) Field, McMullen County, Texas

Gentlemen:

At formal conference held on Monday, August 18, 1986, the Commission approved the above-referenced application.

Please refer to the attached order.

Yours very truly,

Greg Cloud
Technical Examiner

GC:nb

Enclosure

cc: Joe Tamez
Fargo Trading Company

John Soule
Scott, Douglass & Luton

Dianne Simmons - NGPA
RRC, Austin

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

OIL AND GAS DOCKET
NO. 1-85,978

IN THE A.W.P. (OLMOS) FIELD
McMULLEN COUNTY, TEXAS

FINAL ORDER
APPROVING THE APPLICATION OF SHELL WESTERN E & P, INC.
FOR THE COMMISSION'S RECOMMENDATION TO THE FEDERAL ENERGY
REGULATOR COMMISSION THAT THE OLMOS RESERVOIR
UNDERLYING CERTAIN PORTIONS OF THE A.W.P. (OLMOS) FIELD
BE RECOGNIZED AS A TIGHT GAS SAND
IN THE A.W.P. (OLMOS) FIELD
McMULLEN COUNTY, TEXAS

The Commission finds that after statutory notice in the above-numbered docket heard on September 11, 1985, the examiner has made a recommendation containing findings of fact and conclusions of law, for which service was waived by parties of record; that the proposed application is in compliance with all statutory requirements; and that this proceeding was duly submitted to the Railroad Commission of Texas at conference held in its offices in Austin, Texas.

The Commission, after review and due consideration of the examiner's recommendation, the findings of fact and conclusions of law as fully set out and separately stated as follows:

FINDINGS OF FACT

1. Notice was issued to all operators in the field on July 26, 1985 that a hearing would be held on September 11, 1985.

2. The application is to consider a tight gas sand recommendation for the Olmos Formation beneath approximately 4853 acres of land within McMullen County, Texas.

   a. The interval occurs at depths below mean sea level from -9100 ft. to -9600 ft.

3. The Olmos Formation is a member of the Taylor Group of Cretaceous age and is recognized as a continuous geologic section over the entire area of application.

   a. The Olmos Sandstone is unconformably overlain by the Escondido Formation of the Navarro Group and it conformably overlies the Austin Chalk.

   b. Within the area of application, the Olmos is composed of a very fine grained sand and detrital clay matrix with clay minerals making up between 33% to 53% of the total rock volume.

4. The average effective in-situ permeability throughout the pay section anywhere within the area of application should not be expected to exceed 0.1 millidarcy.

   a. 14 of 49 wells within this area have been subjected to pressure buildup analysis.

buildup analysis.

b. The calculated average effective in-situ permeability from pressure buildup analysis is 0.085 md.

5. No well within the area of application is capable of producing at stabilized production rates of more than 5 BOPD or 600 MCFG/D.

a. The average pre-stimulated stabilized gas flow rate calculated from 14 out of 49 wells was 335 MCF/D.

b. The highest initial gas flow rate detected upon completion for any one well was 560 MCF/D, however, this rate would have declined prior to stabilizing.

c. The average amount of measureable oil production from any of the 27 oil wells within the area of application was 4.4 BOPD upon initial completion, however, this rate would have declined prior to stabilizing.

6. There has been no infill drilling authorized within the area of application.

a. The area of application consists of 4853 acres and has 49 producing wells which constitutes an average density of development equivalent to 99 acres/well.

b. Field rules allow for one well per 80 acres and a tolerance of 40 acres for the last well on a lease.

7. All wells within the area of application are completed in a manner to comply with Commission rules requiring the protection of useable quality groundwater.

8. The Railroad Commission of Texas is the jurisdictional agency authorized to review applications for recommendations to the Federal Energy Regulatory Commission to recognize a particular formation as a tight gas sand.

CONCLUSIONS OF LAW

A. Proper notice was issued to all affected persons as required by the applicable codes and regulatory statutes.

B. The Commission is the appropriate agency to make a determination concerning tight gas sands pursuant to the Natural Gas Policy Act, 18 C.F.R. §271.703(c)(1980).

C. The area of application complies with the provisions of sections 107 of the NGPA and the Commission recommends that the Federal Energy Regulatory Commission recognize the area of application as complying with those requirements sufficiently to support a determination that all wells within that area are producing from a tight gas sand.

Therefore, it is ordered by the Railroad Commission of Texas that effective October 28, 1985, the application of Shell Western E & P, Inc. for the Commission's recommendation to the Federal Energy Regulator Commission that the Olmos Reservoir underlying certain portions of the A.W.P. (Olmos) Field be recognized as a tight gas sand in the A.W.P. (Olmos) Field, McMullen County, Texas, be and it is hereby approved.

Done this 28th day of October, 1985.

RAILROAD COMMISSION OF TEXAS

CHAIRMAN

COMMISSIONER

Mark Wallace
COMMISSIONER

ATTEST:
Secretary

DOJ/ima

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

[18 CFR Part 271]

Qualifying Certain Tight Formation Gas for Tax Credit	)	Docket No. RM91-8-000

NOTICE OF PROPOSED RULEMAKING

(March 20, 1991)

I. INTRODUCTION

As part of the Revenue Reconciliation Act of 1990, 1/ signed into law by the President on November 5, 1990, the tax credit for nonconventional fuels under Section 29 of the Internal Revenue Code was extended for two years to continue to provide an incentive to develop nonconventional fuels. The tax credit was also reinstated for one nonconventional fuel for which it had previously lapsed -- gas from newly drilled wells in tight formations -- by revising the tax code so that tight formation gas is eligible for the tax credit even if the price for tight formation gas is no longer regulated.

The Federal Energy Regulatory Commission (Commission) is proposing three minor amendments to the Commission's regulations to carry out Congress' intent in restoring the tax credit for gas produced from newly drilled tight formation wells. The Commission is proposing to establish maximum allowable production rates for natural gas produced from tight formations whose average

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1/ Pub. L. No. 101-58, __ Stat.____.

depth exceeds 15,000 feet. 2/ In addition, the Commission is proposing to permit jurisdictional agencies to designate as a tight formation a formation that (1) does not meet the Commission's permeability standard for tight formations (but meets the production rate standards), if the jurisdictional agency can show that the tax credit (or the incentive price for wells spudded before May 13, 1990) is necessary to provide reasonable incentives to produce natural gas from that formation, or (2) was previously authorized to be developed by infill drilling if the jurisdictional agency's judgment is that the formation subject to infill drilling cannot be developed without the tax credit (or incentive price for wells spudded before May 13, 1990). These proposed amendments would enable natural gas produced from tight formations of average depths below 15,000 feet, natural gas produced from formations which do not meet the Commission's permeability standard for tight formations, and natural gas produced from formations subject to previous infill drilling orders to qualify for the tax credit. The proposed amendments do not affect the price at which tight formation gas may lawfully be sold.

II. BACKGROUND

Under Section 29 of the Internal Revenue Code, qualified nonconventional fuels are eligible for a production credit that is equal to $3 per barrel or the Btu barrel-of-oil equivalent

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2/ The average depth referred to means the average depth to the top of the formation.

(adjusted for inflation). Qualified fuels include (1) oil produced from shale and tar sands, (2) gas produced from geopressured brine, Devonian shale, coal seams, tight formations, or biomass, and (3) liquid, gaseous, or solid synthetic fuels produced from coal (including lignite), including such fuels when used as feedstocks. Prior to amendment by the Revenue Reconciliation Act of 1990, the production credit was available for qualified fuels produced from a well drilled, or a facility placed in service, before January 1, 1991, and sold before January 1, 2001. Under the 1990 Act, the credit was extended for two years to fuels produced from a well drilled, or a facility placed in service, before January 1, 1993, and sold before January 1, 2003.

In addition, before amendment by the 1990 Act, the tax credit for gas produced from tight formations was only available if the price of the gas was regulated by the United States with a maximum lawful price of at least 150 percent of the applicable ceiling price under section 103 of the Natural Gas Policy Act of 1978 (NGPA). 3/ Section 107(c)(5) of the NGPA authorized the Commission to prescribe maximum lawful prices that exceeded the otherwise applicable ceiling prices for the first sale of "high-

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3/ 15 U.S.C. §§ 3301-3342 (1988). However, the credit is not available unless the gas was sold at a lawful price determined without regard to the provisions of NGPA § 107. (Internal Revenue Code § 29(e)) Thus, a producer can utilize the tight formation incentive price by collecting a price in excess of the otherwise applicable maximum, or the tax credit, but not both.

cost" natural gas produced under such other conditions as the Commission determines to present extraordinary risks or costs. In Order No. 99, issued August 15, 1980, the Commission, acting under NGPA section 107(c)(5), authorized a ceiling price of 200 percent of the maximum lawful price under NGPA section 103 for gas produced from qualified tight formations. 4/ The incentive price was not provided for gas from tight formations below 15,000 feet, because ceiling prices for gas from below such depths had been previously removed under NGPA section 121(b). 5/

All tight formation gas that qualified for the NGPA section 107(c)(5) incentive ceiling price established by Order No. 99 qualified for the tax credit. However, by 1990 a substantial portion of the tight formation gas had been deregulated and, accordingly, no longer qualified for the tax credit. Under the Natural Gas Wellhead Decontrol Act of 1989, 6/ natural gas that was not subject to a first sale contract on the date of enactment was immediately deregulated. Gas sold under contracts that

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4/ Regulations Covering High-Cost Natural Gas Produced From Tight Formations, 45 Fed. Reg. 56034 (Aug. 22, 1980), FERC Stats. & Regs. [Regulations Preambles 1977-1981] ¶ 30,183.

5/ Section 121(b) of the NGPA provided that on the effective date of the Commission's incremental pricing regulations under section 201 of the NGPA, the ceiling prices for section 107 high-cost gas would no longer apply, except to categories of gas under section 107(c)(5). Incremental price regulations became effective November 1, 1979. See Interim Rules Defining and Deregulating Certain High-Cost Natural Gas, 44 Fed. Reg. 61950 (Oct. 29, 1979), FERC Stats. & Regs. [Regulations Preambles 1977-1981] ¶ 30,094 at p. 30,691.

6/ Pub. L. No. 101-60, July 26, 1989, 103 Stat. 157 (1989).

expire or are terminated, or which the parties renegotiate to provide that maximum lawful prices no longer apply, is also deregulated. Gas from newly spudded wells will be deregulated on May 15, 1991, and all remaining wellhead price controls will be removed on January 1, 1993. In Order No. 523, the Commission amended its regulations to reflect the provisions of the Decontrol Act, and noted that producers may voluntarily file applications for well category determinations for any NGPA category, including high-cost gas, until January 1, 1993, when section 503 of the NGPA is repealed. The Commission stated that it would continue to process such applications for well category determinations until that date in order to allow producers to obtain tax credits that are dependent upon such determinations, even if the gas has been otherwise decontrolled.

In addition, in Order No. 519, issued February 12, 1990, the Commission terminated the incentive ceiling price for sales of tight formation natural gas produced from wells spudded or recompleted after May 12, 1990. 7/ The Commission concluded that since most natural gas had already been decontrolled, or was being sold at levels beneath the applicable ceiling price, the incentive ceiling prices for tight formation gas were no longer necessary to stimulate new production of such gas, and that commitment of new money by producers in reliance on the incentive

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7/ Limitation of Incentive Prices for High-Cost Gas to Commodity Values, 55 Fed. Reg. 6367 (Feb. 23, 1990), FERC Stats. & Regs., Regulations Preambles ¶ 30,879.

ceiling price was no longer in the public interest. 8/ Thus, the tax credit for gas from tight formations, which was dependent on the existence of a regulated price, lapsed for tight formation gas from wells spudded or recompleted after May 12, 1990, or for which the price has been deregulated under the Decontrol Act.

The 1990 Act allows such deregulated gas nevertheless to qualify for the tax credit by making it available for gas from tight formations that was committed or dedicated to interstate commerce (as defined in the NGPA) as of April 20, 1977, or produced after December 31, 1990, from a well drilled after the date of enactment. 9/ The requirement that the price of the gas be regulated was deleted.

III. DISCUSSION

Section 271.703 of the regulations provides that a formation must meet three guidelines to qualify as a tight formation: a permeability standard, a maximum production rate, and an oil production limit. One of these guidelines -- the maximum stabilized production rate in section 271.703(c)(2)(i)(B) -- is tied to the average depth of a formation. Because gas below 15,000 feet was deregulated on November 1, 1979, the Commission only established maximum stabilized production rates for formations whose average depth did not exceed that depth. Any gas from

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8/ Id. at p. 31,668.

9/ The Revenue Reconciliation Act of 1990 was signed by the President on November 5, 1990. However, the Conference Report states that gas qualifies for the tax credit if produced from a well drilled after December 31, 1990.

below that depth, having no ceiling price, could not therefore qualify for an incentive price. However, since newly drilled wells that produce gas from tight formations below 15,000 feet are now eligible for the tax credit, the Commission proposes to amend section 271.703(c)(2)(i)(B) to establish maximum allowable production rates for formations below that depth. 10/ The highest maximum stabilized production rate proposed is for completions at 19,500 feet and deeper. The Commission does not believe there is any need to establish higher rates for production from lower depths, because very little gas is found below 20,000 feet, and the maximum allowable production rate for completions at 19,500 feet is an adequate measure of tight formation production rates from lower depths.

The second proposed change involves section 271.703(c)(2)-(ii) of the Commission's regulations. That section currently provides that a jurisdictional agency may designate as a tight formation a formation that meets the maximum allowable production rates for gas and oil, but does not meet the permeability standard of 0.1 millidarcy or less, if the jurisdictional agency shows that the formation exhibits low permeability characteristics, and the tight formation incentive price is necessary to

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10/ The formula used to establish maximum stabilized production rates below 15,000 feet is the same as that used in Order No. 99 to establish such rates for production from above 15,000 feet. Regulations Covering High-Cost Natural Gas Produced from Tight Formations, 45 Fed. Reg. 56034 (Aug. 22, 1980), FERC Stats. & Regs. [Regulations Preambles 1977-1981] ¶ 30,183.

provide reasonable incentives to produce natural gas from that formation. Since there is no longer a tight formation incentive price for gas from wells drilled or recompleted after May 12, 1990, or tight formation gas that has been deregulated under the Decontrol Act, the Commission proposes to amend this regulation to provide that jurisdictional agencies may designate a formation with permeability in excess of the 0.1 millidarcy standard as a tight formation, if it otherwise qualifies as a tight formation, and the tax credit (or the incentive ceiling price for wells spudded before May 13, 1990) is needed to develop the formation.

Some formations with permeability in excess of 0.1 millidarcy, which may be designated tight formations on the ground that the tax credit is needed to develop the formation, may include wells that were spudded before May 13, 1990. The Commission is requesting comments on the appropriate treatment of gas from such wells. A jurisdictional agency may determine that a field qualifies as a tight formation based on a showing that the tax credit is necessary to warrant further development, without considering whether the incentive price is necessary to provide reasonable incentives for production. In such circumstances, should any producer in that field be entitled to collect the tight formation incentive price for gas from wells in that formation spudded before May 13, 1990, based solely on the finding that the tax credit is necessary to warrant further development? Alternatively, should separate procedures be established to consider whether the tight formation incentive

price (as opposed to the tax credit) is necessary to provide reasonable incentives to produce natural gas from those wells?

The third proposed change involves section 271.703(c)(2)-(i)(D) of the Commission's regulations. This section currently requires a jurisdictional agency to exclude a formation, or portion thereof, that is subject to a prior infill drilling order from determination as a tight formation if the jurisdictional agency's judgment is that the formation subject to infill drilling can be developed without the incentive price. The Commission proposes to amend this section to refer to the tax credit for the same reasons given for amending section 271.703(c)(2)(ii).

III. WRITTEN COMMENT PROCEDURE

The Commission invites all interested persons to submit written data, views, and other information concerning the proposals in this Notice of Proposed Rulemaking. All comments in response to this Notice should be submitted to the Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N.E., Washington, D.C. 20426, and should refer to Docket No. RM91-8-000. An original and fourteen copies should be filed with the Commission within 30 days after publication of this Notice in the Federal Register.

Written comments will be placed in the Commission's public files and will be available for inspection in the Commission's Public Reference Room, 941 North Capitol Street, N.E., Washington, D.C., during regular business hours.

IV. ADMINISTRATIVE FINDINGS

A. Regulatory Flexibility Act Statement

The Regulatory Flexibility Act (RFA) 11/ requires the Commission to describe the impact that a proposed rule would have on small entities or to certify that the rule will not have a significant economic impact on a substantial number of small entities. 12/ The Commission is not required to make an analysis if a proposed rule will not have such an impact. 13/

In general, the economic impact of a proposed rule is not "significant" within the meaning of the RFA if the impact on small entities is expected to be beneficial. 14/ The proposed rule will enable certain natural gas producers that may qualify as small entities to qualify for tax credits. The Commission believes this impact is beneficial and, therefore, certifies that this proposed rule will not have a significant economic impact on a substantial number of small entities. 15/

11/ 5 U.S.C. §§ 601-12 (1988).

12/ The Act defines a "small entity" as a small business, a small not-for-profit enterprise, or a small government jurisdiction. 5 U.S.C. § 601 (b)(1988). A "small business" is defined by reference to section 3 of the Small Business Act as an enterprise "which is independently owned and operated and which is not dominant in its field of operation." 15 U.S.C. § 6.32(a)(1988).

13/ 5 U.S.C. § 605(b) (1988).

14/ Mid-Tex Electric Cooperative, Inc. v. FERC, 773 F.2d 327, 340-43 (D.C. Cir. 1985).

15/ 5 U.S.C. § 605(n)(1988).

B. Environmental Review

The Commission is not preparing an environmental assessment or environmental impact statement in this proceeding because the proposed amendments do not substantially change the effect of the regulations being amended. The proposed amendments provide procedures for carrying out the intent of Congress in reinstating the tax credit for gas produced from new wells in tight formations, but would have no significant effect on the human environment. 16/

C. Information Collection Statement

The Office of Management and Budget's (OMB) regulations require OMB to approve certain information collection requirements imposed by agency rule. 17/ In Order No. 523, supra, the Commission stated that it would continue to process applications for well category determinations through December 31, 1992, so that producers could qualify for tax credits. This proposal will not increase the regulatory burden under existing regulations on producers seeking to qualify tight formations of natural gas to be eligible for tax credits. The Commission, however, is notifying OMB of its actions in this notice of proposed rulemaking.

16/ Section 380.4(a)(2)(ii) of the Commission's regulations categorically exempt from environmental review Commission proposals for promulgation of rules that are clarifying, corrective, or procedural, or that do not substantially change the effect of regulations being amended. See also, § 380.2(a) for the definition of "categorical exclusion."

17/ 5 C.F.R. § 1320.13 (1990).

List of Subjects in 18 C.F.R. Part 271

Continental shelf
Natural gas
Price controls
Reporting and recordkeeping requirements

In consideration of the foregoing, the Commission proposes to amend Part 271, Chapter I, Title 18, Code of Federal Regulations, as set forth below.

By direction of the Commission.

(S E A L)

Lois D. Cashell

Lois D. Cashell,
Secretary.

Part 271--Ceiling Prices

1. The authority citation for Part 271 is revised to read as follows:

Authority: 15 U.S.C. 717-717w; 42 U.S.C. 7101-7352; E.O. 12009, 3 CFR 1978 Comp., p. 142; 15 U.S.C. 3301-3432; Pub. L. 101-60, 103 Stat. 157.

2. In § 271.703, paragraphs (c)(2)(i)(B), (c)(2)(i)(D), and (c)(2)(ii) are revised to read as follows:

§ 271.703 Tight Formations

* * * * *

(c) * * *

(2) * * *

(i) * * *

(B) The stabilized production rate, against atmospheric pressure, of wells completed for production in the formation, without stimulation, is not expected to exceed the production rate determined in accordance with the following table:

If the average depth to the top of the formation (in feet)		The maximum allowable production rate (in thousand cubic feet per day)
exceeds --	but does not exceed --	may not exceed --
0	1,000	44
1,000	1,500	51
1,500	2,000	59
2,000	2,500	68
2,500	3,000	79
3,000	3,500	91
3,500	4,000	105
4,000	4,500	122
4,500	5,000	141

5,000	5,500	163
5,500	6,000	188
6,000	6,500	217
6,500	7,000	251
7,000	7,500	290
7,500	8,000	336
8,000	8,500	388
8,500	9,000	449
9,000	9,500	519
9,500	10,000	600
10,000	10,500	693
10,500	11,000	802
11,000	11,500	927
11,500	12,000	1,071
12,000	12,500	1,238
12,500	13,000	1,432
13,000	13,500	1,655
13,500	14,000	1,913
14,000	14,500	2,212
14,500	15,000	2,557
15,000	15,500	2,956
15,500	16,000	3,417
16,000	16,500	3,950
16,500	17,000	4,567
17,000	17,500	5,279
17,500	18,000	6,103
18,000	18,500	7,055
18,500	19,000	8,156
19,000	19,500	9,429
19,500 +		10,900

* * * * *

(D) If the formation or any portion thereof was authorized to be developed by infill drilling prior to the date of determination and the jurisdictional agency has information which in its judgment indicates that such formation or portion subject to infill drilling can be developed absent the tax credit under section 29 of the Internal Revenue Code (or incentive price established in paragraph (a) of this section for wells spudded before May 13, 1990), then the jurisdictional agency shall not include such formation or portion thereof in its determination.

* * * * *

(ii) The jurisdictional agency may designate as a tight formation any formation that meets the guidelines contained in paragraphs (c)(2)(i)(B) and (c)(2)(i)(C) of this section, but does not meet the guideline contained in paragraph (c)(2)(i)(A) of this section, if the jurisdictional agency makes an adequate showing that the formation exhibits low permeability characteristics, and that eligibility for a tax credit under section 29 of the Internal Revenue Code (or the incentive ceiling price for wells spudded before May 13, 1990) is necessary to provide reasonable incentives for production of the natural gas from the determined formation due to the extraordinary costs associated with such production.

* * * * *

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date APRIL 18, 1991 Time: 8:15 A.M.

NAME	REPRESENTING	LOCATION
William F. Carr	Campbell and Black, P.A.	Santa Fe
Maurice Brunner	Bysam	SF
Joanne Reuter	D. Hartman	SF
Allen F. Buckingham	BLM	Albq
Arlene SALAZAR	BLM	ALBUQ
ROBERT KENT	BLM	ALBUQ.
Perry Pearce	Montgomery & Andrews,	S.F.
Jerry Hoover	Conoco	Midland TX
Bob Beamer	Conoco	Midland, TX
Paul W. Burchell	El Paso Natural Gas Co	El Paso, TX
JOHN KULSETH	HINKLE LAW FIRM ~~SANTA FE ENERGY OPERATING PARTNERS~~	SANTA FE.
VICTOR T. LYON	GAS CO / NM	SANTA FE
W. Kellahin	Kellahin Kellahin Aubrey	Santa Fe
MARK WEIDLER	Cole, et al	FARMINGTON
Jack A. Cole	Cole Prod Co	Farmington
Brian Scarborough	BHS Oil & Gas	Midland
David Lynch	Lynch O & G	Donington

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date APRIL 18, 1991 Time: 8:15 A.M.

NAME	REPRESENTING	LOCATION
W.R. Speer	Consulting Geologist	Farmington
R. Alexander	Bannon Energy	Houston, Tx
David Jones	Bannon Energy	Houston, Tx.

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

Case No. 10273

IN THE MATTER OF CASE NUMBER 10273)
APPLICATION OF JACK A. COLE FOR)
DESIGNATION OF A TIGHT FORMATION IN)
SAN JUAN, RIO ARRIBA, AND SANDOVAL)
COUNTIES, NEW MEXICO)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING
BEFORE: JIM MORROW, HEARING EXAMINER

Thursday, April 18, 1991
8:15 a.m.
Santa Fe, New Mexico

This matter came on for hearing before the Oil Conservation Division on April 18, 1991, at 8:15 a.m., at Morgan Hall, State Land Office Building, 310 Old Santa Fe Trail, Santa Fe, New Mexico, before: Gail D. Vinson, CCR, Certified Court Reporter Number 297, for the State of New Mexico.

FOR: OIL CONSERVATION DIVISION

BY: GAIL D. VINSON, CCR
Certified Court Reporter
CCR No. 297

I N D E X

April 18, 1991
Examiner Hearing
Case No. 10273

E X H I B I T S

A P P E A R A N C E S

FOR THE DIVISION:	ROBERT G. STOVALL, ESQ. General Counsel Oil Conservation Commission State Land Office Bldg. 310 Old Santa Fe Trail Santa Fe, New Mexico 87501
FOR GAS CO. OF NEW MEXICO:	KELLEHER & McLEOD, P.A. Attorneys at Law BY: WARD CAMP, ESQ. 414 Silver, S.W. Albuquerque, New Mexico 87102
FOR JACK A. COLE:	CAMPBELL & BLACK, P.A. Attorneys at Law BY: WILLIAM F. CARR, ESQ. 110 N. Guadalupe, Suite 1 Santa Fe, New Mexico 87504
FOR EL PASO NATURAL GAS:	MONTGOMERY & ANDREWS, P.A. Attorneys at Law BY: W. PERRY PEARCE, ESQ. 325 Paseo de Peralta Santa Fe, New Mexico 87504

EXAMINER MORROW: The first case to be called is Case 10273, application of Jack A. Cole for designation of a tight formation, San Juan, Rio Arriba and Sandoval Counties, New Mexico.

Call for appearances.

MR. CARR: May it please the Examiner, my name is William F. Carr, with the law firm of Campbell & Black, P.A., of Santa Fe. I represent Jack A. Cole, and I have two witnesses.

EXAMINER MORROW: Any other appearances?

Ward Camp of Kelleher & McLeod, P.A., Albuquerque New Mexico, appearing for Gas Company of New Mexico. We have no witnesses.

MR. STOVALL: Mr. Camp, is it true you're now actually legally appearing here today.

MR. CAMP: Well, I got news that I passed the Bar yesterday. I haven't been sworn at yet.

MR. STOVALL: Congratulations.

MR. CAMP: Thank you.

MR. PEARCE: One more. W. Perry Pearce, law firm of Montgomery and Andrews in Santa Fe, appearing in this matter on behalf of El Paso Natural Gas Company. I do not have witnesses.

EXAMINER MORROW: Any others? Will the witnesses stand and be sworn, please.

(Whereupon Mr. Stovall collectively swore the witnesses.)

MR. CARR: At this time I call Mark E. Weidler.

MR. STOVALL: Mr. Carr, before you begin, let me note for the record that Allen Buckingham is appearing here with the BLM; is that correct, Mr. Buckingham?

MR. BUCKINGHAM: Yes, and also Robert Kent and Arlene Salazar from the BLM in Albuquerque.

MARK E. WEIDLER,

was called as a witness and, having been previously sworn, was examined and testified as follows:

EXAMINATION

BY MR. CARR:

Q. Would you state your full name for the record, please?

A. Mark E. Weidler.

Q. Mr. Weidler, by whom are you employed?

A. I'm a consulting petroleum geologist in

Farmington, New Mexico. I've been retained by Jack A. Cole to do a study in the subject area.

Q. Have you previously testified before this Division and had your credentials as a geologist accepted and made a matter of record?

A. I have.

Q. How long have you worked in the San Juan Basin?

A. Twenty-one years.

Q. And during that 21 years, have you become familiar with the Gallup formation in northwest New Mexico?

A. I have.

Q. Are you familiar with the application filed in this case on behalf of Mr. Cole and others?

A. I am.

MR. CARR: At this time we would tender Mr. Weidler as an expert witness in petroleum geology.

EXAMINER MORROW: Yes, we accept his qualifications.

Q. Would you briefly state what Jack A. Cole seeks with this application?

A. The purpose of the application is to seek approval under Section 107 of the NGTA of a

portion of the Gallup formation in northwest New Mexico as a tight formation designation.

Q. And what interest does Mr. Cole or Jack A. Cole have in this area?

A. Mr. Cole has been active in this area for a number of years, has drilled over 40 wells in the area, and currently operates 15 wells in the immediate area of the study.

Q. Could you identify for the Examiner the other operators that have joined in this application?

A. The other participants in this study were Bannon Energy, Incorporated, headquartered in Houston, Texas. BCO, Incorporated, who is active in the area and is headquartered in Santa Fe, and Dugan Production Company of Farmington, who also has production in the area.

Q. Have you made a geological study of the Gallup formation in the area which is the subject of this Farmington which is application?

A. Yes, I have.

Q. And have you prepared certain exhibits for presentation here today?

A. I did, as a part of this study.

Q. Were each of these exhibits prefiled

with the Oil Conservation Division and the Bureau of Land Management as required by the rules and regulations of each of those agencies?

A. Yes, they were, sir.

Q. Would you refer to the exhibit book that has been marked Exhibit A, and then return to the tab identified as Exhibit Number 1, and then identify that for Mr. Morrow?

A. Exhibit Number 1 is a location map -- a generalized location map which shows the location of the study area with respect to local highways, landmarks and communities. And I would point out the city of Aztec is located on the northwest corner of the map, and the city of Santa Fe in the southeast corner and gives us the reference.

Q. How many acres are included in the area that is being recommended for tight formation designation?

A. Approximately 82,300.

Q. Could we now go too Exhibit Number 2 and ask you to identify that and review that for the Examiner?

A. Exhibit Number 2 is a structure contour map I prepared in the study area. The contours are on the top of the Gallup formation and illustrate

the fairly uniform homoclinal northeastward dip of the formation into the basin. The rate of dip varies from about 75 to 100 feet per mile.

In addition on the map outlined in heavy broad yellow is the study area in which we request the tight sand designation, and also shown on the map are the boundaries of existing pools which are established by the Oil Conservation Division, naming from south to north the Alamito Gallup pool outlined in orange. In blue is outlined the Lybrook Gallup pool.

On the southeast end is the Counselors Gallup-Dakota pool. In the midpart of the map in pink is the Escrito Gallup associated pool, and to the northeast the Devil's Fork Gallup associated pool. In addition, indicated by brown and green lines, and marked AA primed and BB primed are two cross-sections which we'll refer to later as Exhibits 4-A and 4-B.

Q. How important is structure in this particular area in terms of obtaining commercial production?

A. The absolute structure on top of the Gallup formation is not critical to the establishment of production in this subject area.

The primary factors are stratigraphic entrapment factors.

Q. Let's move now to Exhibit Number 3, and I would ask you to refer to that, identify it, and then locate the well on Exhibit Number 2?

A. Exhibit Number 3 is a typical well log, a typical density log in the subject area. The well illustrated is the Bannon Energy State 16-2, which on this map is located at this point (indicating).

Q. And you're indicating just to the south --

A. Of our line of cross-section.

Q. -- Just to the south and east of what, cross-section --

A. AA primed --

Q. -- AA prime--

A. And second well from the east end.

Q. -- now if you would go to Exhibit Number 3, and using that exhibit describe for the Examiner each of the primary producing zones in the Gallup that are the subject of this particular application?

A. The four main producing zones in the study area are named by us, and these names are generally accepted by industry. The uppermost

formation is the Skelly, the next down is the Marye I, Marye II, and the bottom-most zone is the Marye 3.

All four of these zones fall within a gross stratigraphic interval of about 250 feet, consisting entirely of siltstone shales and sandstones, which were deposited in marine conditions. The uppermost zones, the Skelly, occurs -- all of these zones occur throughout part of the study area, not all zones extend to the entire limits of the study area.

The Skelly, the uppermost zone, varies from zero to 14 feet in thickness, and the porosity varies from 6 percent to 10 percent. It's a very fine grained sandstone, very well sorted, it has a considerable amount of calcareous cement which reduces the natural porosity and permeability of the formation.

The Marye I formation is probably the most widespread and the most significant producing zone in the study area. It was deposited in a pattern primarily northwest to southeast and many students of the area have referred to these as strike valley sands, which were deposited in subtle depressions on the sea floor in Gallup time.

And the unique thing about the Marye I, it consists of a very heterogenous admixture of grain sizes in that the sands vary from fine grain to very coarse grain, consisting predominantly of coarse sands but also containing an admixture of rock class in the sand size and abundant fossil fragments.

Because of its heterogeneous nature, there is some reduction to natural porosity and permeability by the poor sorting of the formation. However it still remains the most significant producing zone in the area.

As I pointed out, its trend is primarily northwest to southeast.

The Marye II and III are the lowermost zones and they exhibit little -- slightly different characteristics in that, although they were very fine to fine grained sands, also well sorted and also containing abundant calcareous cement, their pattern of deposition is southwest to northeast, reflecting a -- what we would refer to as a distal deltaic depositional mode in which the sand deposition prograded from southwest to northeast. These are productive throughout much of the area but do not represent primary reservoir as the Marye I

zone.

In all cases the zone thickness in the Marye II and III will vary from zero up to 18 feet, and their porosity generally is in a range from six to twelve percent. The Marye I, the porosity will range from six to fourteen percent over most of the area, and will -- has a pay thickness that gets up to as much as 22 feet.

Q. All right, Mr. Weidler, let's now go to Exhibits 4-A and 4-B, the cross-sections. And I'd ask you to review those for Mr. Morrow?

A. The two cross-sections I prepared are to illustrate the nature of these four zones, from the southeast to the northwest, and south to north, parts of the study area. What you can see, I've used density logs so you can see the porosity values which are typical of the wells producing in this area, and substantiate the numbers which I've presented in the written text.

The Skelly zone, the uppermost zones on cross-section AA primed, as you can see does not extend all the way to the northwest part, although the zone itself is present, reservoir development, which I use as a cutoff of 6 percent, does not exist in the northwest parted.

Both -- all Marye I, II and III are present throughout the area, and as you can see they are fairly continuous, and from all practical standpoint can be considered contiguous and continuous reservoirs over that extent.

The cross-section BB primed, running from south to north shows that the Skelly formation is presented from the southernmost to the northernmost part of the study area, although it thins to the north.

The Marye I, II and III are present over much of the study area in this dimension and exhibits the same basic characteristics that we've described to you before.

Q. Mr. Weidler, what conclusions have you reached from your geologic study of the subject area?

A. The -- we are dealing with four principal producing zones, primarily fine grained sandstones, except for the Marye I where there are some coarser grained sands. These zones are fairly consistent in their depositional extent over the study area, are consistently low in porosity, low in permeability, and just from practical matters require stimulation to establish commercial

prediction.

Q. Were Exhibits 1 through 4-B prepared by you?

A. Yes, they were.

MR. CARR: At this time Mr. Morrow, we would move the admittance of Jack A. Cole Exhibits 1 through 4-B.

EXAMINER MORROW: Exhibits 1 through 4-B are admitted

(Exhibits 1 through 4-B were admitted into evidence.)

MR. CARR: That will conclude my direct examination of Mr. Weidler.

MR. STOVALL: Mr. Carr?

EXAMINER MORROW: I don't believe I have any questions at this time.

MR. CARR: At this time we call Mr. Neel Duncan.

NEEL L. DUNCAN,

was called as a witness and, having been previously sworn, was examined and testified as follows:

EXAMINATION

BY MR. CARR:

Q. Will you please state your full name for

the record?

A. Neel Lawrence Duncan.

Q. Where do you reside?

A. Farmington, New Mexico.

Q. By whom are you employed and in what capacity?

A. I'm employed by Jack A. Cole as his engineering and production manager.

Q. Have you previously testified before the New Mexico Oil Conservation Division?

A. No, I have not.

Q. Would you briefly review for Mr. Morrow your educational background and then summarize your work experience?

A. I received a Bachelor of Science in petroleum engineering from Texas Tech. University in December of 1985. And I've worked for Mobil Corporation from January 1986 through September 1989, where my final position was the lead engineer for the Brekenridge Texas district. I joined Jack A. Cole, or Cole Production Company, in September of '89, and have been the engineering and production manager since that time.

Q. Are you familiar with the applications filed in this case on behalf of Jack A. Cole?

A. Yes, I am.

Q. Have you made a study of the Gallup formation and the area that is the subject of today's applications and hearing?

A. Yes, I have.

MR. CARR: At this time, Mr. Morrow, I would tender Mr. Duncan as an expert witness in petroleum engineering.

EXAMINER MORROW: We accept your qualifications.

Q. Mr. Duncan, in your opinion, does the area that is the subject of this application meet all FERC requirements for designations of a tight formation under NGPA Section 107?

A. Yes, it does. Average in situ gas permeability is .1 millidarcy or less. Prestimulation production rate does not exceed 163 MCF per day for an average well depth of 5,377 feet, and prestimulation oil production rate does not exceed five barrels per day.

Q. Have you prepared certain exhibits for presentation in this hearing?

A. Yes, I have.

Q. And were these exhibits prefiled with the Oil Conservation Division and BLM as required by

the rules of these agencies?

A. Yes, they were.

Q. I would like to initially direct your attention to certain questions concerning permeability in the proposed tight formation area. Based on your opinion, do you have -- based on your study, do you have an opinion as to the in situ gas permeability for the Lybrook tight formation area?

A. Yes, it is significantly less than .1 millidarcy.

Q. And what did you refuse to reach this conclusion?

A. We studied core data, also analyzed well performance and deliverability, and performed a pressure build-up test.

Q. Would you refer to what has been marked as Jack A. Cole Exhibit Number 5, identify this exhibit, and review it for the Examiner?

A. Exhibit Number 5 is a permeability map which shows permeability for each well studied and the method of derivation for each of those wells. There are -- the 16 bright orange dots on the map represent wells in the area which have been cored. The two bright yellow dots in the center of the map show where the Steven A. Holditch & Associates

production history matching program was used to determine permeability.

The 21 green dots show where the Darcy equation and well deliverability analysis were used to determine permeability. And the one red dot in 23 north 6 west shows the location of the well in which pressure build-up test was performed.

Q. Now you have 16 dots here indicating core analysis, is that all the core information that is available in the subject area?

A. That is correct, those are all the wells that were cored.

Q. In your opinion which of these methods gives you the most accurate representation of in situ permeability in the area?

A. The core data is probably the most accurate representation of permeability. And the fact that it is well distributed makes it very representative of the entire scope of the reservoir.

Q. Mr. Duncan, would you now just explain to the Examiner how the in situ permeability was obtained?

A. Okay. Before discussing quantitatively the in situ permeabilities, I need to point out there's a difference between routine, or

laboratory-measured permeability and permeability values as they occur in the reservoir. Overburden stress, in the presence of connate water in the reservoir combined with the Klinkenberg gas slippage effects in laboratory measurements cause the in-situ permeability values to be 10 to 1,000 times less than those which are observed in the laboratory.

Much has been done in the past to quantify these effects. The U.S. Bureau of Mines published the first study -- one of the first studies back in 1972. The authors were Thomas and Ward. And they showed the effects of overburden stress on cores from the gas buggy area.

In 1979 Amoco expanded upon this study and explored the effects of connated water saturation and Klinkenberg effect to a greater degree. And what precipitated from all this was an equation which employs a set of constants which vary with the -- which vary depending upon qualitative reservoir characteristics. And these constants vary the severity correction that is applied to the laboratory core data.

If you will refer to the equation, it's on Page 5 of the text.

Q. That's behind the fist tab in Exhibit A?

A. Correct.

You'll note that the equation --

Q. Just a second.

EXAMINER MORROW: Okay.

A. You'll note that the constants A and B are used in that equation at the left such that in-situ permeability to gas or KG is equal to the laboratory measurement raised to the B power and then multiplied by A. Now the values of the constants A and B vary depending on reservoir conditions as stated earlier.

The constants for minimum correction apply to very, very clean sands, at shallow depths where the overburden stresses are less than 2,000 psi. The constants for the "very great correction" where there are very large differences between laboratory data and in-situ permeability, we're talking in the magnitude of one hundred to one thousandfold, these apply to the deeper high clay content sands in which -- where the overburden stresses are relatively high.

Q. What constants did you use for the Gallup in this area?

A. In the Gallup formation we used -- we assumed that the constants ranging from moderate

corrections to very great would apply. And, in fact, we're probably weighted more toward the very great as I'll show later in the well performance analysis.

And for your reference, the entire Amaco study is presented as Exhibit Number 6.

Q. And the Amaco study is what has resulted in this equation that we've been talking about?

A. That is correct.

Q. What permeability values were actually obtained from the core data?

A. Okay, moving to Exhibit 7-A, we show the laboratory and corrected or in-situ permeability values for each well. And using both the moderate correction and the very great correction -- moderate correction we're showing is Kmod in the exhibit, and using the very great correction constants we're calling that Kvg.

At the bottom we have averages for the 16 wells, average for the Gallup formation as a whole, the gross interval is.0170 millidarcys, using the moderate effect correction, and .0065 millidarcys using the very great severity constants.

For net pay greater than six percent, which is what we normally perforate, average in-situ

permeability is .0243 millidarcys using the moderate severity constants, and .0098 millidarcys using the very great severity constants.

And as you will see later, the deliverability analysis shows that the very great severity constants are probably the most applicable.

Q. In your study do you see any relationship between the location of the wells and the permeability that was obtained?

A. No, I do not.

Q. Are you ready to move now to Exhibit 7-B through 7-G and identify those, please?

A. I would first discuss the ranges of permeability values that we did see in Exhibit 7-A.

Q. Okay.

A. We find that our -- discussing net pay from this point forward, our Kmods range from a high of .0531 millidarcys to a low of .0017 millidarcys and our Kvgs, which is probably more what the reservoir characteristics actually are, range from a high of .0208 millidarcys, to a low of .0001 millidarcys.

Q. Now your actual permeability would probably fall between those?

A. Yes.

Q. Are you ready now to move to 7-B?

A. Yes.

Q. Would you identify that for Mr. Morrow?

A. Okay. Exhibits 7-B through 7-Q are the foot-by-foot permeability details for each well. You may notice that there are a few cases in which an individual permeability measurement is greater than .01 millidarcys, but these are very isolated and have little effect on the in-situ values. Further, it is my opinion that these small anomalies are a result of fractures created while coring the well, or while drilling the core plug out of the whole core for testing.

There is certainly no evidence either in well performance or the pattern of these occurrences to point to the existence of any kind of organized fracture system in the Gallup formation in our study area.

Q. Let's go now to Exhibit Number 8, and I'd ask you to identify and review that for the Examiner?

A. Exhibit Number 8 is presented just to ensure completeness of the evidence we're presenting this morning. These are copies of the original core analyses performed on all 16 wells.

Q. Now, Mr. Duncan, what did you do to close the gaps between the core wells, and to also confirm the core data?

A. Even though we have good coverage of core data, we went forward with some additional permeability study to assign confidence to these values and to fill in the gaps, as Bill mentioned. Three methods were utilized. These were, one, production history matching; and, two, the Darcy flow equation; and, three, the pressure build-up testing.

Q. Let's go to your production history matching. And first I'd like you to, one, identify for the Examiner, the location of the wells that were used, and then review the process you used to confirm the core information?

A. Okay. Exhibit 5 shows the two wells which were modeled using the Holditch history match. Those are in the bright yellow dots right in the middle of the map. These are the done numbers 10 and 11 wells, operated by BCL, Incorporated.

Q. And what sort of results did you obtain by using the history maps?

A. The results obtained show that the Dunn

Number 10 has a permeability .0181 millidarcys and the Dunn Number 11 has an average drainage area permeability of .0256 millidarcys. Now this is -- the computer program which was used was developed by Stephen A. Holditch & Associates at Texas A&M University.

This program uses an iterative procedure to match known reservoir parameters with production performance history to determine an unknown parameter which in this case is permeability. The computer loops through calculations until it finds a permeability which will calculate a production pro forma similar to the well's actual production history.

Exhibit 9 shows the computer input and output for this analysis method. Of particular note within this exhibit is, for each well, the graph of actual production history versus the production pro forma provided by the model when it found that permeability match point. The coefficient of fit for both of these wells was 1.00, indicating a mathematically perfect fit.

Q. And how close to the core permeabilities were the results obtained by history matching?

A. If you refer back to Exhibit 7-A, these

numbers are well within range of the data.

Q. And in your opinion does this further confirm the information and the conclusions you reached?

A. Yes, it does.

Q. Let's go now and ask you to identify Exhibit Number 10, and using that exhibit, review the Darcy calculation method you used?

A. Okay. The next calculation method was the Darcy deliverability analysis method. Basically, we used well performance or current production, and the Darcy equation corrected for the effects of fracture stimulation, which causes a negative skin, to back calculate permeability.

The equation which we use is set out in Pages 6 and 7 of the text, and I'm sure most of you are familiar with the Darcy equation. The only thing that one may or may not be familiar with is the estimation of the negative skin effect caused by a fracture stimulation, and that is simply the fracture -- the minus natural log of the fracture half length divided by the well bore diameter.

Exhibit Number 10 shows the results of these calculations. As I mentioned earlier, 21 wells were modeled and those were the green dots on

Exhibit 5. Average permeability for the wells modeled in this fashion is .00743 millidarcys, with the highest being .01882 millidarcys. All of which are well below the .1 millidarcy maximum for qualification as a tight formation.

It may also be noted that if you compare this to the average darcy permeability of .0074 with the very great -- or Kvg permeability in Exhibit 7-A, .0098, that's very good agreement within the same order of magnitude.

Q. Are you ready to move to Exhibit Number 11?

A. Just about.

Q. All right.

A. Okay. As far as input data, into the darcy equation, there are several parameters that must be determined to go into the darcy equation and back-calculate permeability. First, net pay height, and we get this from the density logs as noted by Mark Weidler earlier. Our reservoir quality cutoff is six percent, so we're defining net pay as six percent or greater porosity.

Another thing that goes into the calculation is the fracture height. This also comes from the density log and our experience with

postfracture radioactive tagging that was performed in 1989. Basically, we found that a fracture propagates 10 feet above and below net perforated pay, unless there is a dense shell to confine that fracture growth.

The third parameter is fracture length. And we go to Exhibit 11 for that. Fracture length was estimated using Halliburton's fracture design simulator, and to simplify it, knowing the job size and pounds of sand per foot of fracture height, we can estimate a fracture length using the simulator. Two lines are presented on the graph. The red line is the number generated by the Halliburton simulator, the blue line is a corrected value based on pressure build-up work performed by BCO when they were investigating fracture lengths.

Basically what the pressure build-up test showed is that actual fracture length was 74 percent of what was advertised by Halliburton. So we applied this correction.

And incidentally, this is a conservative correction, because by throwing a shorter fracture length into the calculation we will actually calculate a higher permeability. So it's conservative on our part.

Q. How was pressure obtained in this area?

A. Reservoir for pressure was determined using our experience with completions in 1989 and 1990, as well as pressure build-up data and long term shut-in pressure data that was available.

Q. And what sort of a range did you get in the pressure?

A. Reservoir pressure in the area varies from 700 psig to 400 psig depending on location. The 700 psig reservoir pressures are mainly found in the north central portion of our study area. The higher pressures are found down in the southern extremities of the area.

Q. Mr. Duncan, there are a lot of variables in the Darcy calculation. How reliable is the information you obtained using this procedure?

A. Well, admittedly there are a lot of variables, but the numbers -- the permeability numbers calculated are so low, one to three orders of magnitude below .1 millidarcy, that we feel that this is as valid approach to determining that we are below the .1 millidarcy range, errors of several thousand percent in our basic reservoir assumptions would have to be present to invalidate this as an approach.

Q. And this further confirms the low in-situ permeability values you obtained from your core analysis?

A. Yes, it does.

Q. Would you reveal your pressure build-up test for Mr. Morrow?

A. Okay. Our pressure build-up test was run in the -- during the month of February on Jack A. Cole's Rincon Number 21 well, and this is shown with the red dot on Exhibit Number 5. The test was performed by producing the well for nine months and then shutting it in for one month in a tight curve match of the pressure build-up performance was performed, and the permeability that was determined was .003 millidarcys.

This was done using an interactive graphics program and in Exhibit 12 we show the match plot with the permeability stated on the match plot, the raw pressure data, and the computer output including that the permeability from this well is .003 millidarcys.

Q. Does this conclude your presentation of the information you developed concerning in-situ permeability in the subject area?

A. Yes, it does.

Q. And what is your conclusion concerning in-situ permeability in the Lybrook tight formation area?

A. We conclude that it is significantly less than .1 millidarcy.

Q. Have you obtained actual stabilized, unstimulated gas production rates for Gallup formation wells in the area?

A. No -- We have a few. It's not a standard practice in the area. Wells will not produce without stimulation; therefore, it's not economical to really try it before you move the rig off. But there is limited data available, Bannon Energy obtained that data in their 1990 drilling program.

Q. Is that set out on what has been marked Exhibit 13?

A. Yes, that's Exhibit 13, and it shows the natural production test for eleven wells, and in all eleven cases a no-flow situation was observed after breaking the perforations down with acid and swabbing the fluid levels down -- all the way down to the pay zone. But these results could be expected considering the low in-situ permeability of the reservoir.

If you will refer to Page 9 of the text, we present a calculation showing the maximum unstabilized oil production rate which could be expected, and that is 3.08 barrels per day, and the maximum gas production rate would be 48 MCF a day, which is less than five barrels per day and less than 163 MCF per day.

Further, these calculations are generous, because they assume no skin effect, and in practice you're not going to get by without having some sort of a skin. The drilling process, the submitting process, cause fluid and particle invasion, also the building of wall cakes. Further, the perforating process causes rock crushing which further causes damage near well bore.

And skin factors from these effects would range from a minimum of 10.0 to a -- all the way up to infinity, which would create the no-flow situation which was seen in the eleven natural completion tests.

If we put a minimum skin of 10.0 into the equation the flow rates are further reduced to 1.37 barrels per day for oil, and 21 MCF for gas. As a further note, these calculations also assume a zero sand face pressure and in reality that's going to be

100 to 200 psi in a well of that depth, to that atmosphere, as required in the stipulation.

Q. When you take these other factors, the skin factor and pressure into account, the five barrels of oil per day figure shown on Page 9 actually would be substantially reduced as you indicated?

A. Yes.

Q. Can you estimate prestimulation production rates?

A. Yes, we have another way of doing that and that's by using early poststimulation production rate, and correcting that back to a prestimulation or radio flow rate by accounting for the effects of fracture stimulation. Now stimulation ratio or the ratio of poststimulation rate to radio flow rate is a function of both fracture length and production time.

If you refer to Exhibit Number 14, we see that stimulation ratio or Q stim to Q natural increases with fracture length as seen by the plot due to increased reservoir system transmissibility and decreases with time due to the accelerated drainage.

Q. Would you refer now to Exhibit

Number 15?

A. Okay. Exhibit Number 15 shows how we looked at the best wells completed from 1987 through 1990 and back-calculated prestimulation production rate. We used one-month production data and assumed a most conservative fracture length of 150 feet, which is the smallest we can imagine having out there. We can expect to have a poststimulation production rate ratio of 22.5 to 1 over the natural stimulation -- or over the natural completion production rate.

In no case in the wells studied over these four years, and even looking back through the data, which I don't have presented here in exhibits back to 1974, do we find that first month's production rate divided by 22.5 is greater than five barrels per day or 163 mcf per day. In this Exhibit Number 15, we see a maximum oil production rate prestim, of 2.5 barrels per day and that was the Marcus A-22 well completed in 1987, and the maximum prestimulated gas production rate would have been 19.1 mcf per day and that is Bannon Energy's Mesa 253R well completed in 1989.

Q. In your opinion, are the production rates, the unstimulated producing rates for Gallup

wells in the area both for oil and for gas substantially below the rate limitations necessary to qualify an area for tight formation under Section 107?

A. Yes, they are.

Q. Could you identify for the Examiner the information contained behind the tabs marked Exhibits 16 and 17?

A. Okay. Exhibit 16 is a required exhibit, basically for informational purposes, and it is also part of our source of data. This is production history for all wells in the study area, sorted on a field and where drilled. We show the completion date, the cumulative, the first year accumulative, and the most recent motion production.

Q. Exhibit number 17?

A. Exhibit number 17 shows the average -- shows the tonnages, the formation top Gallup formation, tops for the wells in the study area. This is again informational, and it was also the data that was used to determine the average top of Gallup formation for the study area in order to determine our qualifying parameters.

Q. Mr. Duncan, are you familiar with existing state and federal regulations concerning

the presence of fresh water aquifers?

A. Yes, I am.

Q. In your opinion will compliance with state and federal regulations assure that the development of the formation which is the subject of this hearing not adversely effect or impair any fresh water aquifer during any hydrolic fracturing or waste disposal operations that you now use or expect --

A. There there will be no damage.

Q. What is the location of the fresh water aquifer underlying the area that is the subject of this application?

A. Basically, in this case, existing from the surface down to 1500 feet, which is the Ojo Alamo.

Q. And how much vertical distance between the subformation and the closest fresh water aquifer?

A. A minimum of 3,500 feet.

Q. Could you review for Mr. Morrow wells are drilled and cased?

A. The normal casing programs are cemented, surface down to 250 feet and setting 4-1/2 production casing through the Gallup interval. Both

casing strings are cemented to surface.

Q. When you drill a well what drilling fluid or method do you use?

A. We use fresh water base muds to drill wells.

Q. Will the production of hydrocarbons in the general area in your opinion impair the fresh water zones?

A. No, they will not. We adequately predict the hydrocarbon bearing zones, and the aquifers with cement. In fact, we comply fully with NTL-FRA-90-1, which requires centralizers and turbidity devices in the fresh water aquifers.

Q. And how are wells in the formation, or in formations in the subject area generally stimulated?

A. Fracture stimulations. And the -- there is no chance of fracture propagated 3,500 feet into an aquifer. That would be impossible.

Q. In your opinion is there any activity going on with the development of the Gallup formation in this area that could impair fresh water or agricultural waters in this area?

A. No, there is not.

Q. Could you summarize the conclusions that

you've reached concerning this area as a suitable area for designation as a tight formation?

A. Well, number one, average in-situ permeability is less than .1 millidarcys. No well is expected to produce without stimulation more than 163 MCF per day, for an average well depth of 5,377 feet and no well is expected to produce without stimulation more than five barrels of oil per day. And finally, fresh water zones can -- have in the past, and will continue to be, adequately protected with the continued development of the Gallup.

Q. In your opinion is the production authorized by Section 107 of the NGPA necessary to provide a reasonable incentive for the production of natural gas from the subject formation due to the extraordinary costs associated with developing this tight formation?

A. Yes.

Q. In your opinion does the data available and presented at this hearing supported the conclusion that the entire area developed by this application should qualify for designation as a tight formation?

A. Yes.

Q. Could you just identify the information

contained behind Tab A or the first tab in Exhibit A?

A. Behind the first tab is a text written jointly by myself and Mark Weidler. Mark Weidler wrote the geology portion and I prepared the engineering section.

Q. Does it basically summarize the information presented in your direct testimony here today?

A. Yes, it does.

Q. Were the text behind Exhibit A and the Exhibits 5 through 17 in Exhibit A either prepared by you or have you reviewed them and can you testify as to their accuracy?

A. Yes.

MR. CARR: At this time Mr. Morrow, we will move the admission of all of the material contained in Exhibit A, which is the exhibit book including the text, and Exhibits 5 through 17.

EXAMINER MORROW: We accept Exhibit A into evidence

(Exhibit A and 5 through 17 were admitted in evidence.)

MR. CARR: That concludes my direct examination of Mr. Duncan.

EXAMINER MORROW: Any questions of Mr. Duncan?

Mr. Duncan, I believe you testified just now that the prices under NGPA was necessary for further development; is that correct.

THE WITNESS: That's correct.

EXAMINER MORROW: And what is that price?

THE WITNESS: The incentive price?

EXAMINER MORROW: Yes.

A. It's 51.7 cents per btu, that's the credit.

MR. STOVALL: Excuse me, let's clarify the language here. Incentive prices --

MR. CARR: And the numbers --

MR. STOVALL: Section 59 of the Internal Revenue Code; is that correct.

THE WITNESS: Yes.

EXAMINER MORROW: And that's what you're testifying is necessary for continued development of the price under NGPA?

THE WITNESS: We're testifying to the tax credit.

EXAMINER MORROW: And you wouldn't expect to receive the incentive price then from

anyone today or would you.

MR. CARR: Mr. Morrow, there are a number of operators in the area. There are at this time questions between, I believe the Gas Company and Jack A. Cole, and Bannon Energy, where these companies do believe that -- apparently they have agreed that the price is not the issue, that the tax incentive is what they are seeking.

We can't however come and stand before you and say that no operator -- Dugan or BCO, we don't know on those and others in the area might not also want the price.

EXAMINER MORROW: Do you know, either one of you, what the price would be if you could get it.

THE WITNESS: I think it's $7 and change.

EXAMINER MORROW: Okay. And you said the fresh water sands were from zero to 1500; was that your --

THE WITNESS: Yes. Mostly at 15 -- mostly -- really we don't have really anything between the surface and the Ojo Alamo.

EXAMINER MORROW: Between the surface and what?

THE WITNESS: The Ojo Alamo.

EXAMINER MORROW: That's one of the fresh water --

THE WITNESS: Yes.

EXAMINER MORROW: Where is it.

THE WITNESS: It's about 1350 to 1500 feet below surface.

EXAMINER MORROW: On Page 9, Mr. Carr asked a question about a five barrel number -- Page 9 of the text.

THE WITNESS: Yes, sir.

EXAMINER MORROW: I didn't find that five barrels.

THE WITNESS: That -- Well, we just basically justly show -- what he was referring to was that fuel oil equals 3.08 barrels a day; therefore, less than five barrels per day.

EXAMINER MORROW: On Exhibit 13, to get cleared up on the no-flow, the no-flow results shown on Exhibit 13; tell me how you obtain that.

THE WITNESS: Swab testing. They swabbed the wells all the way down to the seating nipples, which were down in the Gallup, and could not get the wells to flow gas, water or oil.

EXAMINER MORROW: To the surface.

THE WITNESS: Yes, that's correct. No blow was identified.

EXAMINER MORROW: Was there any fill up in the well bore or was that measured? Does no flow mean no flow at the surface or no flow in the well bore.

THE WITNESS: Basically, no flow into the well bore because they swab down to the seating nipple and shut down for several hours, went back, and they found the fluid level just where they had left it.

EXAMINER MORROW: And these are on 13, or several recent wells?

THE WITNESS: Yes. They're all 1990 wells drilled by Bannon Energy, Incorporated.

EXAMINER MORROW: And did all these wells make wells after they were stimulated.

THE WITNESS: After stimulation. Of course, after stimulation I don't think any of them qualified as -- I don't think any of them made it to five barrels and the 163 mcf after stimulation.

EXAMINER MORROW: On Exhibit 12 I didn't understand for sure what you were matching there on the graph.

THE WITNESS: Basically --

EXAMINER MORROW: Good match there --

THE WITNESS: Yeah, that's tight curve analysis and there are several SP monographs that provide type curves which are really pregenerated pressure draw-down curves that we use in pressure build-up analysis. And by matching those curves we can determine pressure build -- permeability.

EXAMINER MORROW: The 700 to 1400 psi reservoir pressure, is that a current reservoir pressure, or the original, or --

THE WITNESS: That is current and it's fairly close to original. I think the original is -- has been documented 1600 to 1700 psi.

EXAMINER MORROW: On Exhibit 9, the production history match permeability, where were those shown in the exhibit? I didn't find the final, the bottom line number?

A. It's down in the final section, the front page of that exhibit for each well where it says "final estimates used in match," permeability in millidarcys .0181.

EXAMINER MORROW: Okay.

THE WITNESS: It's also presented on the summary graph in the right-hand corner.

EXAMINER MORROW: How was the area

chosen for facts and designations? How did you happen to pick the area that's outlined.

THE WITNESS: Basically it evolved through the bringing in of different operators and it's basically due to the special interests of the parties involved.

EXAMINER MORROW: There is some area included I notice that is not in any of the existing pools. Do you have reason to believe that there would be development in those areas.

THE WITNESS: Some of the parties had indicated a desire to examine those areas for future development.

EXAMINER MORROW: In one of your exhibits, I believe you did say that you reviewed each well completion in the proposed area for designation; is that correct.

THE WITNESS: Very generally scoping all the wells, but in detail, knowing the frac sizes, and the perfs, and all the specific details, they are in the wells with the dots on the permeability map. We had to do the detailed study to back calculate permeability.

EXAMINER MORROW: Now did the review include even wells that are not completed in the

formation in the questioned designation.

THE WITNESS: I don't understand your question.

EXAMINER MORROW: Are there any wells that drilled through and didn't complete in the -- let's see, it's the Gallup, I believe, is that right?

THE WITNESS: Yes, sir. Now, as far as looking at Gallup data on wells that were not completed in the Gallup, no, that was not done.

Now both of the maps presented, Exhibits 2 and 5 do show the completions by the shapes of the wells on the exhibits, the diamonds are the Gallup wells.

EXAMINER MORROW: Well there's some Gallup wells apparently then that are not included in any existing pool; is that correct? Over on the west portion of Exhibit Number 2, you'll find there are some diamonds that aren't-- that apparently are not in a designated pool.

THE WITNESS: Yes, I see those. If you want me to follow up on those, I can. But there is a -- there is some documented undesignated Gallup out there.

EXAMINER MORROW: Okay. You think

that's probably what that is.

THE WITNESS: Yes.

EXAMINER MORROW: Now the upper and lower designation of this area, have you tied that to a specific well log anywhere so that it could be identified as a marker, could be used in the future to know when you're in the zones.

THE WITNESS: Yes. There is a very predominant gamma ray peak. I believe it's on the type log. Yes, it is. On Exhibit 3?

EXAMINER MORROW: Okay.

THE WITNESS: There's a very definitive marker just above where the word Skelly reads and that is --

EXAMINER MORROW: Right there at 5300 is that --

THE WITNESS: Yes, that's the top of the Gallup.

EXAMINER MORROW: So if we were going to identify this, tie it to a log, the 5300 would be your proposed top.

THE WITNESS: Yes, that's correct.

EXAMINER MORROW: How about the base, where would the --

THE WITNESS: The base is where the --

basically where the Marye III runs out.

EXAMINER MORROW: And what would you call that on this type log.

THE WITNESS: If I could call Mark Weidler --

MR. CARR: May it please the Examiner, Mr. Weidler, the geological witness is still here and he might be able to provide you with that.

MR. WEIDLER: Mr. Morrow, I --

MR. STOVALL: Wait a minute, Mr. Weidler, please.

EXAMINER MORROW: I just have one or two more questions.

THE WITNESS: Okay.

EXAMINER MORROW: I know it's in one of the exhibits, but do you know the number of wells producing in the area that you would --

THE WITNESS: I don't have the number in my head. It's -- I believe it's in the 250 range.

EXAMINER MORROW: 250.

THE WITNESS: I can follow that up if you would like.

EXAMINER MORROW: All right, if you don't mind.

THE WITNESS: Okay.

EXAMINER MORROW: All the pools that are included here are oil-producing pools; is that correct.

THE WITNESS: That's correct.

EXAMINER MORROW: And I believe there are no other oil-producing pools in New Mexico that have tight sand designation; do you agree with that.

THE WITNESS: Correct, in New Mexico.

EXAMINER MORROW: Now, do you know of other pools in other states that are designated as tight --

THE WITNESS: There are some in Texas, Mr. Morrow, and --

MR. CARR: May it please the Examiner, following the question yesterday concerning the presence of oil pools in which 107 classification has been approved, we have checked and there are no others in New Mexico. We have located in one day, three in Texas that are oil pools that were approved by the Railroad Commission, subsequently accepted by FERC.

Basically they are the AWP Olmos, O-L-M-O-S, field in McMullen County, Texas. It was approved by the Railroad Commission in December of 1985, subsequently by FERC.

The northeast Texas panhandle field, the Cleveland formation in that field, which was approved in November of 1981 by the Railroad Commission, subsequently by FERC.

And finally the Anacacho, A-n-a-c-a-c-h-o field, and at Atascosa -- I think it is A-t-a-s-c-o-s-a -- County, Texas. That was approved in 1982.

I have copies of the orders from the Railroad Commission and FERC and I'll be happy to make those available to you following the hearing and also to the Bureau of Land Management and anyone else who would like copies of those.

EXAMINER MORROW: Okay. All right, we'd like to have them.

Mr. Duncan, thank you, you may be excused.

MR. CARR: At this time, Mr. Morrow, we would recall Mr. Weidler.

MARK E. WEIDLER

having been previously sworn, was recalled and further testified as follows:

EXAMINER MORROW: All right, Mr. Weidler, on Exhibit Number 3 we asked questions

about the top and base of the proposed designated area, if you would give us that information.

THE WITNESS: The top of the Gallup, for our study purposes, we feel is delineated by a very prominent gamma ray, high gamma ray marker. And on Exhibit 3 is illustrated at a depth of 5302 feet, just above the interval marked Skelly. This marker is present throughout most of the study area and reference to Exhibits 4-A and 4-B will show that that marker was utilized by myself as the datum for those two cross sections, AA primed and BB primed, and as you can see by reference to those two exhibits are present in all the wells utilized, and serves as a very prominent marker that's used by most workers in this part of the area.

As far as the base of the section, my recommendation would be to use an interval -- the Marye III is readily recognized if one correlates the logs in the area. But I could see where other workers in the area might differ with my opinion. But I think if the Commission were to use an interval of 300 feet below the Gallup marker as indicated on Exhibit 3, I think would be a reasonable designation for this area.

EXAMINER MORROW: 5602 then would be the

base is what you're saying?

THE WITNESS: I would be satisfied that that would cover all the intervals. Now I must point out that in parts of the area there are sands developing reservoir level porosities below the Marye III and other operators may choose those. But for our purposes, these were the main designated intervals, and my recommendations would be 53 -- 300 feet below the top of the Gallup, as indicated by the marker.

EXAMINER MORROW: And you think that would include those others --

THE WITNESS: I think it would include those others.

EXAMINATION

BY MR. CARR:

Q. Mr. Weidler, could you identify the well from which the log on Exhibit 3 is drawn?

A. On the map?

Q. Or just by name. It's not identified on the exhibit.

A. It's the Bannon Energy, Incorporated, State 16-2.

Q. And it's located?

A. It's located in the northwest quarter of Section 16, Township 23 north, Range 6 west, Rio Arriba County.

EXAMINER MORROW: I need for you to do all that again, the name and the location.

THE WITNESS: It is the Bannon Energy, Incorporated, State Number 16-2, located in the northwest quarter, Section 16, Township 23 North, Range 6 west, Rio Arriba County.

EXAMINER MORROW: All right. That's all I have. Anything else Mr. Carr?

MR. CARR: I have nothing further, Mr. Morrow.

MR. BUCKINGHAM: Mr. Morrow?

EXAMINER MORROW: Yes, sir?

MR. BUCKINGHAM: I'd like to offer a clarification on -- further clarification on the NGPA price versus NGPA tax incentive. There is no longer a Section 107 NGPA price for tight formation. I posed this question to FERC last November, and asked if they were going to change the tight formations regs. They said they were studying it.

In Denver in our NGPA workshop in February, I asked the FERC representative if they were still studying it, he said yes.

They were really waiting for somebody to come forward with a case. Somebody came forward, but last month they issued a notice of proposed rule making, which clarifies everything about price incentive for 107 tight formation is out, and they're substituting it for the words tax incentive.

MR. STOVALL: I'm sure the Gas Company will be relieved to hear that.

EXAMINER MORROW: All right, thank you.

MR. STOVALL: Mr. Buckingham, is there anything further you'd need in this case? Do we need to have any discussion or do you --

MR. BUCKINGHAM: No.

MR. STOVALL: -- feel that you've got enough information --

MR. BUCKINGHAM: We've got enough information. If they happen to come forward with any late information to you, just send a copy to the BLM.

MR. STOVALL: All OF the additional information that you are going to provide, Mr. Carr --

MR. CARR: We will copy to the Bureau of Land Management.

MR. STOVALL: The clarification is that Mr. Buckingham's role in this is -- we are actually making a federal determination through the authority delegated and that's the relationship for -- why the BLM is here and active in this case, I believe; is that not correct, Mr. Buckingham.

MR. BUCKINGHAM: Just for further clarification for anybody that reads the transcript of this hearing, or any future hearings in New Mexico, we will continue to always deal with NMOCD.

But in the other states like Colorado, Oklahoma, Texas and Kansas, in case there's any operatives that have any business with them, we are going to do it through the administrative process if it involves only BLM federal lands.

If it involves the state lands in that area of those states, we will, of course, also have to attend a hearing. But if it's strictly federal lands in those other four states, we will do it right in Albuquerque by the administrative process only.

EXAMINER MORROW: Okay. Anything more?

All right. Case 10273 will be taken under advisement.

We'll take a ten-minute break.

(A recess was taken and the hearing of Case 10273 concluded at 9:40 a.m.)

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

REPORTER'S CERTIFICATE

I, GAIL D. VINSON, CCR, a Certified Court Reporter and Notary Public, DO HEREBY CERTIFY that I stenographically reported these proceedings before the Oil Conservation Division; that the foregoing is a true, complete and accurate transcript of the proceedings of said hearing so taken and transcribed under my personal supervision.

I FURTHER CERTIFY that I am not related to nor employed by any of the parties hereto, and have no interest in the outcome hereof.

DATED at Santa Fe this 20th day of May, 1991.

GAIL D. VINSON, CCR
Certified Court Reporter
CCR 297, Notary Public

NOTARY PUBLIC
STATE OF NEW MEXICO
County of Bernalillo
GAIL D. VINSON
My Commission Expires 5-4-94

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 10273, heard by me on April 18 1991.

Examiner
Oil Conservation Division