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November 26, 1991

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Mr. William J. LeMay
Oil Conservation Division
310 Old Santa Fe Trail, Room 206
State Land Office Building
Santa Fe, New Mexico 87501

Re: Application of Conoco Inc for Designation of a Tight Formation, Pictured Cliffs Formation, San Juan County, New Mexico

Dear Mr. LeMay;

On behalf of Conoco Inc. please find enclosed our application for designation of tight formation for a portion of the Pictured Cliffs formation, San Juan County, New Mexico.

We would appreciate this matter being placed on the Division's Examiner docket now scheduled for December 19, 1991 with the understanding that the case will be continued to December 20, 1991 and the hearing held in the Bureau of Land Management office in Albuquerque.

Very truly yours,

W. Thomas Kellahin

cc: Gregory Gazda, Conoco-Oklahoma City
cc: Bill Denton, Esq, Conoco-Houston
cc: Mr. Alan Buckingham BLM-Albuquerque (Federal Express)

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: 10625

APPLICATION OF CONOCO, INC.
FOR DESIGNATION OF TIGHT
FORMATION, PICTURED CLIFFS
FORMATION, SAN JUAN
COUNTY, NEW MEXICO.

A P P L I C A T I O N

Comes now CONOCO INC., by and through its attorneys, Kellahin, Kellahin & Aubrey, and as provided in the Oil Conservation Division's Special Rules and Procedures for Tight Formation Designations under Section 107 of the Natural Gas Policy Act of 1978 promulgated by the Oil Conservation Division Order R-6388 on June 30, 1980 and hereby applies for an order designating certain portions of the Pictured Cliffs formation as a tight formation under Section 107 of the Natural Gas Policy Act of 1978 and in support of its application states:

(1) Applicant is an owner and operator of certain

interests in the Pictured Cliffs formation underlying the following described lands situated in San Juan County, New Mexico:

Township 30 North, Range 9 West

All of Sections 1-6

Township 30 North, Range 10 West

All of Section 1-4

Township 31 North, Range 9 West

All of Sections 1-36

Township 31 North, Ragne 10 West

All of Sections 1-4, 9-16, 21-28, and 33-36

Township 32 North Range 9 West

All of Sections 7-36

Township 32 North, Range 10 West

All of Sections 9-16, 21-28 and 33-36

containing a total of 74,311 acres, more or less.

(2) The Pictured Cliffs formation is expected to have an estimated average in situ gas permeability throughout the pay section of less than 0.1 millidarcy per foot.

(3) The average depth of the top of the Pictured Cliffs formation is 3,500 feet and the stabilized production rates, against atmospheric pressure, of wells completed for production in said formation, without stimulation, is not expected to exceed 91 mcf of gas per

day.

(4) No well drilled into the Pictured Cliffs formation in the above described area is expected to produce, without stimulation, more than five barrels of crude oil per day.

(5) Attached to this application and incorporated herein by reference is a complete set of exhibits which applicant proposes to offer or introduce at the hearing of this application, together with a statement of the meaning and purpose of each exhibit. See Summary entitled "Tank Mountain Tight Gas Area". These exhibits cover all aspects of the required evidentiary data described in Section D of Order R-6388, as amended, being the Oil Conservation Division's Special Rules and Procedures for Tight Sand Formation Designation under Section 107 of the Natural Gas Policy Act of 1978.

WHEREFORE, Applicant requests that this application be set for hearing before a duly appointed examiner of the Oil Conservation Division on December 19, 1991 and that after notice and hearing as required by law, the Division enter its order recommending to the Federal Energy Regulatory Commission that pursuant to 18 CFR, Section 271.701-705, that the Pictured Cliffs formation underlying the above described land be designated a tight

formation, and making such other and further provisions as may be appropriate.

Respectfully submitted,

W. Thomas Kellahin
Kellahin, Kellahin, Aubrey
Post Office Box 2265
Santa Fe, New Mexico 87504
(505) 982-4285
ATTORNEYS FOR CONOCO, INC.

CERTIFICATE OF MAILING

I hereby certify that a copy of this Application and a complete set of all exhibits which Applicant proposes to offer or introduce at hearing, together with the statement of meaning and purpose of each, has been sent Federal Express to the Bureau of Land Management, attn: Mr. Alan Buckingham, 435 Montano, NE, Albuquerque, New Mexico 87107 on this 27th day of November, 1991.

W. Thomas Kellahin

APPLICATION OF
CONOCO INC.
FOR DESIGNATION OF THE
TANK MOUNTAIN AREA OF THE
PICTURED CLIFFS SANDSTONE
AS A TIGHT FORMATION

SAN JUAN AND RIO ARRIBA COUNTIES
NEW MEXICO

Case No. 000000 November 15, 1991

TANK MOUNTAIN TIGHT GAS AREA

LIST OF EXHIBITS

Exhibit Number	Exhibit Name	Exhibit Purpose
1	Pictured Cliffs Field Map	Show the location of the Tank Mountain tight gas area relative to area of established Picture Cliffs production.
2	Tank Mountain Tight Gas Area Wells	List Pictured Cliffs gas wells and cumulative production data in the Tank Mountain Area.
3	Tank Mountain Tight Gas Area Type Log Amoco Prod. Co. San Juan 32-9 Unit #102 NW 17 T31N R9W	Show log character of the Pictured Cliffs Formation in the tight gas area.
4-A	North-South Cross Section	Show the continuity of the Pictured Cliffs Sandstone from north to south across the Tank Mountain area.
4-B	West-East Cross Section	Show the continuity of the Pictured Cliffs Sandstone from west to east across the Tank Mountain area.
5	Map of Pictured Cliffs gas production and permeability trends	Show that published studies regard the Pictured Cliffs to be a low permeability formation in the Tank Mountain Area.

6	Pretreatment test of San Juan 32-9 Unit #106	Show that the Pictured Cliffs production rate before stimulation does not exceed 105 MCFD.
7	Plot of pressure buildup on San Juan 32-9 #106	Show that the average in situ permeability through the pay section is expected to be 0.1 millidarcy or less.
8	Sidewall core analysis from the San Juan 32-9 Unit #106 & #108 Pictured Cliffs Productive Zone	Show that the average in situ permeability through the pay section is expected to be 0.1 millidarcy or less.
9	Fresh Water Remarks	Show that Conoco believes that development drilling for the Pictured Cliffs in the Tank Mountain area will not adversely affect fresh water aquifers.

PICTURED CLIFFS SANDSTONE
GEOGRAPHICAL AND GEOLOGICAL DESCRIPTION OF THE FORMATION

Geographic Description

The Tank Mountain area is located in San Juan County, New Mexico adjacent to the Colorado boarder. The area includes the following sections: T30N R9W sections 1-6; T30N R10W sections 1-6; T31N R9W all sections; T31N R10W sections 1-4, 9-16, 21-28, 33-36; T32N R9W all sections; and T32N R10W sections 9-16, 21-28, 33-36. Tank Mountain is the name of a prominent topographic feature located near the center of the area. The area includes the San Juan 32-9 Unit which is a Federal Unit operated by Meridian Oil Inc.

Geologic Description

Location

The Tank Mountain Area is located in the north central San Juan Basin, a major gas and oil producing region which covers over 6000 square miles in Northwest New Mexico and Southwest Colorado. Hydrocarbon production in San Juan Basin is primarily from four Cretaceous age formations including the Dakota, Mesaverde and Pictured Cliffs Sandstones, and coal seams in the Fruitland Formation. The Tank Mountain area includes several hundred wells which produce gas primarily from either the Mesaverde, Fruitland, or Pictured Cliffs horizons.

Stratigraphic and Structural Description

In the Tank Mountain Area the top of the Pictured Cliffs Sandstone is found at an average measured depth (depending on topography) of 3,500 feet (3,160 feet above sea level). The average thickness is 150 feet. Structural dip is negligible at less than 25 feet per mile. The geologic age of the Pictured Cliffs is Campanian (Upper Cretaceous). It is the youngest in a series of Upper Cretaceous marine sandstone deposits found in the San Juan Basin. The Pictured Cliffs was deposited in marginal marine (shoreface) environments and can be described as a coarsening upward sequence. A gradual transition from the underlying Lewis Shale begins with 30-60 feet of thin beds of very fine sandstone interbedded with gray marine shale. The beds gradually become thicker and coarser grained and the upper part of the Pictured Cliffs is characterized by 40-100 feet of medium to thick bedded, fine grained sandstones interbedded with siltstones and shales. Common sedimentary structures found in the thick sandstone beds in the upper part include cross-bedding and burrows characteristic of the marine environment.

The Pictured Cliffs is overlain by the Fruitland Formation which is composed of coal seams, silty shales and sandstones of terrestrial origin. The top of the Pictured Cliffs is generally defined as the base of the first coal seam or shale in the Fruitland Formation. The contact between the Pictured Cliffs and Fruitland however is somewhat transitional. Thin coal seams occasionally appear below the thick bedded marine sandstones and marine sandstones occasionally interfinger above the thick coal seams of the basal Fruitland.

Texture and Composition

The texture or grain size of the Pictured Cliffs Sandstone is best described as fine to very fine grained. The average composition of framework grain types is 50% rock fragments, 40% quartz, and 10% feldspar. The sand composition is classified as a litharenite or feldspathic litharenite. The sandstone also contains significant amounts of diagenetic minerals which have formed in the intergranular pore spaces. The formation of these minerals following the deposition of the

sandstone has contributed greatly to the low permeability nature of the rock. These minerals include clays such as illite-smectite, dolomite, siderite, calcite, quartz overgrowths, and minor amounts of kaolinite. The existing porosity in the Pictured Cliffs is largely the result of dissolution of unstable framework grains. Most of the original porosity present at the time of deposition has been destroyed by compaction and the formation of diagenetic minerals in the intergranular spaces.

Gas Production and Reservoir Characterization

The Tank Mountain Area includes 132 wells which produce from the Pictured Cliffs, all of these are located in the southwestern third of the area. The northern portion the area does not currently produce from the Pictured Cliffs but completions have been attempted on only a limited number of wells. The Pictured Cliffs throughout the area is considered a low permeability reservoir and all wells require fracture stimulation to achieve commercial rates of production.

The most common type of data available in the Tank Mountain Area for studying the Pictured Cliffs is from induction resistivity, electric, gamma-ray, spontaneous potential and density well logs which are run on most wells. Permeability data such as core analysis, drill stem tests, or pre- stimulation flow tests are not commonly acquired since the formation is known to require stimulation to establish commercial production. Sidewall core analysis is available on two wells and pre-stimulation flow test data is available on only one well in the area and indicate a very tight formation with permeability less than 0.1 millidarcy.

The productive zone in the Pictured Cliffs is typically found in the upper 150 feet and may range from 0 to 70 feet in net thickness. It is typically identified on logs by density porosity greater than 8% and resistivity greater than 20 ohm meters. Average porosity of this productive zone is 12-14%. Permeability is not commonly measured but is generally considered to be less than 0.1 millidarcy. Sidewall cores from this zone in the San Juan 32-9 #106 and #108 wells confirm the low permeability. Saturation calculations indicate gas to be present in the formation along with average water saturations of 50%. The typical Pictured Cliffs well produces dry methane gas with little or no well head condensate and no water. No Pictured Cliffs well in the area is known to produce volumes of oil or condensate greater than one barrel per day.

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W. THOMAS KELLAHIN
KAREN AUBREY

JASON KELLAHIN
OF COUNSEL

RECEIVED
JAN 1 1 1991
OIL CONSERVATION DIVISION

January 10, 1991

Mr. Michael E. Stogner
Hearing Examiner
Oil Conservation Division
310 Old Santa Fe Trail, Room 206
State Land Office Building
Santa Fe, New Mexico 87501

HAND DELIVERED

Mr. Alan Buckingham
Bureau of Land Management
435 Montano NE
Albuquerque, New Mexico 87107

FEDERAL EXPRESS

Re: Application of Conoco, Inc. for
Designation of a Tight Formation
San Juan County, N.M.
NMOCD Case 10425

Gentlemen:

On behalf of Conoco Inc., I respectfully request permission to amend our application to reduce the area for which Conoco seeks approval of a tight formation designation. In support of that request, I submit:

(1) Initial Application Area:

The area of our original request was based upon conclusive core data evidence of 0.1 MD of permeability or less for the San Juan 32-9 Unit Wells #106 and #108 around which we scribed a rectangle with an approximate radius of six miles from the control wells to the side boundaries of the initial application area.

(2) Informal Review:

That area was the subject of our informal meeting with the OCD and the BLM in Albuquerque on

December 6, 1991. For purposes of clarity, the area can be divided into the southwest area and the northeast area. Because of the substantial number of Pictured Cliff wells drilled in the Southwest Area, none of which could produce without stimulation, we characterized that to be substantial evidence of low permeability. In addition, Conoco did a technical literature search which supports the widely held conclusion that the Pictured Cliffs formation is a low permeability reservoir. In contrast, the Northeast area had very few wells and we characterized that as an area with little data. We left that meeting with the belief that the initial requested area boundaries were reasonably acceptable to the OCD and BLM. In addition, as a result of the informal meeting, we had the understanding that we should focus our technical efforts on the northeast area and it was that area for which we provided testimony at the hearing held on December 20, 1991.

(3) Hearing:

At the hearing, it was apparent that we had misunderstood the type of data both the BLM and OCD considered substantial evidence of permeability to qualify the southwest area. Accordingly, at our request, you provided us an opportunity to review the southwest area and to submit post hearing supplemental evidence of permeability.

(4) Post Hearing Data Request:

It is my recollection that Conoco was to re-examine the southwest area to: (1) again search for any existing core data or pressure build up data to conclusively establish the required permeability and (2) submit to the BLM and OCD a list of "type" wells within each of the contour lines of the Southwest area which would be used to estimate the magnitude of reservoir permeability using the infinite acting radial flow equation.

(5) Supplemental Data Results:

I have been advised by Mr. Ben Sargent, Conoco's petroleum engineer who testified at the hearing, of the following:

(a) Further search fails to find any additional core data or pressure build up data other than already submitted for this area at the hearing;

(b) There are 35 Pictured Cliffs wells in the southwest area and Conoco operates none of them and has no ownership interest in them. Conoco would be asking those operators to shut in production during the months of highest gas price and least amount of curtailment. While Conoco is willing to seek the cooperation of other operators to shut in their wells and run the tests, there is insufficient time now remaining for drilling wells in a qualified tight formation area to allow for obtaining this type of data;

(c) The application of the infinite acting radial flow equation to wells in the southwest area with significant cumulative production results in a calculated reservoir permeability in excess of the 0.1 md permeability limitation. While one cannot assume that high cumulative production means permeability in excess of 0.1 md, the result of applying this calculation to those wells does not provide the necessary data to estimate permeability within the permitted limitation so as to qualify the southwest area by this analysis.

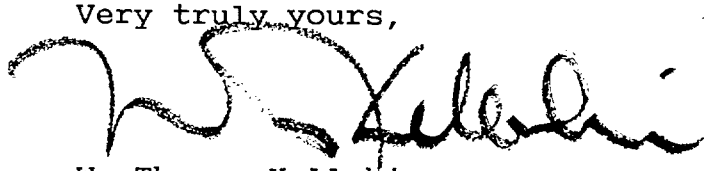
(6) Request to reduce requested area:

As a result of the foregoing, I have enclosed a revised map showing a reduced area of application which has excluded those areas for which we do not yet have the required substantial evidence of low permeability.

Conclusion:

Please advise me of the concurrence of the OCD and BLM to this request, and I will submit to you a proposed draft order and the necessary exhibits for final action.

Very truly yours,



W. Thomas Kellahin

WTK/jcl
cc: Gregory Gazda (Conoco-Oklahoma City)
Robert G. Stovall, Esq. - OCD

ltrt110.089

The revised area now contains acreage as follows:

Federal:	38,089.09 acres
State:	5,766.48 acres
Fee:	4,299.50 acres
	48,155.07 acres

(7) Additional procedural matters:

(a) It is my opinion that the OCD has the authority to allow the application area to be reduced after the hearing but before an order is entered. This is analogous to unit cases which are reduced is size; unorthodox location cases that are moved to more standard locations; and creation of pools with special rules that are ordered for only part of an initially requested area.

(b) It is my opinion that there is no need to reopen the hearing and require that it be placed upon another hearing docket. The purpose of doing so would be to provide notice. However, because the area is reduced and not expanded, there are no parties that would benefit by new notice which have not already been notified.

(c) It is my opinion that the OCD has the authority to allow the amendment or in the alternative, to approve in part and deny in part any OCD case including this one. There is nothing in the OCD rules, the FERC rules, the Oil & Gas Act or Division Order R-6388-A which limits the Division to only approving or denying the entire area of initial application. Such a limitation unreasonably restricts the ability of the Division to issue orders certifying appropriate areas for tight formation designation.