Cont'd

May 20, 1981

2MW 7004: BLACKWOOD & NICHOLS COMPANY, ,'.
PD. FOR DESIGNATION OF A TIGHT FORMA-
TION, SAN JUAN AND RIO ARRIBA COUNTIES,

Case No.

7086

Application

Transcripts

Small Exhibits

ETC

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

12 November 1980

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

APPEARANCES

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: William F. Carr, Esq.
CAMPBELL & BLACK P. A.
Jefferson Place
Santa Fe, New Mexico 87501

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
12 November 1980

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mex

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: William F. Carr, Esq.
CAMPBELL & BLACK P. A.
Jefferson Place
Santa Fe, New Mexico 87501

I N D E X

CHARLES F. BLACKWOOD

Direct Examination by Mr. Carr	4
Cross Examination by Mr. Chavez	26
Cross Examination by Mr. Padilla	29
Cross Examination by Mr. Stamets	33

E X H I B I T S

Applicant Exhibit A, Map	7
Applicant Exhibit 1, Plat	6
Applicant Exhibit 2, Section	9
Applicant Exhibit 3, Regulations	10
Applicant Exhibit 4, Regulations	10
Applicant Exhibit 5, Recommendation	13
Applicant Exhibit 6, Report	15
Applicant Exhibit 7, Report	15
Applicant Exhibit 8, Report	16
Applicant Exhibit 9, Report	16
Applicant Exhibit 10, Report	17
Applicant Exhibit 11, Report	18
Applicant Exhibit 12, Report	19
Applicant Exhibit 13, Report	19

E X H I B I T S

Applicant Exhibit 14, Report 19

Applicant Exhibit 15, Report 19

Applicant Exhibit 16, Report 20

Applicant Exhibit 17, Report 20

MR. STAMETS: Call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd, for a designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. CARR: May it please the Examiner, I'm William F. Carr, Campbell and Black, Santa Fe, appearing on behalf of the applicant.

I have one witness who needs to be sworn.

(Witness sworn.)

CHARLES F. BLACKWOOD

being called as a witness and being duly sworn upon his cath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your name and place of residence?

A. Charles F. Blackwood, Oklahoma City, Oklahoma.

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

A. I'm employed by Blackwood and Nichols Company as a general partner and geological and engineering consultant.

Q. Have you previously testified before this Commission, had your credentials accepted and made a matter of record?

A. Yes.

Q. Are you familiar with the application in this case?

A. Yes.

Q. Are you familiar with the subject area?

A. Yes.

MR. CARR: Are the witness qualifications acceptable?

MR. STAMETS: Yes, they are.

Q. Mr. Blackwood, would you briefly state what Blackwood and Nichols Company, Limited, is seeking with this application?

A. We are requesting that the Pictured Cliffs reservoir be designated a tight reservoir under the terms of paragraph 107 of the Natural Gas Production Act.

Q. Have you prepared certain exhibits for introduction in this case?

A. Yes, I have.

Q. Have these exhibits previously been submitted to the Oil Conservation Division and the USGS with a statement of the meaning and purpose of the exhibits?

A. Yes, they have.

Q. Will you please refer to what has been marked for identification as Exhibit Number One, which is the land plat, and explain to Mr. Stamets what this is and what it shows?

A. This is a map which shows an area of the San Juan Basin. The boundary of the Northeast Blanco Unit, which Blackwood and Nichols Company is the operator, is shown on the plat by a dotted line all around the boundary.

This is approximately a 33,500 acre area which Blackwood and Nichols operates, and it also shows on there marked in red wells which are currently producing from the Pictured Cliffs formation. They're all along the northern boundary. Only two of which of these wells are inside the Northeast Blanco Unit. The remaining five wells are outside the boundary and have been included merely for information, because these are the only wells in the area and they're just additional information which has been put in for your perusal.

The Mesaverde gas wells are also shown in black on this well.

MR. CARR: Mr. Stamets, for clarifica-

tion, we have 17 numbered exhibits and we have an additional exhibit, which has been marked Exhibit A, which is a summary of the testimony which Mr. Blackwood will present here today, and so at this time I'm going to ask him to refer to Exhibit A and then as he works through Exhibit A he will be making reference to the other exhibits.

MR. STAMETS: Fine.

Q. Mr. Blackwood, will you refer to Exhibit A and review this for Mr. Stamets?

A. I have prepared a geographical and geological description, and I think it might be easiest if I just read this. This was prepared as written testimony and I believe the easiest -- well, I'll just read this into the record and if at any point you have a question, please feel free to stop me and I'll answer any kind of questions that come up.

MR. STAMETS: Okay.

A. Geographical: The San Juan Basin of northwest New Mexico is a major gas-producing area, which is approximately 80 miles long in a northwest to southeast trend, and 40 miles wide from the southwest to the northeast.

The center of this gas-producing area is approximately 25 miles southeast of Aztec, New Mexico. Most of the gas produced in this area is found in stratigraphic

reservoirs of the Mesaverde group and Dakota formation. Smaller volumes of gas have been produced from the Pictured Cliffs-Fruitland formations.

Blackwood and Nichols Co., Ltd., operates the Northeast Blanco Unit, a 33,500 acre area located on the northeast flank of the San Juan Basin. The Northeast Blanco Unit is located in Townships 30 and 31 North and Range 6 and 7 West; also Sections 25 and 36 of Township 31 North, Range 8 West; and Sections 1, 12, 13, and 24 of Township 30 North, 8 West. A map of the Northeast Blanco Unit is provided. This is the Exhibit One, which we've referred to.

The surface area is a part of the Colorado Plateau province and contains broad tablelands and rolling hills, interrupted by steep cliffs and canyons.

Geological: The Pictured Cliffs formation in this area is of upper cretaceous age. This formation consists of sandstones, shales, and coal seams. The sandstones within the formation are grey to greyish-white with a salt and pepper lock; fine to medium grained, well sorted, angular to subrounded, composed mainly of quartz with some ferromagnesium minerals and glauconite cemented with calcite and bentonite.

These sandstones are a series of lenses or benches that were deposited on the -- as the shoreline

phase of a sea that regressed northeastward across the area. These benches show a definite northwest to southeast trend and overlap one another. They become stratigraphically higher from the southwest to the northeast, a general geologic section of the San Juan basin is attached. That is our Exhibit Two.

In the Northeast Blanco Unit area no wells were completed in or produced gas from the Pictured Cliffs formation prior to 1979. Over 100 wells have penetrated the Pictured Cliffs and have been completed in the deeper Mesaverde and Dakota formations. The Pictured Cliffs formation has been observed to contain natural gas at abnormally high pressures. In order to control these pressures it is necessary to raise the mud weight to approximately 12 pounds per gallon.

The information gathered while drilling and logging the Pictured Cliffs formation has indicated tight sandstone stringers, coal seams, and shale, which contain natural gas and water (very fresh) at abnormally high pressures.

No drill stem test information or other form of pressure information is available from which in situ permeability can be directly calculated. The stabilized flow rates of the newly completed Pictured Cliffs wells is used

to justify the designation of tight reservoir.

Blackwood and Nichols Company, Ltd., operates the Northeast Blanco Unit. We have taken all necessary precautions to insure that all fresh water zones are protected and not adversely affected by our operations. Our procedures have been in accord with all State and Federal rules and regulations. A part of the pertinent Federal regulations are attached. They are pages 1 through 5 of Supplement to USGS NTL-6.

Q. And that's EXhibit Three?

A. That's Exhibit Three.

Pages 6 -- pages, pardon me, pages C-6, C-7, and C-8 of the New Mexico Oil Conservation Division of the Energy and Minerals Department, are also attached.

Q. Exhibit Four.

A. That would be our Exhibit Four.

We believe that compliance with these rules and regulations adequately protects and will not adversely affect or impair any fresh water aquifers that are being used or expected to be used in the forseeable future for domestic or agricultural purposes.

Geological and Engineering Data: Pictured Cliffs formation of the northeast flank of the San Juan Basin -- pardon me, this should be reread.

The Pictured Cliffs formation of the northeast flank of the San Juan Basin occurs in San Juan and Rio Arriba Counties, New Mexico. It is composed primarily of sandstones, shales, and coal seams. Information has been obtained from electric, radioactivity, gamma ray neutron, sonic, formation density, sidewall neutron, and other logs run on more than 100 wells within the area of the Northeast Blanco Unit from 1950 to 1979. The analysis of these logs has shown that natural gas and water of near drinking quality is present in the pore space of Pictured Cliffs formation.

While drilling the Pictured Cliffs zone gas kicks have made it necessary to raise the weight of the drilling mud to approximately 12 pounds per gallon in order to control against blowouts. This indicates abnormally high pressure. The fact that this abnormally high pressure has not been able to escape the Pictured Cliffs sandstones is an indication of extremely low permeability within the formation.

The flow rates of all the wells producing from the Pictured Cliffs formation in the Northeast Blanco Unit area, and those adjacent to the north boundary, support the tight reservoir designation. All of the Pictured Cliffs producers were stimulated prior to production. Calculations to determine non-stimulated stabilized flow rates to the atmosphere for each well will be shown.

Stabilized production versus depth guidelines: Blackwood and Nichols Co., Ltd., drilled five holes in the Northeast Blanco Unit area to test shallow gas possibilities. All five wells encountered Pictured Cliffs sandstones, which appeared to be possibly productive. Completions in the Pictured Cliffs formation were attempted in all five wells. Three of those five wells produced small volumes of gas and water. All three wells were incapable of commercial gas production from the Pictured Cliffs formation and had to be reworked. The Pictured Cliffs zone was abandoned in the Northeast Blanco Unit Well No. 201, the Northeast Blanco Unit Well No. 203, and the Northeast Blanco Unit Well No. 205. Only two wells were successfully completed in the Pictured Cliffs formation.

These two wells were also completed in the Fruitland formation and are now producing with the Pictured Cliffs formation and the Fruitland formation commingled.

In order to allocate production between the two zones, 50 percent of the production from Northeast Blanco Unit Well No. 202 and Northeast Blanco Unit Well No. 204 has been allocated to each zone.

All Northeast Blanco Unit wells were stimulated prior to production. The calculated productivity improvements ratio is 10 to 11. The Western Company has fur-

nished a fracture stimulation recommendation for the Northeast Blanco Unit Well No. 203. A copy of this recommended procedure which shows fluids, rates, pressures, proppants, costs, et cetera, is enclosed.

Q. And that is your Exhibit Number Five?

A. Yes, this is Exhibit Number Five.

In order to approximate stabilized production rates without stimulation computations have been made. A theoretical stabilized production rate to the atmosphere has been calculated in the following manner:

The pressure differential between shut-in pressure and pipeline pressure has been ascertained for each producing well. This pressure differential is then used with pipeline pressure and actual production to calculate theoretical stabilized production rate to the atmosphere, and the following formula has been used:

$$\frac{\text{Delta pressure}}{\text{Shut-in pressure}} = \frac{\text{Production (to the pipeline)}}{\text{Production (to the atmosphere)}}$$

Where Delta pressure is equal to the shut-in pressure psig minus the pipeline pressure psig.

Then in order to estimate the non-stimulated stabilized production rate, the calculated production to the atmosphere has been divided by ten for wells stimulated in a manner similar to that recommended for the Northeast

Blanco Unit Well No. 203. This factor of ten is the smaller of the productivity increases calculated by Western Company as being created by the stimulation which has already occurred in the wells.

A productivity increase of four times has been assumed for other stimulation treatment (performed on Palmer Oil and Gas Company-Tenneco Wells.)

Next we will give information about the Northeast Blanco Unit Well No. 202, located in the northeast quarter of Section 11, Township 31 North, Range 7 West, San Juan County, New Mexico. This is a Fruitland-Pictured Cliffs commingled well.

The production is shown for June and July, 1980. I think I will summarize this somewhat in showing that it represents 275 Mcf per day per zone and 263 Mcf per day per zone.

When this production of -- well, I'll just read it.

Each zone has produced an average of 270 Mcf for the last two months into the pipeline. The production against atmosphere pressure is estimated to be 395 Mcf per day.

This well was previously stimulated and the productive capacity theoretically increased tenfold. The

pre-stimulation stabilized production rate to the atmosphere is calculated to be 40 Mcf per day from the Pictured Cliffs reservoir.

A copy of the completion report is enclosed.

Q. Exhibit Six.

A. That would be Exhibit Six.

The Northeast Blanco Unit Well No. 204, located in the southwest quarter of Section 1, Township 31 North, Range 7 West, San Juan County, New Mexico, a Fruitland-Pictured Cliffs commingled well.

Using 120 Mcf per day per zone as the average production into the pipeline, we've calculated that the production to the atmosphere would be 162 Mcf per day.

This well was stimulated prior to production. If we reduce the 162 Mcf per day per zone by a factor of five, based on theoretical productivity increase obtained by stimulation, we estimate 34 Mcf per day. So the Pictured Cliffs zone is calculated to have a 34 Mcf per day stabilized production rate against atmospheric pressure.

A copy of the completion report for this well is enclosed.

Q. Exhibit Seven.

A. That's Exhibit Seven.

Three other holes penetrated and logged the Pictured Cliffs formation in the Northeast Blanco Unit area in 1979. These were the No. 201, 203, and 205 Wells. The Northeast Blanco No. 201 was perforated and fracture stimulated in the Pictured Cliffs formation but was not able to flow gas at commercial rate from Pictured Cliffs perforations. The Pictured Cliffs perforations were shut off and abandoned during a re-work of the well.

A copy of this recompletion report is attached.

Q. And that's Exhibit Eight.

A. Northeast Blanco Unit Well 203 was also originally perforated and fractured in the Pictured Cliffs formation. The Pictured Cliffs zone failed to flow commercial quantities of gas. The perforations in the Pictured Cliffs formation were abandoned during the re-work of the well in 198[illegible].

A copy of the recompletion report is attached.

Q. And that is our Exhibit Nine.

A. Northeast Blanco Well No. 205 was originally completed in the Pictured Cliffs reservoir in August of 1979. When the well was turned on and production attempted, it would not flow gas because of too much water. It was neces-

sary to abandon the Pictured Cliffs perforations and recomplete the well in the Fruitland formation.

A copy of this recompletion report is enclosed.

Q. That is our Exhibit Number Ten.

A. That's right.

The experience of Blackwood and Nichols Co., Ltd., indicates that there is high risk of successfully completing commercial gas wells in the Pictured Cliffs formation in the Northeast Blanco Unit area. Five completions have been attempted and only two were successful and resulted in gas wells. 60 percent of the attempted completions in the Pictured Cliffs have not been successful.

The reasons for this high risk of completing wells are numerous. The reservoir rocks are extremely tight sandstones. Some gas is present in the coal seams. The sandstones are not continuous but are numerous lenses which probably are not in pressure communication with another. The resistivity logs are very difficult to interpret precisely as to gas and/or water saturations. The very fresh, highly resistive water which occurs in the sandstones is not easy to differentiate from natural gas by resistivity measurements.

This difficulty in precise gas and water saturation, along with the unknown, very low permeability of

the Fruitland formation makes it almost impossible at this time to determine which locations will be productive from the Pictured Cliffs formation without actually drilling, setting pipe, perforating, fracturing and testing the formation. Our success to date has only been 40 percent in the Pictured Cliffs formation.

Palmer Oil and Gas drilled and completed several wells adjacent to the northern boundary of the Northeast Blanco Unit. These wells were purchased by Tenneco Oil and Gas, who is now the operator. Production and completion information on these adjacent wells is shown below.

I think I'll summarize this if it's all right. My voice is failing.

The Tenneco Yager No. 3 in the southwest quarter of Section 3, Township 31 North, Range 7 West, San Juan County, New Mexico.

This well, when final calculations were made, ended up with a calculated stabilized production rate to the atmosphere without stimulation of 12 Mcf per day.

A 1978 deliverability test and completion report are enclosed.

Q. That's Exhibit Eleven, and Exhibit Twelve. No, that's just Exhibit Eleven.

A. Just Exhibit Number Eleven.

All right, the Tenneco State No. 3 Well, located in the southwest quarter of Section 3, Township 31 North, Range 7 West, San Juan County, New Mexico.

I'll summarize this to say that the calculated non-stimulated production rate to the atmosphere for this well is 45 Mcf per day.

A completion report and the 1978 deliverability test are enclosed.

Q. And that's Exhibit Twelve and Thirteen.

A. Okay. The Tenneco State No. 2, located in the southwest of Section 2, Township 31 North, Range 7 West, San Juan County, New Mexico.

Again to summarize, the calculated non-stimulated stabilized production rate to the atmosphere for this well is 68 Mcf per day.

A completion report and the 1978 deliverability test are enclosed.

Q. And that is Exhibit Fourteen and Exhibit Fifteen.

A. The Tenneco Yager No. 4 from the northwest quarter of Section 10, Township 31 North, Range 7 West, San Juan County, New Mexico.

Again to summarize, the calculated non-stimulated stabilized flow rate to the atmosphere for the Pic-

tured Cliffs formation is 25 Mcf per day.

And the Tenneco Federal No. 3, and again I'll summarize, the non-stimulated stabilized production rate to the atmosphere is 20 Mcf per day.

A deliverability test and the completion report are enclosed.

Q And those are Exhibits Sixteen and Seventeen.

Mr. Blackwood, what conclusions can be drawn from this engineering and geological data?

A. Let me read my conclusions, if it's all right.

The Pictured Cliffs formation has been drilled through, logged, evaluated, and bypassed over thirty years in the Northeast Blanco Unit area. No wells were completed in the Pictured Cliffs formation in the Northeast Blanco Unit area prior to 1979.

Palmer Oil and Gas Company drilled and completed the first Pictured Cliffs wells in the area adjacent to the northern boundary of the Northeast Blanco Unit in 1978.

Blackwood and Nichols Co., Ltd., has drilled and completed over 100 producing gas wells in the 33,500 acre Northeast Blanco Unit area from 1950 to 1978, and had never attempted a Pictured Cliffs completion.

MR. STAMETS: Mr. Blackwood, I'm sorry to interrupt you but I have to take a phone call.

(Thereupon a recess was taken.)

MR. STAMETS: Okay, we can go back on the record. I'm sorry for the interruption, Mr. Blackwood, and if you'd like to pick up wherever you choose on this, we will go ahead, hopefully with no more interruptions.

MR. BLACKWOOD: Thank you.

Blackwood and Nichols Company, Ltd., has drilled and completed over 100 producing gas wells in the 33,500 acre Northeast Blanco Unit from 1950 to 1978, and never attempted Pictured Cliffs completion. The information gathered while drilling the more than 100 wells indicated that the Pictured Cliffs reservoir was very tight and contained both natural gas and fresh water.

In 1979 Blackwood and Nichols Co., Ltd., drilled five holes along the northern boundary of the Northeast Blanco Unit. Completions were attempted in the Pictured Cliffs formation. Three of the five completion attempts were unsuccessful and three holes had to be abandoned in the Pictured Cliffs formation and recompleted in the Fruitland forma-

tion.

At this time it is very difficult, if not impossible, to precisely calculate gas and water saturations within the sandstone lenses of the Pictured Cliffs formation.

It can be shown that natural gas occurs in the Pictured Cliffs formation in this area. It is known that the Pictured Cliffs formation is extremely tight. The low permeability and uncertainty as to gas and water saturations has caused this zone to be bypassed prior to 1979.

The low permeability, high cost, and high risk trying to produce the Pictured Cliffs was an uneconomic venture. The designation of the Pictured Cliffs as a tight reservoir will enable gas to be produced from this formation which would otherwise be left in the ground as noncommercial.

The Pictured Cliffs wells which we have -- which have recently been completed and produced in this area have the calculated non-stabilized flow rates to the atmosphere shown below:

Northeast Blanco Unit Well 204, 40 Mcf per day.

Northeast Blanco Unit Well No, -- pardon me. I believe I misread. It's 202 is 40 Mcf per day.

The Northeast Blanco Unit Well No. 204,

34 Mcf per day.

Tenneco Yager No. 3, 12 Mcf per day.

Tenneco State No. 3, 45 Mcf per day.

Tenneco State No. 2, 68 Mcf per day.

Tenneco Yager No. 4, 25 Mcf per day.

Tenneco Federal No. 3, 20 Mcf per day.

A seven-well total, 244 Mcf per day.

The average Pictured Cliffs well, 35 Mcf per day per well.

All available data collected to date support the designation of Pictured Cliffs formation as a tight reservoir in the Northeast Blanco Unit area. The average well's current calculated stabilized producing rate to the atmosphere without stimulation is 35 Mcf per day. None of the seven newly completed Pictured Cliffs wells in the area have a flow rate which exceeds the 91 Mcf per day rate which is published (depth versus rate guideline.)

The cost of drilling, completing, fracture stimulating, et cetera, when combined with the risks of unsuccessful completions, make a tight reservoir designation necessary for the recovery of these gas reserves.

Q In assembling this data, have you used methods, techniques, and tests that are acceptable throughout the oil and gas industry?

A Yes.

Q. Does the data available to you and presented at this hearing support the conclusion thatthe entire area governed by this application should qualify for a tight formation designation?

A. I believe it should.

Q. In your opinion does the Fruitland formation underlie all the acreage which is included within this application?

A. I believe you mean the Pictured Cliffs.

Yes.

Q. I mean the Pictured Cliffs.

A. Yes, it does.

Q. Is this formation productive throughout the area?

A. We cannot prove that it will be productive throughout the area, but we believe that it will be productive over the entire area at numerous locations and at certain locations it will not be. It will be spottily productive throughout the entire area.

Q. Without the higher price authorized for tight formations, will the area be developed?

A. I don't believe so.

Q. Now, in determining that 90 Mcf was authorized per day by the Oil Conservation Division rules, what

average depth were you using for the top of the Pictured Cliffs formation?

A. I think we used about 3200 feet.

Q. Are any fluids produced from any of these wells?

A. Yes, they make varying amounts of fresh water.

Q. Is there any oil or condensate produced?

A. A tiny amount of condensate that's so far been too small to even collect.

Q. So it would be safe to say that any well drilled in the portion of the Pictured Cliffs covered by this application would not be anticipated to produce five barrels of crude oil per day prior to any sort of treatment.

A. No, certainly not.

Q. Has this formation been authorized for development with an infill drilling program?

A. No.

Q. Were Exhibits A and One through Seventeen prepared by you or under your direction and supervision?

A. Yes, they were.

MR. CARR: At this time, Mr. Examiner, we would offer Applicant's Exhibits A and One through Seventeen.

MR. STAMETS: These exhibits will be admitted.

Q. Mr. Blackwood, in your opinion will granting this application be in the best interest of conservation, prevention of waste, and protection of correlative rights?

A. Yes, it will.

MR. CARR: At this time I have nothing further on direct and would pass the witness.

MR. STAMETS: Are there questions of this witness?

CROSS EXAMINATION

BY MR. CHAVEZ:

Q. Mr. Blackwood, on your calculations, why did you use the direct proportional method productivity index instead of using the back pressure type curve to calculate what would have been the volumes that would have been produced by a well to atmosphere?

A. Well, because we were dealing with actual production figures into a pipeline, and we felt that what we were dealing with was the pressure loss required to produce gas against the pipeline back pressure, and we felt that the most reasonable proportion there would be merely to increase

the pressure in a direct relationship down to the pipeline pressure of zero.

Q You felt that that gave you a little more accuracy than a back pressure type curve?

A We thought it was -- yeah, the same accuracy.

Q You're aware now that these wells are in a pool already.

A Yes.

Q That pool itself extends up into Township 32 North, 7 West.

A Uh-huh.

Q Was there a particular reason why you wanted one section of that pool designated as tight and leave out the other?

A The only reason that I limited this area to the area that my company operates, was because we're a small company and I represent the entire engineering staff of the company, with the exception of one field completion engineer, and that the Federal regulations require that I introduce evidence as to every producing well from the reservoir in the area which my application covers, and I thought that I would prefer to limit the area of my application to the area that we operate.

Q Mr. Blackwood, we've noticed up in this area and further to the northeast, that there are at times problems in defining where actually the Pictured Cliffs formation begins, and due to the different coal seams. Now, what the accepted definition has been, has been the first gas producing sand below the last Fruitland coal; however, in this area and further to the northeast, we find that the USGS and other agencies have designated a Fruitland tongue within the Pictured Cliffs formation.

Now does this -- do you foresee any problems in defining the Pictured Cliffs, say, with what the OCC has used to date and what seems like a trend is being with this coal -- coal tongue?

A Well, if you'll go back to my first just talking about the Pictured Cliffs, let me -- let me mention, it says that the -- the lenses in the Pictured Cliffs do intertongue with the lenses in the Fruitland, and it is a difficult problem to define precisely the Fruitland-Pictured Cliffs boundary. I -- I have not attempted to make a specific definition here. I think that needs more to be left up to the -- probably a large study committee involving numerous geologists, but the way that I have handled this, is I have also a sister application, which is coming up next, in which we talk about the Fruitland, and inasmuch as Fruitland and Pictured Cliffs

are allowed to be commingled for production, I believe we can skip that definition problem at this point.

So I have not really faced that problem.

Q Okay.

MR. CHAVEZ: That's -- that's all I have right now.

MR. STAMETS: Are there other questions of the witness?

MR. PADILLA: I have a couple, Mr. Examiner.

CROSS EXAMINATION

BY MR. PADILLA:

Q Mr Blackwood, the Pictured Cliffs formation is not being developed by infill drilling at this time in the area -- in the proposed area.

A I don't believe that there's any infill drilling on it.

Q And the only -- the only wells, Pictured Cliffs wells, in the proposed area are the two wells up in the north, is that correct?

A Yes, that's correct.

Q Have you calculated any type of permeability factors on those -- either of those two wells that

would be characteristic of the entire -- that you would -- in your opinion would be characteristic of the entire area?

A. No, I have not.

Q. You're just going on the assumption that historically the Pictured Cliffs has been -- has -- is a tight formation?

A. We are basing our entire application on the fact that the rates of flow are substantially below the rate versus depth guideline tables and the fact that this area is, yeah, is basically known to be a very tight area. We do not have any hard permeability data that we can submit on this application.

Q. You're aware that one of the guidelines that the FERC has set is that the average in situ permeability is 0.1 millidarcy or less.

A. Yes. In our Fruitland formation application we have hard evidence to show that; however, in this we are going on the alternate method, which we cannot prove the permeability is -- we simply do not have data on the permeability.

Q. Do you have any estimates as to -- at all as to what the permeability characteristics of this are?

A. Merely from the -- from the depths and the flow rates and the amount of perforated producing interval,

I would assume it is less than 0.1 millidarcy per foot, but I don't have hard engineering data to prove it.

Q. My problem is that if -- that you have no evidence of low permeability characteristics; this might also be interpreted as being low deliverability type of wells. In other words, they just don't produce very much and the permeability may be not low characteristics -- or not low permeability characteristics,

A SPECTATOR: Is what, sir?

Q. May not have low permeability characteristics. In other words, I'm trying to distinguish between a situation where we have low type of deliverability wells and wells that have low permeability.

A. I don't believe such a distinction can be made. If -- if a fairly thick area of reservoir has even reasonable permeability, its deliverability will be high. The permeability is directly related to deliverability and the only way that you're going to have a well with extremely low deliverability is to have extremely low permeability.

Q. Well, couldn't you have wells that have a very thin pay section that would have low deliverability as opposed to wells that have a thicker --

A. Well, permeability is -- the permeability number that we're talking about here is related to thickness.

It's millidarcy -- 0.1 of a millidarcy per foot thickness. So these things are automatically rolled in together. If you have a very -- a 2-inch thick reservoir, then you could indeed have a migh permeability and a low deliverability.

But we don't have that. We have normal thickness throughout in the range of 30 or 40 feet of thickness, and we have low deliverabilities, which when you relate back to thickness, have to have very low permeability, on the order of 0.1 of a millidarcy per foot of permeability, or less.

Q. What evidence have you introduced that indicates that? In other words, that you don't have a high permeability, low pay?

A. Okay, the completion reports on each of the wells show the perforated interval, which indicates the thickness of the reservoir, so that we have, although I have not specifically talked about it, each of the completion reports does give the perforated interval; therefor, the interval of the reservoir, and none of these are, you know, very think, 1-foot thick reservoirs or anything.

Q. Now, as far as the protection of the fresh water in the area, you've indicated -- pointed to Federal and State regulations specifically, you're talking about the casing requirements.

A. Yes, casing and cementing requirements, uh-huh.

Q. And those are sufficient in your opinion to protect the fresh water aquifers.

A. I believe that they are.

MR. PADILLA: I believe that's all I have, Mr. Examiner.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Blackwood, some of this is going to be repeat, but I want to just go through what we list as evidence in our Order Number R-6388, so that I'll assure myself that everything is in there, or at least we've talked about everything.

Starting from the top, then, you've indicated that you have no evidence of the in situ gas permeability in the Pictured Cliffs in the area.

A. We -- we have no direct evidence from which a bona fide calculation can be made.

Q. No core analysis, no --

A. No core analysis.

Q. -- Horner plots.

A. That's right.

Q. Okay.

A. We have indirect evidence that would lead us to believe the permeability is within that area, but --

Q. Then as to the stabilized production rates, you have no stabilized production rates on wells that have not been treated before the rates were obtained.

A. That's true. All of these wells were completed and fractured prior to our knowledge that anyone would ever want such a thing --

Q. Right.

A. -- as a non-stimulated --

Q. Right.

A. -- production curve.

Q. Right, and you have utilized a set of calculations to try to estimate what those might be.

A. Yes, that's right.

Q. Okay, and all of those that you estimated fall below the 91 Mcf per day that is set out in the regulations.

A. That's true.

Q. Okay. And you've indicated that there is very little hydrocarbon liquids produced at all and nothing that would be called a crude oil.

A. That's true.

Q. Okay. Now, in Rule 2-D of R-6388 it says, if an application meets the guidelines contained in sub-paragraphs B and C above, B and C being stabilized rates and liquids production, but does not meet the guidelines contained in sub-paragraph 2-A, which is the permeability, 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.

Now, where is the evidence as to the extraordinary risk and cost and that the incentive price is needed before you go out and try and make some completions here?

A. The evidence that I gave earlier about only two of the five wells being successfully completed in the Pictured Cliffs, and that three of the five had to be abandoned in the Pictured Cliffs, I think is evidence that -- that there is extraordinarily high risk, that this is not a cinch. We go out and we drill the wells and we -- we hope that about half of them will be producers in the Pictured Cliffs formation.

Our evidence to date is 40 percent have produced and 60 percent have been unsuccessful. The --

Q. Well --

A. No, I think we can add to this. We need --

Q. Okay, I --

A. I appreciate your questions.

Q. Let me state that that's interesting, but I don't believe that that is proof.

I think what we'd have to have would be something which would have the costs of these wells, plus the reserves that you developed, and what you would expect to receive back from these reserves, and basically, how much money you're going to get back for the investment in the five wells.

A. Well, I think that would be desireable to have. The only thing I can say, let me tell you that these wells cost approximately $150,000 each when they were drilled; that three of them had to be reworked at a cost of approximately $50,000 each, and were then unsuccessful; that the stimulation treatments for each of these wells cost approximately $50,000.

Q. That's over and above the $150,000?

A. No, that was in the initial $150,000.

Q. Okay.

A. Then we are unable to give you an accu-

rate reserve picture at this time because the two wells -- one of the wells has only been producing for 90 days, and although I could come up with a volumetric number, I would not have the confidence in a reserve number that's developed after 90 days production that I would from a well that's produced for a year.

Q. How about the other well, how long has it been on production?

A. The one well has produced now almost a year, the Well No. 204. Well No. 204 has produced almost a year and I could probably come up with a reasonable reserve estimate for that one well. I have not done so at this time.

Q. It would seem to me that something like that has to be done in order to say that we have a situation here where we have extraordinary risk and to demonstrate that the incentive price is needed to develop this.

MR. CARR: Can you keep the record open to enable us to submit that data?

MR. STAMETS: I'm certain that we can. I'm not certain that submitting that without an opportunity for cross examination would be appropriate in this case. This is -- these things -- these cases are not routine at this point, and this is the first one where we've not had at least some evidence as to the permeability.

I might prefer that we simply continue the case for additional testimony on another day. I --

A. That would be acceptable with me.

Q. I can appreciate that you might not want to come back that day.

A. I always like to visit Santa Fe.

Q. We'd like to do these first ones right.

MR. CARR: And if it's continued, we would like to have it continued to one of your hearings, and so that would be what, December the 10th?

MR. STAMETS: Right, I believe that's correct.

MR. CARR: We can be here then if you would like to continue it.

A. I can prepare some additional information and return December 10th, if that would be agreeable.

MR. STAMETS: Okay, let's go on and look at some more of these issues here and make certain that everything is clear in everybody's mind where we stand and what additional data we might need.

Under Two-D-1 it says an application based on the guideline outline in sub-paragraph Two-D shall include data to support the contention that the guidelines contained in Two-B and Two-C are met, and in addition thereto

shall contain the types and extent of enhanced recovery -- enhanced production techniques which are expected to be necessary. Now you've included that in your report from Western?

A. Yes.

Q. Okay. The estimated expenditures necessary for employing these techniques --

A. Those are part of this report.

Q. Okay, and an estimate of the degree of increased production from use of such techniques, together with engineering and geological data to support that estimate.

A. That -- those are also included.

Q. Okay, and you're satisfied with those. I haven't, of course, had time to read through those today. I will, subsequent to the hearing, if I have any questions on those, I'll relay them to you so that you'll be prepared when the case is reopened.

A. Fine.

Q. Okay. Another thing that I think should be -- that is needed in this case, is a simple cross section, probably north to south, since that's the longer axis of the area, which would demonstrate the formation, its appearance on the logs and its top and bottom.

A. All right.

Q. And the selection of a type log. I

would suggest that perhaps this would be coordinated with the Geological Survey and our Aztec District Office. Probably that could be done even over the telephone.

A. Yeah, we can do that.

Q. Now, let's assume for the minute that -- that we're finally satisfied with all of the information that we have. Information on permeability could be developed as new wells are completed, is that not correct?

A. Yes, that's correct.

Q. Cores could be taken and analyzed and/ or wells --

A. I understand that cores will really not help you much; that the better method of obtaining permeability data would be from pressure testing, from drill stem tests and /or perforation into the zone prior to stimulation; that cores themselves are subject to other -- a number of problems when you start talking about in situ permeability, because you don't -- the cores have already changed by the time you have removed them from the borehole and -- and they have -- they self-fracture; therefor, that your permeabilities are different. So I would submit that cores are probably not going to be one of the more desireable ways to go forward with.

Q. Would Blackwood and Nichols be willing

to take an actual flow test and calculate permeabilities on a certain number of wells to be completed within the area?

A. Yes. In fact, we're planning on doing that on some future wells. We -- this thing caught us unawares, you know, by the time we knew what the rules were for testing, we had already stimulated all of these previous wells.

MR. STAMETS: Does anyone have any other questions of this witness?

MR. CHAVEZ: I've got one more, just to clear up my own confusion.

You're asking for this tight determination just within the unit boundary?

A. Yes.

MR. CHAVEZ: Okay. Also, on figure two in your exhibit from WEstern, you used a productivity index contrast (sic). Have you used the Vogel inflow performance relationship curves, also, just to make a determination as to increase in permeability or what should I say, increase in production?

A. The only -- the only data which we have used is a relationship in productivity improvement that's based on these curves in the Western. We have not used any other method.

MR. CHAVEZ: Okay, in your -- the next

page, Exhibit -- well, after Exhibits One and Two, the permeability to stimulation fluid and permeability to reservoir fluid, these were assumed permeabilities of the formation that you used?

A. Yes, that's right.

MR. CHAVEZ: Did the stimulation records -- the pressures during the actual stimulations coincide with the or come pretty close to what was predicted to be the pressures that you would --

A. Yes, in this -- in this No. 203 Well, when the Fruitland zone was stimulated, we reached a maximum injection pressure of 2800 pounds when they had estimated a 2700 pound pressure, and we were able to exceed the rate slightly, but they were -- they were close, yes. The actual occurrence of the stimulation procedure was very similar to the predicted occurrence.

MR. CHAVEZ: Do you think that was due in part to the correct -- or the assumption of permeability?

A. I believe so.

MR. CHAVEZ: Okay, that's all I have.

MR. STAMETS: Does anyone have any other questions of Mr. Blackwood at this time? He may be excused. And if there is nothing further, this case will be continued to the December 10th Examiner Hearing.

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7086, heard by me on 11-12 1980.

Richard L. Stamets, Examiner
Oil Conservation Division

SUPPLEMENTAL INFORMATION

Gathered after October 1980

In Support of the Tight Reservoir Designation

PRODUCTION

	Well # 202 Mcf		Well # 204 Mcf	
Month	@15.025	@14.73	@15.025	@14.73
Oct. 1980	9573	9764	7118	7260
Nov. 1980	9899	10097	7130	7273
Dec. 1980	10006	10206	6173	6296
Jan. 1981	7798	7954	6341	6468
Feb. 1981	5959	6078	4043	4124
Mar. 1981	9337	9524	5995	6115

Production from the two wells given above is from the commingled Fruitland and Pictured Cliff reservoirs. To estimate production by zone we have assigned the total production equally to each formation.

Northeast Blanco Unit Well # 202

In March, 1981 the production rate (Pictured Cliffs) was 146 Mcfpd. The estimated stabilized production rate (stimulated) to the atmosphere is calculated to be 922/(922-292) x 146 = 214 Mcfpd. The stimulation procedure theoretically improved the producing capacity by a factor greater than ten. Therefore, the "non stimulated stabilized production rate to the atmosphere" is estimated to be 21 Mcfpd for March 1981 from the Pictured Cliffs formation.

Northeast Blanco Unit Well # 204

In March, 1981 the production rate (Pictured Cliffs) was 96 Mcfpd. The estimated production rate to the atmosphere is calculated to be 942/(942-246) x 96 = 130 Mcfpd. The stimulation procedure theoretically improved the producing capacity by a factor greater than five. Therefore the "non stimulated stabilized producing rate to the atmosphere" is estimated to be 26 Mcfpd for March, 1981.

Production from the nearby gas wells operated by Tenneco for the month of March, 1981 is shown below.

Tenneco Yager # 3

1025 Mcf @15.025 psi 31 days
34 Mcfpd @14.73 psi

$\frac{1467}{(1467-311)}$ x 34 = 43 Mcfpd to the atmosphere

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 5
CASE NO. 7086
Submitted by Blackwood
Hearing Date June 3, 1981

Tenneco Yager # 4

1652 Mcf @15.025 psi 31 days
54 Mcfpd @14.73 psi

$\frac{1425}{(1425-310)}$ x 54 = 76 Mcfpd to the atmosphere

The production of this well was enhanced by stimulation by a procedure which theoretically increased productive capacity four fold. Therefore the estimated "stabilized non stimulated productive rate to the atmosphere" is 19 Mcfpd for March, 1981.

Tenneco State # 2

3874 Mcf @15.025 psi 31 days
126 Mcfpd @14.73 psi

This zone was stimulated by a fracture treatment which theoretically increased productive capacity by a factor of four. Therefore the "stabilized non stimulated production rate to the atmosphere" is estimated to be 31 Mcfpd.

Tennecc State # 3

3613 Mcf @15.025 psi 31 days
119 Mcfpd @14.73 psi

The well was fractured to increase productiivity by more than four times. Therefore the estimated "stabilized non stimulated production rate to the atmosphere" is 30 Mcfpd.

Tenneco Federal # 3

498 Mcf @15.025 psi 31 days
16 Mcfpd @14.73 psi

The seven producing Pictured Cliffs wells in this area have an average "non stimulated stabilized production rate to the atmosphere" of 27 Mcfpd in March 1981.

PERMEABILITY TESTING NEW WELLS

Blackwood & Nichols Co., Ltd. has drilled and tested three new wells in the Pictured Cliffs formation since 1980. The Northeast Blanco Unit Well # 13-A was drill stem tested on November 29, 1981. Copies of the Drill Stem Test are attached (Exhibit No. 18). The data collected indicates that the formation is too tight to yield precise permeability information during the length of this test. The risk of sticking the drill stem test tools in the hole and losing the hole increases with the length of the test. It was therefore decided to test additional wells through casing in order to obtain permeability information.

The Northeast Blanco Unit Well # 206 (Section 12, 31N-7W) was drilled and production casing set to 3690' on March 25, 1981. The Pictured Cliffs formation was perforated with four holes per foot per interval 3528', 3529', 3537', and 3549'. 2 3/8 inch tubing was run to 3588' and the hole swabbed dry. A seven day pressure build up test was taken from April 7th through 14th, 1981. The

well was opened to flow but died in an hour. The well was shut in and new plans for testing were considered. On April 24, 1981 the Northeast Blanco Unit Well # 206 was flow tested for three hours. A rate of 17 Mcfpd was recorded. The well was then shut in for three days and the pressures recorded. The information collected during these tests has been evaluated and calculated to obtain "in situ" permeability. The calculated permeability for this well (not stimulted) is 0.0116 Md/ft (millidarcies per foot). Copies of the seven day pressure test, three day pressure build up, three hour flow test chart, permeability calculation and pressure build up graphs are enclosed as Exhibit 19, "Permeability Information, Northeast Blanco Unit Well # 206".

Northeast Blanco Unit Well # 208 was drilled and production casing set to 3661' on April 9, 1981. The Pictured Cliff formation was perforated with four holes per foot per interval 3477', 3489', 3521', 3547', 3561', and 3570'. A seven day pressure build up test was run from April 14-21, 1981. The Northeast Blanco Unit Well # 208 was flow tested on April 22, 2981. A rate of 2.026 Mcfpd was recorded. The well was shut in and a pressure build up was taken from 4-23-81 to 4030-81. The information collected during these tests has been evaluated and calculated to obtain "in situ" permeability. The calculated permeability for this well (not stimulated) is 0.003 md/ft. Copies of the pressure build up tests, one point back pressure test, flow test, and pressure build up graphs are enclosed as Exhibit No. 20, "Permeability Information Northeast Blanco Unit WELL # 208".

SUMMARY AND CONCLUSIONS

The additional permeability data collected since November 1980 supports the "Tight Reservoir" designation. Three new wells were drilled and the Pictured Cliffs formation tested for pressure, flow rate, and permeability.

A Drill Stem Test of the Northeast Blanco Unit Well # 13-A, recorded data which indicated that the Pictured Cliffs formation was too "tight" to collect precise permeability data during a two hour drill stem test.

The Northeast Blanco Unit Well # 206 flowed 17 Mcfpd natural (no stimulation) and had a calculated permeability of 0.0116 md/ft.

The Northeast Blanco Unit Well # 208 flowed 2 Mcfpd natural (no stimulation) and had a calulated permeability of 0.003 md/ft.

The average calculated "non stimulated production rate" of the seven producing Pictured Cliffs wells in this area as of March 1981 is 27 Mcfpd per well. This is less than the 35 Mcfpd per well average shown for July, 1980.

Geologic Cross Sections, An Isopachous Map and a Structure Map of the Pictured Cliffs formation have been included in this application. They are identified as follows:

Geologic Cross Section A-A is Exhibit No. 21
Geologic Cross Section B-B is Exhibit No. 22
Geologic Cross Section C-C is Exhibit No. 23
The Gross Interval Isopachous Map is Exhibit No. 24
The Structure Map is Exhibit No. 25.

All the data collected to date indicates that the Pictured Cliffs formation within the area of the Northeast Blanco Unit qualifies as a "Tight Reservoir".

EXHIBIT NO. 18

Drill Stem Test

Northeast Blanco Unit Well No. 13-A

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
B+N EXHIBIT NO. 18
CASE NO. 7086
Submitted by Bradbury
Hearing Date June 3, 1981

FLUID SAMPLE DATA

Sampler Pressure 0 P.S.I.G. at Surface
Recovery: Cu. Ft. Gas
cc. Oil
cc. Water
cc. Mud 1500
Tot. Liquid cc. 1500
Gravity ° API @ °F.
Gas/Oil Ratio cu. ft./bbl.

	RESISTIVITY			CHLORIDE CONTENT
Recovery Water	@	°F.		ppm
Recovery Mud	4.55 @	70 °F.		ppm
Recovery Mud Filtrate	@	°F.		ppm
Mud Pit Sample	4.61 @	67 °F.		ppm
Mud Pit Sample Filtrate	@	°F.		ppm
Mud Weight	11.5	vis 57		sec.

Date 11-29-80 Ticket Number 717313
Kind of D.S.T. OPEN HOLE Halliburton Location FARMINGTON
Tester MR. FREIDLINE Witness MR. LOOS
Drilling Contractor FOUR CORNERS DRILLING COMPANY #4 bc

EQUIPMENT & HOLE DATA

Formation Tested Picture Cliff
Elevation 6342' KB Ft.
Net Productive Interval 182' Ft.
All Depths Measured From Kelly Bushing
Total Depth 3430' Ft.
Main Hole/Casing Size 8 3/4"
Drill Collar Length 625' I.D. 2.25"
Drill Pipe Length 2737' I.D. 3.826"
Packer Depth(s) 3242' - 3248' Ft.
Depth Tester Valve 3220.5' Ft.

Cushion TYPE AMOUNT Ft. Depth Back Pres. Valve Surface Choke 3/4" ADJ. Bottom Choke 3/4"

Recovered 320 Feet of Gas cut mud
Recovered Feet of
Recovered Feet of
Recovered Feet of
Recovered Feet of
Recovered Feet of

Remarks SEE PRODUCTION TEST DATA SHEET.

NOTE: If this formation contains a minimum 1500 PSI bottom hole pressure as stated by Mr. Charles Blackwood, the visual appearance of this drill stem test indicates the formation is too tight to yield permeability information during the length of this test.

TEMPERATURE	Gauge No. 349 Depth: 3226.51' Ft. 24 Hour Clock		Gauge No. 283 Depth: 3427' Ft. 24 Hour Clock		Gauge No. Depth: Ft. Hour Clock		TIME (00:00-24:00 hrs.)	
Est. 124 °F.	Blanked Off No		Blanked Off Yes		Blanked Off		Tool Opened	1112
Actual °F.	Pressures		Pressures		Pressures		Opened Bypass	1530
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	2047.5	1938.8	2050.9	2059.6				
First Period Flow Initial	133.7	122.3	259.2	265.2			—	—
First Period Flow Final	200.6	199.4	324.7	326.4			32	29
First Period Closed In	293.9	293.8	409.7	418.1			89	92
Second Period Flow Initial	214.0	217.3	337.7	340.4			—	—
Second Period Flow Final	214.0	218.0	337.7	341.7			16	16
Second Period Closed In	240.7	239.9	357.4	363.0			121	121
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed In							—	—
Final Hydrostatic	2047.5	1932.8	2050.9	2053.5			—	—

FORM 101-83 - PRINTED IN U.S.A.

FORMATION TEST DATA

LITTLE'S 11103 7.5C 3/80

Legal Location Sec. - Twp. - Rng. 20 - 30N - 7W
Lease Name N. E. B. U. Well No. 13-A Test No. 1
Field Area BASIN MESA VERDE
Mete. From Tester Valve
Tested Interval 3248' - 3430'
County RIO ARRIBA State NEW MEXICO
Lease Owner/Company Name BLACKWOOD AND NICHOLS COMPANY LIMITED

Casing perfs. _____ Bottom choke _____ Surf. temp _____ °F Ticket No. 717 313

Gas gravity _____ Oil gravity _____ GOR _____

Spec. gravity _____ Chlorides _____ ppm Res. _____ @ _____ °F

INDICATE TYPE AND SIZE OF GAS MEASURING DEVICE USED _____

Date Time a.m. p.m.	Choke Size	Surface Pressure psi	Gas Rate MCF	Liquid Rate BPD	Remarks
0100					On location
0530					Picked up tools
0900					Trip in hole with tools
1112					Opened tool with a fair blow
1127					Decreasing blow
1144					Closed tool with a weak blow
1313					Opened tool with a weak blow
1329					Closed tool with a weak blow
1530					By-passed tools, unseated packers
					Pulled out of hole
1900					Out of hole with tools

PRODUCTION TEST DATA

FORM 193-RI—PRINTED IN U.S.A.

LITTLE'S DOTS IN 8/74

BLACKWOOD AND NICHOLS — 717313

Lease Owner/Company Name — Ticket Number

B.T. 349 — B.T. 283 — B.T.

Depth 3226.51' — Depth 3427' — Depth

INITIAL FLOW

	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.
0.	.0000		122.3	.0000		265.2			
1.	.0132		146.2*	.0134		268.6*			
2.	.0298		162.2	.0301		285.8			
3.	.0461		170.8	.0468		295.8			
4.	.0629		184.1	.0636		309.8			
5.	.0794		190.7	.0803		318.4			
6.	.0960		199.4	.0970		326.4			
	5 minute intervals								
	*Interval = 4 minutes								
	29 TOTAL MINUTES								
	INITIAL CLOSED IN PRESSURE								
0.	.0000	-----	199.4	.0000	-----	326.4			
1.	.0033	1.478	198.1	.0033	1.481	325.7			
2.	.0066	1.192	197.4	.0066	1.196	325.1			
3.	.0099	1.029	199.4	.0099	1.033	325.7			
4.	.0133	.915	200.7	.0133	.919	327.7			
5.	.0166	.831	202.7	.0166	.835	329.7			
6.	.0199	.765	204.7	.0199	.769	331.7			
7.	.0232	.711	206.7	.0232	.714	334.4			
8.	.0265	.665	208.7	.0265	.668	335.7			
9.	.0298	.625	210.7	.0298	.629	337.7			
10.	.0332	.590	212.7	.0332	.593	340.4			
11.	.0398	.533	216.0	.0398	.536	343.7			
12.	.0464	.487	219.3	.0464	.490	347.0			
13.	.0530	.449	222.7	.0530	.452	350.3			
14.	.0597	.416	225.3	.0597	.419	353.0			
15.	.0663	.389	228.6	.0663	.391	355.7			
16.	.0729	.365	231.3	.0729	.367	358.3			
17.	.0796	.344	234.0	.0796	.346	361.0			
18.	.0862	.325	237.3	.0862	.327	363.6			
19.	.0928	.308	239.3	.0928	.311	366.3			
20.	.0995	.293	241.9	.0995	.296	368.9			

CONTINUED ON PAGE 2.....

Remarks:

6

BLACKWOOD AND NICHOLS — 717313

Lease Owner/Company Name — Ticket Number

B.T. 349 — B.T. 283 — B.T.

Depth 3226.51' — Depth 3427' — Depth

INITIAL CLOSED IN PRESSURE CONTINUED.....

	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	Log $\frac{t+\theta}{\theta}$	PSIG Temp. Corr.
21.	.1160	.262	248.6	.1160	.264	374.3			
22.	.1326	.237	253.9	.1326	.238	379.6			
23.	.1492	.216	259.1	.1492	.218	384.2			
24.	.1658	.198	264.3	.1658	.200	388.9			
25.	.1823	.184	268.9	.1823	.185	393.5			
26.	.1989	.171	272.9	.1989	.173	396.9			
27.	.2155	.160	277.4	.2155	.161	401.5			
28.	.2321	.150	281.4	.2321	.152	404.8			
29.	.2486	.142	284.6	.2486	.143	408.8			
30.	.2652	.134	288.6	.2652	.135	412.8			
31.	.2818	.127	291.2	.2818	.128	415.5			
32.	.2984	.121	293.1	.2984	.122	417.5			
33.	.3050	.119	293.8	.3050	.120	418.1			
	First 10 intervals = 1 minute each; next 10 intervals = 2 minutes each; next 12 intervals = 5 minutes each; last interval = 2 minutes								
	92 TOTAL MINUTES								
	SECOND FLOW								
0.	.0000		217.3	.0000		340.4			
1.	.0560		218.0	.0530		341.7			
	16 TOTAL MINUTES								
	SECOND CLOSED IN PRESSURE								
0.	.0000		218.0	.0000		341.7			
1.	.0430		220.0*	.0431		343.7*			
2.	.0827		222.7	.0829		347.0			
3.	.1223		225.3	.1226		349.0			
4.	.1620		227.3	.1624		351.7			
5.	.2017		230.0	.2022		353.7			
6.	.2413		232.0	.2419		355.7			
7.	.2810		234.0	.2817		357.6			
8.	.3207		236.0	.3215		359.6			
9.	.3604		237.9	.3612		361.6			
10.	.4000		239.9	.4010		363.0			
	12 minute intervals								
	*Interval = 13 minutes								
	121 TOTAL MINUTES								

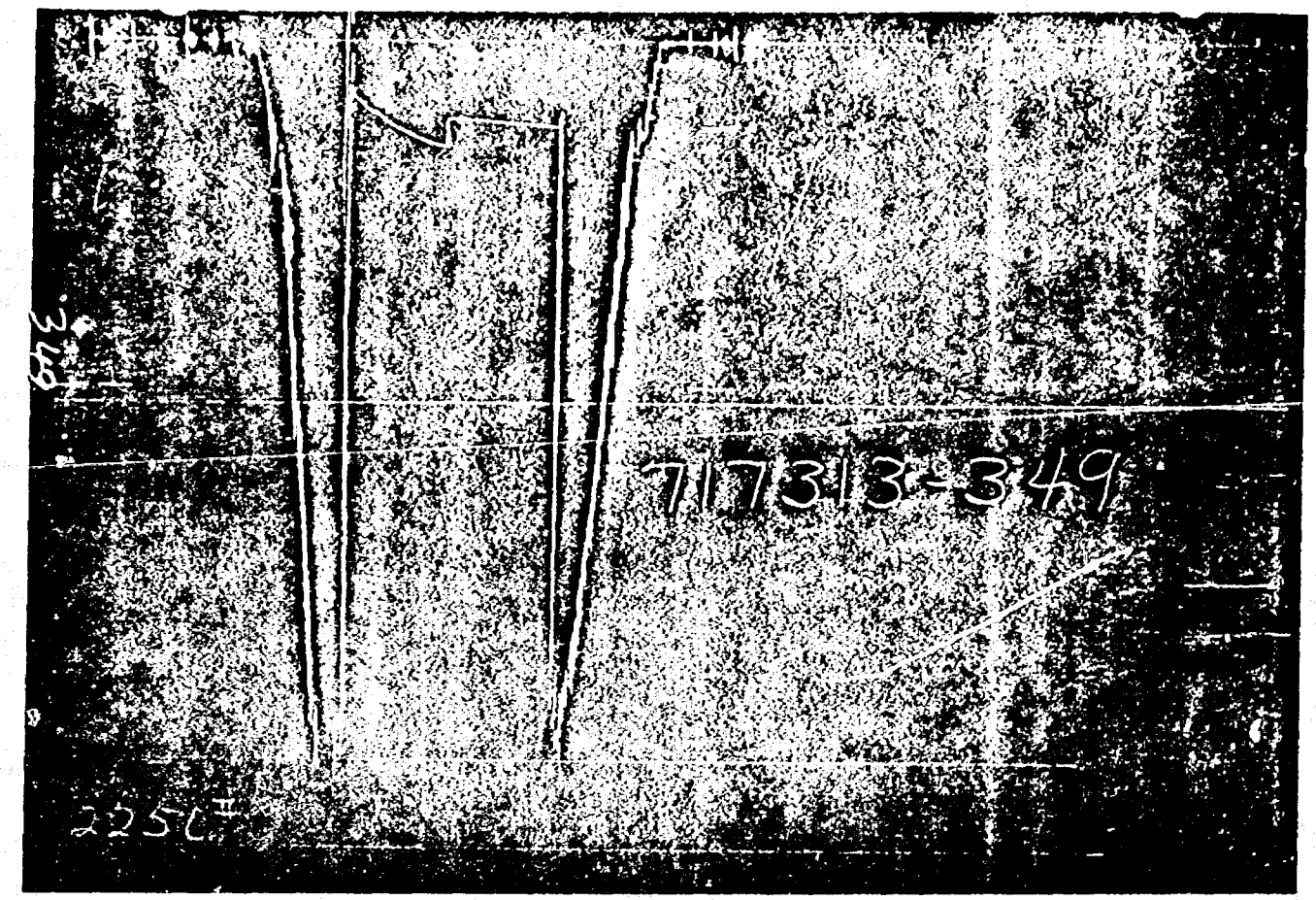
Remarks:

6

	O. D.	I. D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Drill Collars	6"	3"	1'	
Reversing Sub				
Water Cushion Valve	4½"	3.826"	2737'	
Drill Pipe	6"	2.25"	475'	
Drill Collars				
Handling Sub & Choke Assembly X over	6"	3"	1'	3213.74'
~~Dual CIP Valve~~	5"	.87"	6.75'	3220.49'
Dual CIP Sampler	5"	.75"	5.02'	
Hydro-Spring Tester				
Multiple CIP Sampler				
Extension Joint	5"	2.25"	4.11'	3226.51'
AP Running Case	5"	1.75"	5'	
Hydraulic Jar	5"	1"	2.78'	
VR Safety Joint				
Pressure Equalizing Crossover	7 3/4"	1.53"	5.8'	3242.2'
Packer Assembly				
Distributor				
Packer Assembly X over	7 3/4" / 6"	1.53" / 3"	5.8' / 1'	3248'
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case	6"	2.25"	150'	
Drill Collars	6"	3"	1'	
Anchor Pipe Safety Joint X over				
Packer Assembly				
Distributor				
Packer Assembly				
Anchor Pipe Safety Joint				
Side Wall Anchor				
Drill Collars	5 3/4"	3.5"	25'	3427'
Flush Joint Anchor	5 3/4"	2.44"	4'	3430'
Blanked-Off B.T. Running Case				
Total Depth				

EQUIPMENT DATA

6



Each Horizontal Line Equal to 1000 p.s.i.

EXHIBIT NO. 19

Permeability Information

Northeast Blanco Unit Well No. 206

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
BTN EXHIBIT NO. 19
CASE NO. 7086
Submitted by Blackwood
Hearing Date June 3, 1981

NEW MEXICO OIL CONSERVATION COMMSSION

MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Form C-132
Revised 9-1-65

Type Test: ☐ Initial ☐ Annual ☒ Special				Test Date: 4-27-81	
Company: Blackwood & Nichols Co., Ltd.		Connection: Natural Formation Test			
Pool: So. Los Pinos-Fruitland PC		Formation: Pictured Cliff			Unit
Completion Date: Not completed	Total Depth: 3704'	Plug Back TD: 3657'	Elevation: 6625' GL	Farm or Lease Name: Northeast Blanco Unit	
Csg. Size: 4.50 / Wt.: 10.50 / d: 4.052 / Set At: 3690'		Perforations: From 3518' To 3549'		Well No.: 206	
Tbg. Size: 2.375 / Wt.: 4.7 / d: 1.995 / Set At: 3588'		Perforations: From 3557' To 3560'		Unit: M / Sec.: 10 / Twp.: 31N / Rge.: 7W	
Type Well – Single – Bradenhead – G.G. or G.O. Multiple: Single		Packer Set At: None		County: San Juan	
Producing Thru: tubing	Reservoir Temp. °F:	Mean Annual Temp. °F:	Baro. Press. – P_a:	State: New Mexico	
L:	H:	Gg: 0.640	% CO_2:	% N_2:	% H_2S:
Prover:	Meter Run:	Taps:			

NO.	FLOW DATA: Prover Line Size	X	Orifice Size	Press. p.s.i.g.	Diff. h_w	Temp. °F	TUBING DATA: Press. p.s.i.g.	Temp. °F	CASING DATA: Press. p.s.i.g.	Temp. °F	Duration of Flow
SI							315		426		7 days
1.	2"		1/16	186		67			293		3 hrs.
2.											
3.											
4.											
5.											

RATE OF FLOW CALCULATIONS

NO.	Coefficient (24 Hour)	$\sqrt{h_w P_m}$	Pressure P_m	Flow Temp. Factor Ft.	Gravity Factor Fg	Super Compress. Factor, Fpv	Rate of Flow q, Mcfd
1	0.0846		198	0.9933	0.9682	1.013	17
2.							
3.							
4.							
5.							

NO.	P_t	Temp. °R	T_s	Z
1.				
2.				
3.				
4.				
5.				

Gas Liquid Hydrocarbon Ratio _____ Mcf/bbl.
A.P.I. Gravity of Liquid Hydrocarbons _____ Deg.
Specific Gravity Separator Gas _____ XXXXXXXXX
Specific Gravity Flowing Fluid XXXXX _____
Critical Pressure _____ P.S.I.A. _____ P.S.I.A.
Critical Temperature _____ R _____ R

P_c 438 P_c^2 191844

NO	P_t^2	P_w	P_w^2	$P_c^2 - P_w^2$
1		305	93025	98819
2				
3				
4				
5				

(1) $\frac{P_c^2}{P_c^2 - P_w^2} = \frac{191844}{98819}$ (2) $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1.9414$

AOF = Q $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1.7575 \times 17 = 30$ Mcfd

Absolute Open Flow 30 Mcfd @ 15.025 | Angle of Slope θ _____ | Slope, n 0.85

Remarks: B & R Wireline Co. ran wireline tools after the 3 hr. flow and found top of liquids @ 3240' 4-24-81. Start 3 days build up test 4-24-81 - 4-27-81.

Approved By Commission:	Conducted By:	Calculated By:	Checked By:
	C. R. Wagner	C. R. Wagner	DeLasso Loos

FIELD DATA SHEET (Not Required To File)

Type Test: ☐ Initial ☐ Annual ☒ Special — Test Date: 4-24-81 — Connection

Company: Blackwood & Nichols Co., Ltd.

Field: So. Los Pinos-F-PC — Reservoir: Pictured Cliffs — Location: M-10-31N-7W

Completion Date — Total Depth: 3704' — Plug Back TD: 3657' — Elevation: 6525' GL

Csg. Size: 4.5 — Wt.: 10.5 — d: 4.052 — Set At: 3690' — Perforations: From 3518' To 3549'

Tbg. Size: 2 3/8 — Wt.: 4.7 — d: 1.995 — Set At: 3588' — Perforations: From 3557' To 3560' — Packer Set At

Type Completion (Describe): Natural Tight Formation Test

Producing Thru: tubing — Reservoir Temp. F — Mean Annual Temp. F — Baro. Press. – P_a

L — H — G_g .640 — % CO_2 — % N_2 — % H_2S — Prover: 2" — Meter Run — Taps

Lease No. or Serial No.

Allottee

Unit

Farm or Lease Name: Northeast Blanco Unit

Well No.: 206

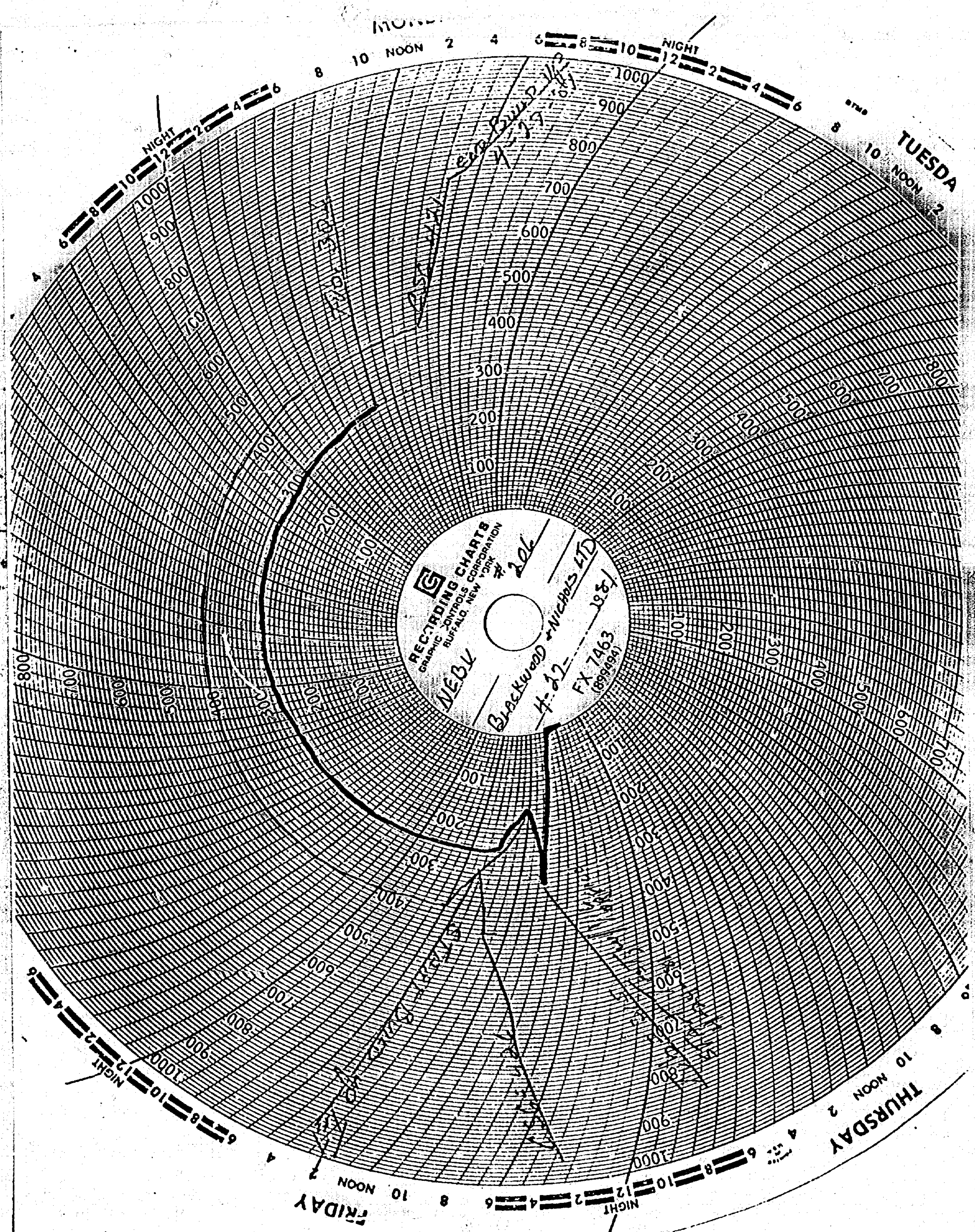
Sec.: 10 — Twp.-Blk.: 31N — Rge.-Sur.: 7W

County or Parish: San Juan

State: New Mexico

DATE Time of Reading	ELAP. TIME Hrs.	Wellhead ~~Working~~ Pressure Tbg. Psig.	Csg. Psig.	Temp. F	~~XXXXXXX~~ PROVER Pressure Psig.	Diff.	Temp. F	Orifice	REMARKS (Include liquid production data: Type–A.P.I. Gravity–Amount)
4-24-81		315	426						Shut-in Pressure
									9:30 AM Start Test
								1/16	Coeff. = 0.0846
	0:15	301	410	63					
	0:30	291	397	64					
	0:45	279	387	65					
	1:00	270	377	65					
	1:15	253	363	65					
	1:30	244	351	65					
	1:45	232	341	66					
	2:00	224	329	66					
	2:15	213	321	66					
	2:30	204	311	67					
	2:45	194	303	67					
	3:00	186	293	67					
4-24-81 1:30PM		Start Build Up Test							Shut well in for buildup
									B & R Service Company
									Ran wireline tools.
									Found water @ 3240'
									378' fill up water
4-27-81		306	421			End Test			

Page ____ of ____ Data By C. R. Wagner



RECORDING CHARTS
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
FX 7463
(899494)
NEBL
206
BLACKWOOD + NICHOLS LTD
4-22 198
TUESDA
THURSDAY
FRIDAY
NOON
NIGHT

NEBU #206

Pi = Initial Shut-in Pressure (Theoretical Reservoir Pressure)

m = PSI/Cycle

μmu = cp

Q = Mcfd

h = ft.

K = md (Gas) Permeability

Pi = 413 PSIG

m = 100

μmu = 0.013

Q = 17 Mcfd

h = 31 ft.

$$K = \frac{(162.6)\ (17)\ (0.013)}{(100)\ \ (31)} = 0.0116 \text{ md}$$

NEBU #206

Hours	$\frac{T+\Delta T}{\Delta T}$	Pressure
1	1.817	290
2	1.642	330
3	1.529	380
4	1.462	380
5	1.400	380
6	1.353	385
7	1.316	388
8	1.286	390
9	1.261	390
10	1.240	393
11	1.222	395
12	1.207	398
13	1.194	391
14	1.182	400
15	1.171	400

$\frac{T+\Delta T}{\Delta T}$

T = Flow Time

ΔT = Time Since Shut-in

NEBU # 296

K = 0 @ 1/1 hr

P_i = 413 PSIG

PRESSURE, PSI

700
600
500
400
300
200
100
0

10 9 8 7 6 5 4 3 2 1 9 8 7 6 5 4 3 2 1

$\frac{T+\Delta t}{\Delta t}$

K&E SEMI-LOGARITHMIC 359-61G
KEUFFEL & ESSER CO. MADE IN U.S.A.
2 CYCLES X 70 DIVISIONS

B & R SERVICE, INC.

P. O. Box 1048
Farmington, New Mexico 87401
(505) 325-2393

Company BLACKWOOD NICHOLS | Lease NEBU | Well 206

County SAN JUAN | State NEW MEXICO | Date 4-7-14-81

Shut-In 12 Noon 4-7-81 | Zero Point K.B. | Tbg. Pressure

Casing Pressure | Tbg. Depth Bomb @ 3550' | Casing Perf.

Max. Temp. | Fluid Level

TIME	PSIG
0 Hrs.	280
6 "	297
12 "	320
18 "	337
24 "	357
30 "	377
36 "	399
42 "	416
48 "	436
54 "	455
60 "	470
66 "	489
72 "	506
84 "	540
96 "	574
108 "	606
120 "	637
132 "	666
144 "	698
156 "	730
168 "	755

K•E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

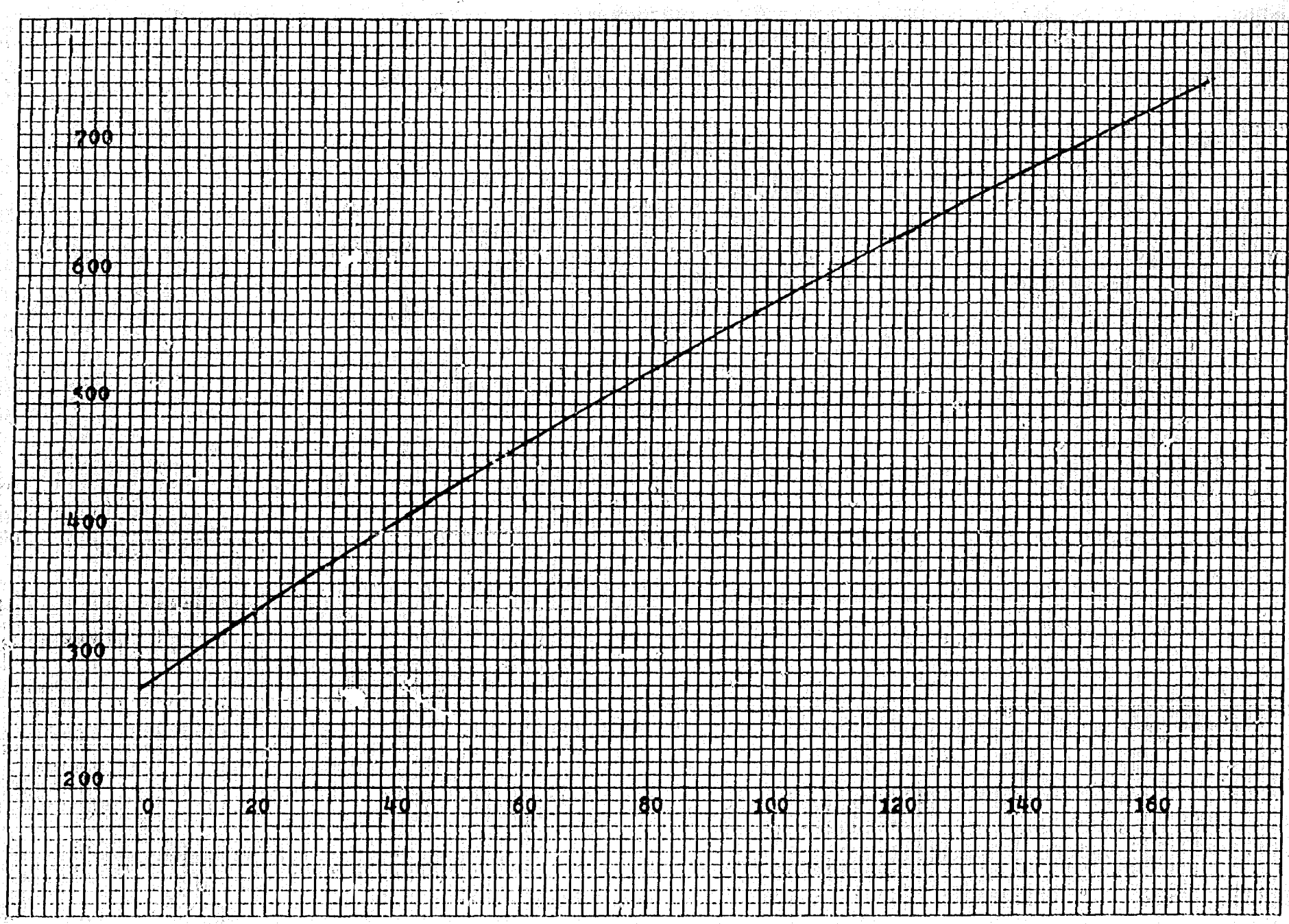


EXHIBIT NO. 20

Permeability Information

Northeast Blanco Unit Well No. 208

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 20
CASE NO. 7086
Submitted by Stadlwood
Hearing Date June 3, 1981

NEW MEXICO OIL CONSERVATION COMMSSION

MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Form C-122
Revised 9-1-65

Type Test: ☐ Initial ☐ Annual ☒ Special				Test Date: 4-23-81	
Company: Blackwood & Nichols Co., Ltd.		Connection: Natural Formation Test			
Pool: So. Los Pinos-Fruitland PC		Formation: Pictured Cliffs			Unit
Completion Date	Total Depth: 3675'		Plug Back TD: 3642'	Elevation: 6541' GL	Farm or Lease Name: Northeast Blanco Unit
Csg. Size: 4.50 / Wt.: 10.50 / d: 4.052 / Set At: 3674			Perforations: From 3477 To 3561 ? TD ?		Well No.: 208
Tbg. Size: 2.375 / Wt.: 4.7 / d: 1.995 / Set At: 3566			Perforations: From --- To 3566		Unit: N / Sec.: 12 / Twp.: 31N / Rge.: 7W
Type Well – Single – Bradenhead – G.G. or G.O. Multiple: Single			Packer Set At: ----		County: San Juan
Producing Thru: tubing	Reservoir Temp. °F	Mean Annual Temp. °F	Baro. Press. – P_a		State: New Mexico
L	H	Gg: 0.640	% CO_2	% N_2	% H_2S / Prover / Meter Run / Taps

NO.	Prover Line Size	X	Orifice Size	Press. p.s.i.g.	Diff. h_w	Temp. °F	TUBING DATA Press. p.s.i.g.	TUBING DATA Temp. °F	CASING DATA Press. p.s.i.g.	CASING DATA Temp. °F	Duration of Flow
SI							272		486		7 days
1.	2"		1/16	15		63			227		24 hrs.
2.											
3.											
4.											
5.											

RATE OF FLOW CALCULATIONS

NO.	Coefficient (24 Hour)	$\sqrt{h_w P_m}$	Pressure P_m	Flow Temp. Factor F_t	Gravity Factor F_g	Super Compress. Factor, F_{pv}	Rate of Flow Q, Mcfd
1	0.0846		27	0.9971	0.9682	1.003	2.026
2.							
3.							
4.							
5.							

NO.	P_t	Temp. °R	T_r	Z
1.				
2.				
3.				
4.				
5.				

Gas Liquid Hydrocarbon Ratio _____ Mcf/bbl.
A.P.I. Gravity of Liquid Hydrocarbons _____ Deg.
Specific Gravity Separator Gas _____ XXXXXXXXXX
Specific Gravity Flowing Fluid XXXXX _____
Critical Pressure _____ P.S.I.A. _____ P.S.I.A.
Critical Temperature _____ R _____ R

P_c 498 P_c^2 248004

NO	P_t^2	P_w	P_w^2	$P_c^2 - P_w^2$
1		239	57121	190883
2				
3				
4				
5				

(1) $\frac{P_c^2}{P_c^2 - P_w^2} = \frac{248004}{190883}$ (2) $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1.2992$

$AOF = Q\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1.2492 \times 2 = 2.498$

Absolute Open Flow 2 Mcfd @ 15.025 | Angle of Slope θ _____ | Slope, n .85

Remarks: B & R Wireline Co. ran wireline tools after the 24 hour flow and found the top of the liquids @ 2950' 4-23-81. Start 7 day build up test 4-23-81 – 4-30-81.

Approved By Commission:	Conducted By:	Calculated By:	Checked By:
	C. R. Wagner	C. R. Wagner	DeLasso Loos

FIELD DATA SHEET (Not Required To File)

Type Test: ☐ Initial ☐ Annual ☒ Special — Test Date: 4-22-81

Company: Blackwood & Nichols Co., Ltd. — Connection:

Field: So. Los Pinos-F-PC — Reservoir: Pictured Cliffs — Location: N-12-31N-7W

Completion Date: — Total Depth: 3675' — Plug Back TD: 3642' — Elevation:

Csg. Size: 4.5 — Wt.: 10.5 — d: 4.052 — Set At: 3674' — Perforations: From: 3477' — To: 3520'

Tbg. Size: 2.375 — Wt.: 4.7 — d: 1.995 — Set At: 3566' — Perforations: From: ---- — To: 3566'

Type Completion (Describe): Natural Tight Formation Test — Packer Set At: ---

Producing Thru: tubing — Reservoir Temp. F: — Mean Annual Temp. F: — Baro. Press. – P_a:

L: — H: — G_g: .640 — % CO_2: — % N_2: — % H_2S: — Prover: 2" — Meter Run: — Taps:

Lease No. or Serial No.:

Allottee:

Unit:

Farm or Lease Name: Northeast Blanco Unit

Well No.: 208

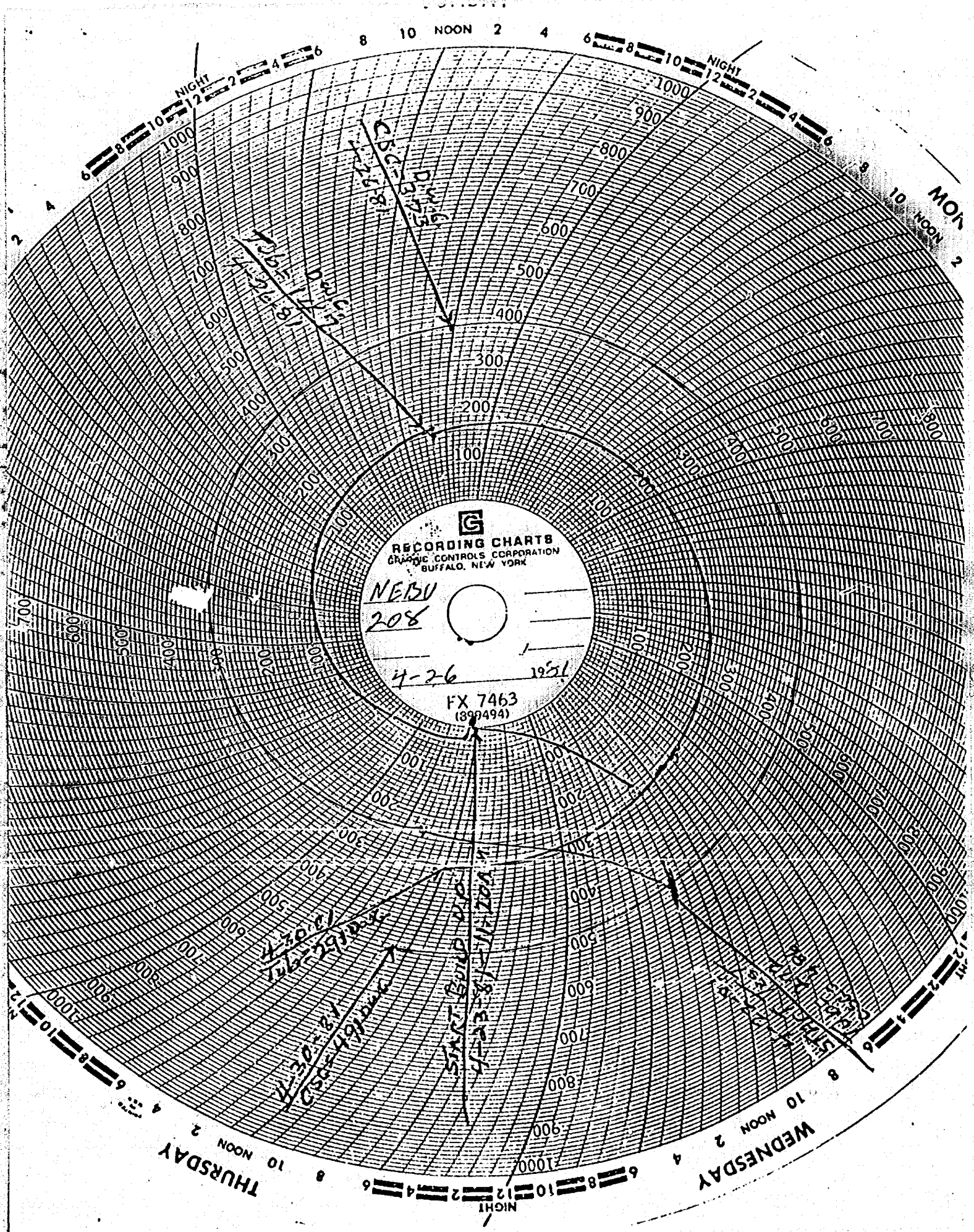
Sec.: 12 — Twp.-Blk.: 31N — Rge.-Sur.: 7W

County or Parish: San Juan

State: New Mexico

DATE Time of Reading	ELAP. TIME Hrs.	Wellhead ~~Xmas~~ Pressure Tbg. Psig.	Csg. Psig.	Temp. F	~~MXXXXXXX~~ PROVER 2" Pressure Psig.	Diff.	Temp. F	Orifice	REMARKS (Include liquid production data: Type–A.P.I. Gravity–Amount)
4-22-81		272	486						
									Shut-in Pressure
	0:15	261	471	62					10:40 AM Start Test
	0:30	249	462	63				1/16	Coeff. = 0.0846
	0:45	242	452	63					
	1:00	233	443	64					
	1:15	224	435	64					
	1:30	214	425	64					
	1:45	207	418	64					
	2:00	198	411	64					
	2:15	192	403	65					
	2:30	184	398	65					
	2:45	178	389	65					
	3:00	171	383	65					
	3:30	161	372	65					
	4:00	148	357	65					
4-23-81									
8:40AM	22	15	230	63					
9:40	23	15	228	63					
10:40	24	15	227	63	Shut well in				B & R Service Company
									Ran wireline tools.
4-23-81									Found water level @ 2950'
11:15AM		Start Build Up Test							527' water fill up
4-26-81		147	373						
4-30-81		295	491						

Page ____ of ____ Data By C. R. Wagner


NOON
NIGHT
RECORDING CHARTS
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
NEBU
208
4-26
1951
FX 7463
(899494)
THURSDAY
WEDNESDAY

NEBU #208

Hours	$\frac{T + \Delta T}{\Delta T}$	Pressure
2	13.000	239
4	7.000	242
6	5.000	247
8	4.000	250
10	3.400	255
12	3.000	260
14	2.714	265
16	2.500	270
18	2.333	273
20	2.200	278
22	2.091	281
24	2.000	284
26	1.923	289
28	2.292	292
30	1.750	301
32	1.750	307
34	1.706	311
36	1.667	315
42	1.571	327
48	1.500	338
54	1.444	349
60	1.400	360
66	1.364	370
72	1.333	373
84	1.286	393
96	1.250	410
108	1.222	428
120	1.200	440
132	1.182	459
144	1.167	472
156	1.154	488
164	1.146	491

NEBU #208

Pi = Initial Shut-in Pressure (Theoretical Reservoir Pressure)

m = PSI/Cycle

μmu = cp

Q = mcfd

h = ft.

K = md (Gas) Permeability

Pi = 524 PSIG

m = 28.4

μmu = 0.013

Q = 2 mcfd

h = 43 ft.

$$K = \frac{(162.6)\ (Q)\ (\mu mu)}{(m)\ (h)}$$

$$K = \frac{(162.6)\ (2)\ (0.013)}{(28.4)\ (43)}$$

K = 0.003 md

NE34 * 208

K = 0.003

P = 524 PSIG

700

00

500

00

00

100

10

1

T + Δt

Δt

329-91 KEUFFEL & ESSER CO.
Semi-Logarithmic, 5 Cycles X 10 to the Inch,
6th lines accented.
MADE IN U.S.A.

B & R SERVICE, INC.

P. O. Box 1048
Farmington, New Mexico 87401
(505) 325-2393

Company BLACKWOOD NICHOLS | Lease NEBU | Well 208

County SAN JUAN | State NEW MEXICO | Date 4-14-21-81

Shut-In 2:00 P.M. 4-14-81 | Zero Point K.B. | Tbg. Pressure

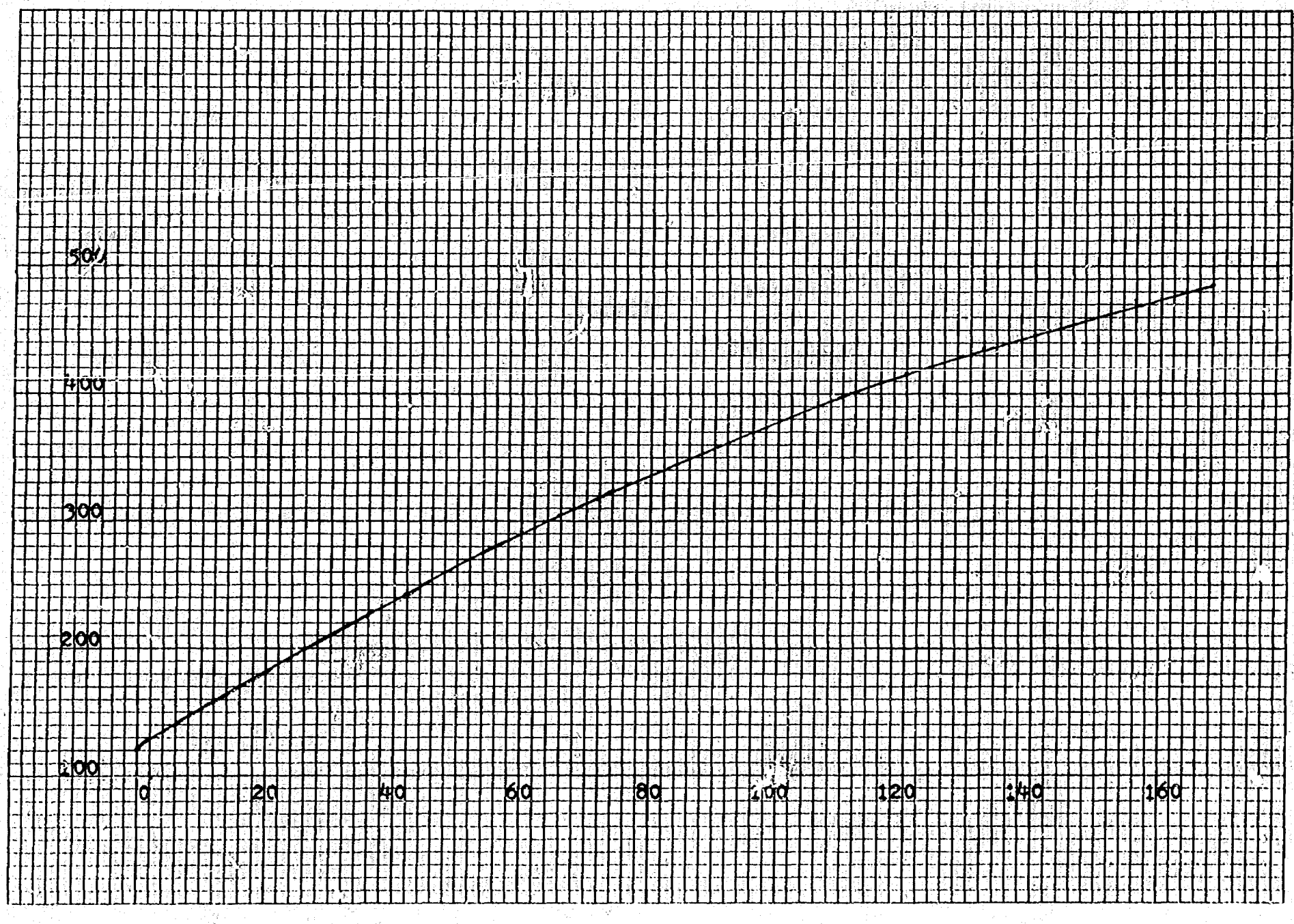
Casing Pressure | Tbg. Depth Bomb @ 3530' | Casing Perf.

Max. Temp. | Fluid Level

TIME	PSIG
0 Hrs.	122
6 "	139
12 "	158
18 "	176
24 "	192
30 "	210
36 "	224
42 "	243
48 "	260
54 "	275
60 "	291
66 "	305
72 "	319
84 "	345
96 "	370
108 "	393
120 "	419
132 "	438
144 "	451
156 "	469
168 "	486

K·E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703



BLUEJET INC. LOGGING

MULTISPACE NEUTRON

FILING NO.

Formation Tops & perforations

COMPANY BLACKWOOD & NICHOLS COMPANY

WELL N.E.B.U. # 206

FIELD PICTURED CLIFFS

COUNTY SAN JUAN STATE NEW MEXICO

LOCATION:
SEC. 12 TWP. 31n RGE. 7w

OTHER SERVICES:
G.R.N.
C.B.L.
T.E.R.F.

PERMANENT DATUM: GROUND LEVEL ELEV. 6541
LOG MEASURED FROM R.K.B. 13 FT. ABOVE PERM. DATUM
DRILLING MEASURED FROM R.K.B.

ELEV.: K.B. 6554
D.F. 6553
G.L. 6541

DATE	4-10-81		
RUN NO.	TWO		
TYPE LOG	MULTISPACE NEUTRON		
DEPTH—DRILLER	3651		
DEPTH—LOGGER	3654		
BOTTOM LOGGED INTERVAL	3653		
TOP LOGGED INTERVAL	2800		
TYPE FLUID IN HOLE	WATER		
SALINITY, PPM CL.			
DENSITY			
LEVEL	FULL		
MAX. REC. TEMP., DEG F.			
OPERATING RIG TIME	1 HOUR		
RECORDED BY	ATTENCIO-LOVE		
WITNESSED BY	MR. LOOS		

RUN NO.	BORE-HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
				4 1/2		SURFACE	P.B.T.D.

FORM 329—1

THIS HEADING AND LOG CONFORMS TO API RP 33

FOLD HERE

BLUEJET INC. LOGGING

MULTISPACE NEUTRON

FILING NO.

Formation Tops & Perforations

COMPANY BLACKWOOD & NICHOLS COMPANY

WELL N.E.B.U. # 206

FIELD PICTURED CLIFFS

COUNTY SAN JUAN STATE NEW MEXICO

LOCATION:
SEC. 12 TWP. 31n RGE. 7w

OTHER SERVICES:
G.R.N.
C.B.L.
PERF.

PERMANENT DATUM: GROUND LEVEL ELEV. 6541
LOG MEASURED FROM R.K.B. 13 FT. ABOVE PERM. DATUM
DRILLING MEASURED FROM R.K.B.

ELEV.: K.B. 6554
D.F. 6553
G.L. 6541

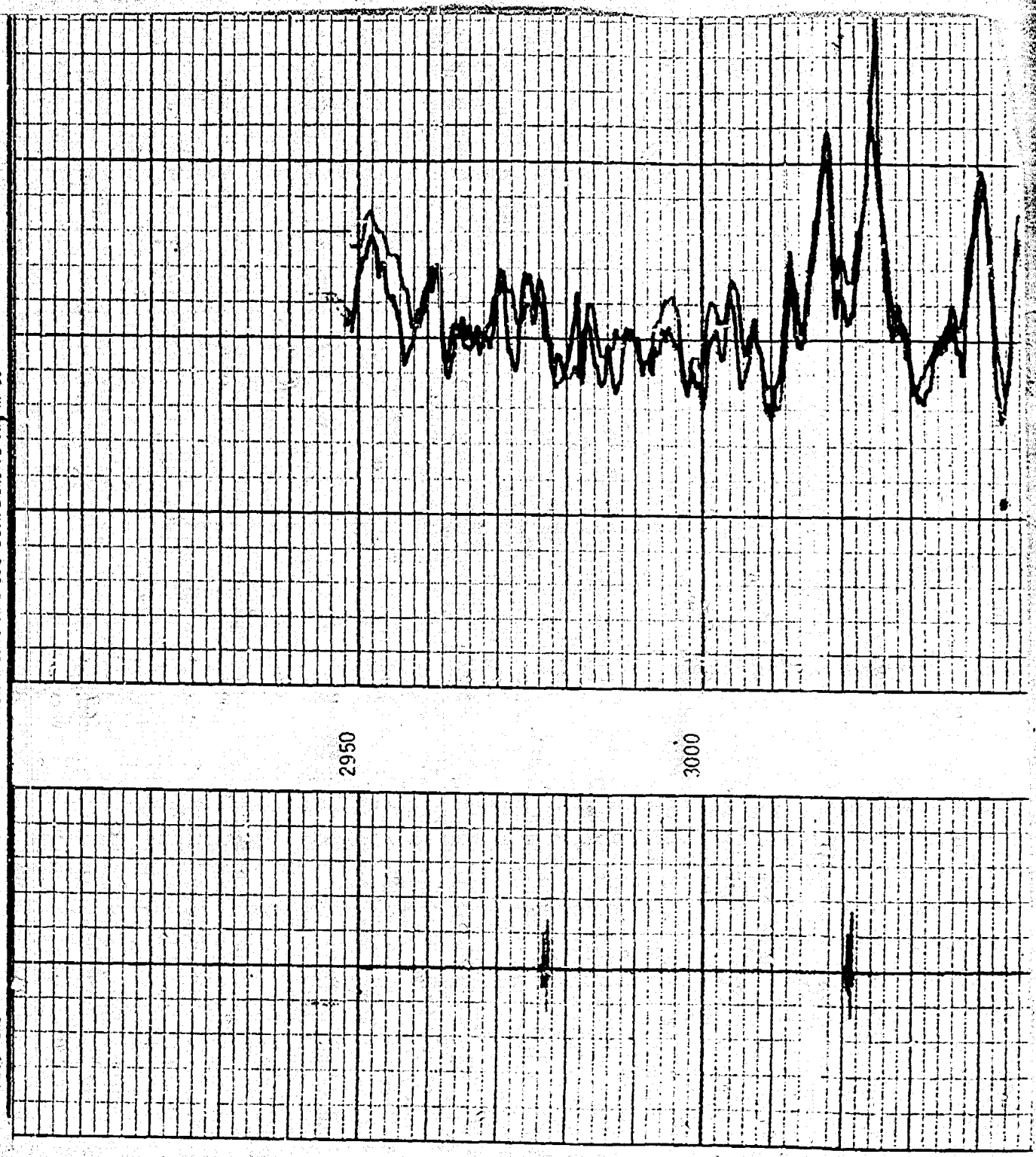
DATE	4-10-81
RUN NO.	TWO
TYPE LOG	MULTISPACE NEUTRON
DEPTH—DRILLER	3651
DEPTH—LOGGER	3654
BOTTOM LOGGED INTERVAL	3653
TOP LOGGED INTERVAL	2300
TYPE FLUID IN HOLE	WATER
SALINITY, PPM CL.	
DENSITY	
LEVEL	FULL
MAX. REC. TEMP., DEG F.	
OPERATING RIG TIME	1 HOUR
RECORDED BY	ATTENCIO-LOVE
WITNESSED BY	MR. LOOS

RUN NO.	BORE-HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
				4 1/2		SURFACE	P.B.T.D.

FORM 329—1

THIS HEADING AND LOG CONFORMS TO API RP 33

FOLD HERE



3466' Top Pictured Cliffs

3477 4 holes

3489 4 holes

3500

3509 4 holes

3521 4 holes

3547 4 holes Cement

3561 4 holes

3570 4 holes

3600

3614' Top Lewis

3644
R.D.

GAS & WATER

WATER

GAS

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

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

CASE NO. 7086
Order No. R-6746

APPLICATION OF BLACKWOOD &
NICHOLS CO., LTD. FOR DESIG-
NATION OF A TIGHT FORMATION,
SAN JUAN AND RIO ARRIBA
COUNTIES, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on June 3, 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 7th day of August, 1981, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Blackwood & Nichols Co., Ltd., requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 C.F.R. §271.703 recommend to the Federal Energy Regulatory Commission that the Pictured Cliffs formation underlying the following lands situated in San Juan and Rio Arriba Counties, New Mexico, hereinafter referred to as the Pictured Cliffs formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

TOWNSHIP 30 NORTH, RANGE 7 WEST, NMPM
Sections 2 through 21: All
Section 22: W/2 W/2
Section 29: N/2

TOWNSHIP 30 NORTH, RANGE 8 WEST, NMPM
Section 1: All
Section 12: All
Section 13: All
Section 24: All

TOWNSHIP 31 NORTH, RANGE 6 WEST, NMPM
Section 6: Lots 8, 9, 10, 11, and S/2
Section 7: All
Sections 18 through 20: All
Section 30: All

TOWNSHIP 31 NORTH, RANGE 7 WEST, NMPM
Section 1: Lots 5, 6, 7, 8, and S/2
Sections 9 through 16: All
Sections 19 through 36: All

TOWNSHIP 31 NORTH, RANGE 8 WEST, NMPM
Section 25: All
Section 36: All

(3) That the applicant did not present evidence relative to the following described acreage and it should be excluded from consideration for tight formation recommendation:

TOWNSHIP 30 NORTH, RANGE 7 WEST, NMPM
Sections 11 through 15: All
Section 16: E/2
Section 22: W/2 W/2

TOWNSHIP 31 NORTH, RANGE 7 WEST, NMPM
Section 9: N/2
Section 10: N/2

(4) That the Pictured Cliffs formation underlies the above described lands; that the formation consists of shales, coal seams and sandstone lenses, about 150 feet thick, composed of fine to medium grained, well sorted, angular to subrounded sand, composed mainly of quartz with some ferromagnesium minerals and glauconite cemented with calcite and bentonite; that the top of such formation is found at an average depth of 3200 feet below the surface of the area set out in Finding No. (2) above; and that the thickness of such formation is from 150 to 250 feet within said area.

(5) That the type section for the Pictured Cliffs formation for the proposed tight formation designation is found at a depth

of from approximately 3230 feet to 3360 feet on the Laserlog dated July 30, 1978 from the Northeast Blanco Unit Well No. 17-A located in Unit D of Section 9, Township 30 North, Range 10 West, San Juan and Rio Arriba Counties, New Mexico.

(6) That the following described wells produce natural gas from the Pictured Cliffs formation within the proposed area:

Northeast Blanco Unit Well #202	NE/4, Section 11, T-31-N, R-7-W, San Juan County, New Mexico
Northeast Blanco Unit Well #204	SW/4, Section 1, T-31-N, R-7-W, San Juan County, New Mexico

(7) That the Pictured Cliffs formation underlying the above described lands has been penetrated by several other wells, none of which produce natural gas in commercial quantites from the Pictured Cliffs formation.

(8) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Pictured Cliffs formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the following parameters:

(a) average in situ gas permeability throughout the pay section of 0.1 millidarcy; and

(b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 C.F.R. §271.703(c)(2)(i)(B) of the regulations; and

(c) production of more than five barrels of crude oil per day.

(9) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:

(a) The estimated average in situ gas permeability throughout the pay section of the Pictured Cliffs formation is expected to be 0.1 millidarcy or less; and

(b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Pictured Cliffs formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and

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

(10) That within the proposed area there is a recognized aquifer being the Ojo Alamo, found at depths of from 500 feet to 1100 feet or approximately 1500 to 2100 feet above the Pictured Cliffs formation.

(11) That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Pictured Cliffs formation will not adversely affect said aquifers.

(12) That the Pictured Cliffs formation within the proposed area should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

IT IS THEREFORE ORDERED:

(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Policy Act of 1978, and 18 C.F.R. §271.703 of the regulations that the Pictured Cliffs formation underlying the following described lands in San Juan and Rio Arriba Counties, New Mexico, be designated as a tight formation:

TOWNSHIP 30 NORTH, RANGE 7 WEST, NMPM
Sections 2 through 10: All
Section 16: W/2
Sections 17 through 21: All
Section 29: N/2

TOWNSHIP 30 NORTH, RANGE 8 WEST, NMPM
Section 1: All
Sections 12 and 13: All
Section 24: All

TOWNSHIP 31 NORTH, RANGE 6 WEST, NMPM
Section 6: Lots 8, 9, 10, 11, and S/2
Section 7: All
Sections 18 through 20: All
Section 30: All

TOWNSHIP 31 NORTH, RANGE 7 WEST, NMPM
Section 1: Lots 5, 6, 7, 8, and S/2
Section 9: S/2
Section 10: S/2
Sections 11 through 16: All
Sections 19 through 36: All

TOWNSHIP 31 NORTH, RANGE 8 WEST, NMPM
Section 25: All
Section 36: All

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

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

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY
Director

SEAL

fd/

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
3 June 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: William F. Carr, Esq.
CAMPBELL, BYRD, & BLACK P.A.
Jefferson Place
Santa Fe, New Mexico 87501

I N D E X

CHARLES BLACKWOOD

Direct Examination by Mr. Carr 4

Cross Examination by Mr. Stamets 20

E X H I B I T S

Applicant Exhibit One, (Revised) Map 7

Applicant Exhibit Eighteen, DST 8

Applicant Exhibit Nineteen, Tests, etc. 8

Applicant Exhibit Twenty, Tests, etc. 12

Applicant Exhibit Twenty-one, Cross Section 15

Applicant Exhibit Twenty-two, Cross Section 16

Applicant Exhibit Twenty-three, Cross Section 17

Applicant Exhibit Twenty-four, Isopach 17

Applicant Exhibit Twenty-five, Structure Map 18

Applicant Exhibit B, Summary 18

MR. STAMETS: The hearing will please come to order.

We'll call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. CARR: May it please the Examiner, my name is William F. Carr, with the law firm Campbell, Byrd, and Black, P. A., Santa Fe, appearing on behalf of the applicant.

We have one witness who needs to be sworn.

MR. STAMETS: I believe this is a continuation of the case. The witness was previously sworn and he still is.

MR. CARR: Would the record also reflect that he has been previously qualified as a geological engineer and remains so qualified to testify in this matter?

MR. STAMETS: Yes, it will.

MR. CARR: Mr. Charles Blackwood.

CHARLES BLACKWOOD

being called as a witness and being previously sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. CARR:

Q. Mr. Blackwood, for the purpose of bringing this hearing today, I think it would be useful to the Examiner for you to state your name and your title with Blackwood and Nichols, and then briefly to summarize materials covered in the prior hearing.

A. My name is Charles Blackwood. I am a general partner, and the managing general partner of Blackwood and Nichols.

We, at the previous hearing, submitted evidence which is already a part of the record. Basically, we told the area that we were interested in having designated a tight reservoir in the Pictured Cliffs zone, and that is approximately 33,500-acre area composing the Northeast Blanco Unit.

We entered evidence that showed that from 1951 until 1977 we had drilled over 100 wells in the area and completed none of them in the Pictured Cliffs formation because we considered it noncommercial and too tight.

We also gave evidence showing that we comply with all Federal and State regulations concerning drilling, casing and cementing programs in order to protect fresh water sands.

And we testified to the average depth of the top of the Pictured Cliffs formation. We made a statement and testified to evidence that all wells that have been completed in the Pictured Cliffs in that area of our unit and adjacent to the northern edge of the unit produce less than 90 Mcf per day, nonstimulated, to the atmosphere, which is important in that it relates to the depth versus rate table that the government requires to have this tight reservoir designated.

We also gave evidence saying that none of the wells produce as much as 5 barrels of oil per day.

We also stated that the Pictured Cliffs formation does not have an infill drilling order applicable.

The hearing was continued from November 12th, 1980, because we did not have adequate permeability data available at the time in order to satisfy the permeability requirements. We were asked at that hearing to produce either additional permeability data or reserves and economic data, and inasmuch as these were very new wells, we thought that the reserve criteria would be extremely difficult for

several years because of the new -- new wells and the tight character of the reservoir.

So during the period after November 12th to this period, we have drilled additional wells through the Pictured Cliffs zone and we have collected additional permeability data, which shows that the permeability is indeed extremely low and meets the criteria required.

That's basically what we intend to put on today, is our new permeability data.

MR. CARR: And, Mr. Stamets, we do not, as Mr. Blackwood has just indicated, intend to go through again the data presented November the 12th, but if you have any questions concerning that or desire any portion of it be represented, we certainly can do that.

MR. STAMETS: Okay, let's just proceed as you had planned.

MR. CARR: I think at this time it's important to note that at that hearing Blackwood and Nichols had admitted into the record their Exhibits One through Seventeen, and also Exhibit A, which is a summary of the -- of their geological and engineering presentation.

Today what we will do is present a supplement to that written engineering and geological report, which will be our Exhibit B. We will present a revised

Exhibit One, which was the plat, that has some additional data on it. We will not deal with Exhibits One through Seventeen, which we previously submitted, but will start and present Exhibits Eighteen through Twenty-five, which relate to the permeability data collected since the previous hearing.

Q. Mr. Blackwood, have you prepared additional exhibits for introduction at this hearing?

A. Yes, I have.

Q. Were these exhibits previously submitted to the Oil Conservation Division and to the United States Geological Survey, as required by Oil Conservation Division rule?

A. Yes, they were.

Q. Will you please refer to what has been marked for identification as Blackwood and Nichols Company Exhibit Number One and review for Mr. Stamets what this is and what it shows?

A. Exhibit Number One is a map which shows the outline of the Northeast Blanco Unit. That is the area that we are requesting the tight reservoir designation for.

Also, in pink we have designated all of the wells within the unit and adjacent to the northern edge of the unit which produce gas from the Pictured Cliffs formation.

The trace of three cross sections is also shown on this exhibit, A-A' is basically an east/west cross section; B-B' is basically a north/south cross section; and C-C' is another east/west cross section.

In addition to that, in yellow we have marked the location of the new wells drilled since November, in which we have collected permeability data.

Q. Mr. Blackwood, will you now refer to what has been marked for identification as Exhibit Number Eighteen, and explain to Mr. Stamets what that is and what it shows?

A. Exhibit Number Eighteen is a drill stem test taken of the Northeast Blanco Unit Well No. 13-A. That is located at the southern part of the unit and shown on the map.

This was our first attempt to collect adequate permeability data and unfortunately, the time period was too short in order to yield accurate permeability data. We -- we do have pressure and we do have some minute flow rates, but the basic overall interpretation of this test is that two hours is just not adequate time to test a formation with such low permeability.

Q. Will you now refer to Exhibit Number Nineteen and review this for Mr. Stamets?

A. Exhibit Number Nineteen consists of several pressure tests and flow tests and permeability calculations, a log of the well, and several charts showing the actual results obtained during the flow testing and shut-in testing.

The -- it might be best just to review how this was obtained.

When this new well was drilled, Well 206, the casing was run and cemented. Then tubing was run into the hole and the well was swabbed dry, or almost dry. Then we perforated an interval from 3518 to 3549 feet, basically a 31-foot interval. Then tubing was rerun into the hole and landed, and the well was shut-in for a 7-day pressure build-up test. That occurred from April 7th through April 14th, 1981.

In 7 days the pressure built to 755 psig and was still building.

Then the well was shut-in for about 2-1/2 days until April 24th, at which time we employed B & R Wireline Services to run a 3-hour flow test and determine the rate of flow on the well.

After this flow test they calculated a rate of approximately 30 Mcf per day.

The well was then shut-in again for an

additional 3-day pressure build-up, and the pressure built up to only 306 pounds on the tubing and 421 pounds on the casing.

The pressure build-up data was plotted and calculations were made to determine the permeability of this Pictured Cliffs formation in the 206 Well, and the permeability was found to be 0.016 millidarcy per foot, which is considerably lower than the 0.1 millidarcy per foot standard for a tight reservoir.

Q. I think that's just -- Copies of all the tests and the calculations to establish the permeability are attached and included with this exhibit, is that correct?

A. Yes, that's right.

Q. Will you now refer to Exhibit Number Twenty and --

MR. STAMETS: Let me ask one question while we're at this point.

I believe you indicated a shut-in pressure of 700 pounds?

A. Yes. The initial test taken prior to any flow of the well, the well built to 755 pounds in 7 days.

MR. STAMETS: Is that a bottom hole pressure?

A. Yes.

MR. STAMETS: And then the 426 pounds shown on Form C-122, does that represent a surface pressure or a shut-in pressure after some sort of a flow?

A. Just a moment. I believe this is a top hole pressure.

MR. STAMETS: Okay, then that would --

A. The --

MR. STAMETS: -- correspond with your 378 feet of water -- I presume that is the cause for the rather large pressure differential between surface and bottom hole pressure?

A. Well, 378 feet of water might account for some 200 pounds of pressure difference.

MR. STAMETS: Okay.

A. Less than -- less than 200 pounds.

MR. STAMETS: Would the gradient of the gas account for the other 100 pounds?

A. I don't think so. I think that the -- th- length of time, if you look at the 7-day pressure build-up, from the -- there was a bomb in the hole during the 7-day pressure build-up, and if we take a 72-hour pressure, which would be approximately equivalent to 3 days, we have -- we had -- the well had only built to 506 pounds during that period,

so I believe that it's basically a time problem. Had the well been shut-in loger, it would have built to higher pressures.

MR. STAMETS And did you get any kind of a flow rate when the well was opened after being shut-in for a 700-pound build-up?

A. It -- we did open it, and it flowed at such low rates that we were unable to measure it. And it, it essentially died because we didn't have a tiny enough choke on it then, and that's why we had to start the process all over again.

Had we been successful in having a larger flow rate at that time, we wouldn't have had to rerun all the tests, but we had to come back with a 1/16th inch choke and run the tests again because we were not able to establish a flow rate on a larger choke.

MR. STAMETS: Okay.

Q. Mr. Blackwood, will you now review Exhibit Number Twenty for Mr. Stamets?

A. Again, Exhibit Number Twenty is the same type of pressure build-up and flow test information which was run on the Northeast Blanco Well No. 208.

Again, to briefly review the procedure, the well was drilled, casing cemented, tubing was run into the hole and the water blown out by the use of nitrogen.

Then the tubing was pulled out of the hole and an interval was perforated from 3477 feet to 3570, a 93-foot interval.

Then the well was shut-in for a 7-day pressure build-up and this well built to only 486 pounds during the 7 days.

MR. STAMETS: What was the perforated inteval, please?

A. 3477 was the top perforation and 3570 were the bottom perforations.

MR. STAMETS: Okay, the 122 showed 3561 for the bottom perfs.

A. Well, my log, let's see, there is an "X" here on my log just above 3570 that might be 3567.

MR. STAMETS: And the field data sheet says 3520 for the bottom perforations.

A. Well, I have a marked log which was sent to me from our field office in which the -- apparently the bottommost perforation was at 3567. I definitely show two sets of perforations below the 3561.

MR. STAMETS: Uh-huh, right. Well, that's a small matter.

A. Okay. Anyway, after the well was perforated, it was shut-in for a 7-day pressure build-up, and

that test is included, and it built to 468 psig during the 7 days.

The well was then opened on a 1/16th inch orifice and flowed for 24 hours and the flow rate chart is included.

The rate of flow was calculated to be 2.026 Mcf per day, and after the flow test the well was shut-in for an additional 7 days. During that 7-day flow test the well built up to, I think that shows 411 pounds per square inch.

No, it's -- pardon me, it's -- instead of 411, it's 491.

From this, a plot was made of this pressure build-up data and the calculations were made to determine permeability, and the permeability was calculated to be 0.003 millidarcy per foot in this interval.

Q. Mr. Blackwood, is this data on permeability what you would anticipate for Pictured Cliffs wells drilled throughout the subject area?

A. Of course there is some variance between the permeability between these two wells, but our experience would indicate that it's certainly going to be in this order and very likely to be less than the 0.1 of a millidarcy per foot throughout the entire area.

Q. And would Pictured Cliffs wells in this area be produced without stimulation?

A. No. Well, you can see the rates here, 2 Mcf per day and 30 Mcf per day, and the 30 was actually, that probably would be 10 three days later.

Q. Would you now refer to your Exhibit Number Twenty-one and explain to Mr. Stamets what this is and what it shows?

A. Exhibit Twenty-one is a cross section across from the west to the east, across the northern part of the unit.

Basically, it shows that we have the top and bottom of the Pictured Cliffs zone and the thickness, and gives logs from which these picks were taken.

It shows that there is sandstone present and shale and that there are -- hydrocarbons are present throughout each of the intervals shown on the Pictured Cliffs.

MR. STAMETS: Excuse me. Now, there's a horizontal line on there and that's the datum on which the logs are all hung.

A. Yes.

MR. STAMETS: Then there are two other lines that vary from log to log. Is the uppermost line the top of the Pictured Cliffs?

A. Yes.

MR. STAMETS: And then the lowermost line is the base?

A. Is the base.

MR. STAMETS: Okay.

Q. Will you now refer to Exhibit Number Twenty-two and review this for Mr. Stamets?

A. Exhibit Number Twenty-two is a north/south cross section across the Notheast Blanco Unit.

Again, it shows the top and bottom of the Pictured Cliffs. It shows the relative thickness between wells. It shows that sandstones and shales are generally present and that hydrocarbon is also present in all of the wells shown on the cross section.

Q. Mr. Blackwood, Blackwood and Nichols was asked at the prior hearing to designate a type log for this area. Does -- is there a log on this cross section which would serve that purpose?

A. Actually, almost any log would serve that purpose. I would think that in the interest of using the more common logs that we've run in the area, probably log 17-A would be a good type section log. It is at the intersection of our B-B' cross section and the C-C' cross section.

Q. Will you now refer to Exhibit Twenty-three and review this for the Examiner?

A. Exhibit Twenty-three is another cross secltion, this one running from west to east along the southern portion of the unit.

Again it shows the top and bottom of the Pictured Cliffs and it shows that there is sandstone present along with shales, and that hydrocarbon is also present within the Pictured Cliffs within each of these wells shown on the cross section.

Q. What general conclusions can you reach concerning the Pictured Cliffs formation from these cross sections?

A. Well, that the entire area of the unit is underlain by the Pictured Cliffs formation; that it has a generally common character of -- of fairly thick sandstones interbedded with shales; that hydrocarbon is present throughout the entire area.

Q. Will you now review Exhibit Twenty-four for the Examiner?

A. Exhibit Twenty-four is an Isopachous map which shows the gross interval of Pictured Cliffs formation throughout the area of the Northeast Blanco Unit.

It basically shows that the formation

is from 150 feet thick to a maximum of approximately 250 feet thick in this area; that there are two lobes of thicker sands over 200 feet thick shown, and nowhere is the sand less than 150 feet thick in the -- well, pardon me -- almost nowhere is the sand less than 150 thick. There is a very small area of 130 to 140 foot thickness in the southeast portion of the unit.

Q. Will you now review Exhibit Twenty-five?

A. Exhibit Twenty-five is a structure map drawn on the top of the Pictured Cliffs formation in the area of the Northeast Blanco Unit.

The numbers shown on the contours are feet above sea level and basically this area is between 3100 feet above sea level and 3250 feet above sea level.

In the northern part of the unit there is a higher area running approximately east/west, elongated in an east/west direction, where the topmost point measured is 3266 feet above sea level.

Q. Mr. Blackwood, I'd now direct your attention to what has been marked as Blackwood and Nichols Exhibit B, which is our supplemental information sheet, and ask you to review this for Mr. Stamets.

A. This supplemental information has to do with the production from the wells from the Pictured Cliffs zone in the area of the unit and directly adjacent to the

northern edge.

At the first hearing in November, we presented information which showed that none of the wells exceeded the 90 Mcf per day flow rate prior to stimulation to the atmosphere. That is one of the guidelines for the order. This simply brings up to date the current production on all of the wells in the area and to summarize the entire exhibit, the average calculated non-stimulated production rate of the seven producing wells from the Pictured Cliffs in this area, as of March, 1981, is 27 Mcf per well per day.

This is somewhat reduced from the average calculated non-stimulated production rate of these same seven wells as they were producing back in July of 1980. In July of 1980 their average rate was 35 Mcf per day. Now the rate has declined to 27 Mcf per day.

Q. Mr. Blackwood, were Exhibits One, as revised, Eighteen through Twenty-five, and Exhibit B, prepared by you or under your direction and supervision?

A. Yes, they were.

MR. CARR: At this time, Mr. Stamets, we would offer Blackwood and Nichols Exhibits 1-R, Twenty-eight through Twenty-five, and B, into evidence.

MR. STAMETS: These additional exhibits are admitted.

MR. CARR: We have nothing further on direct.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Blackwood, referring back now to Exhibit Number Eighteen, which is the drill stem test of the No. 13-A, did that well recover any free gas? Or only gas-cut mud?

A. Only gas-cut mud, as far as I have been able to determine from this. There was -- there was a blow at the surface, but the blow never became pure gas. There was a, you know, slight air blow.

Q. So on that basis it would be fair to say that this well would not be capable of producing more than 90 Mcf per day of unstimulated production?

A. Yes, sir.

Q. Actually, it would be substantially less than that.

A. Yes, it was -- it was such a small rate, it was -- well, actually, I asked Halliburton to make some permeability calculations from this test, and we calculated the theoretical amount of gas we would have had in that small amount of gas-cut mud, and the permeability number was

considerably less than either of the two given in Exhibit Nineteen or Exhibit Twenty.

Q. Now on Exhibit Nineteen you have a flow rate of 17 Mcf and that's a 1. flow rate and that's through a -- what sort of a testing device do you have on that well?

A. It was an orifice, a 1/16th of an inch orifice well tester.

Q. Okay. Then you have calculated the absolute open flow at 30 Mcf a day, and what's the factor that goes into that final calculation?

A. Well, all sorts of -- there are pressures at the surface and pressures at the bottom of the hole. There are -- there are corrections for the friction, you know, in the -- in the pipe, and that when you -- when you take these squared functions at the bottom, you calculate for the absolute flow at zero pressure at the bottom of the hole.

Q. What slope "N" did you use in that calculation?

A. I didn't make the calculation personally. They were made by Mr. Wagner of the B & R Wireline, and I would have to go back and do some work to tell you what that slope "N" was.

Q. I presume the slope "N", as shown there down to the right below that point, it says 0.85.

A. I -- I -- yes, there it is.

Q. Is that the slope which is commonly used for Pictured Cliffs wells in the northwestern part of the state?

A. I really couldn't say. This is our first experience with -- with trying to test the Pictured Cliffs wells.

MR. STAMETS: Let's go off the record for a minute.

(There followed a discussion off the record.)

MR. STAMETS: Okay, let's go back on the record now, Sally.

I am advised that that slope of 0.85 is the standard slope used in this area for calculations concerning absolute open flow, so that would appear to be standard Oil Conservation Division policy.

Q. It would appear, Mr. Blackwood, that everything that has transpired since the original hearing has confirmed all of the conclusions you made at that time, and -- and perhaps has even -- the evidence indicates that the unstimulated deliverability is going to be much less than

what you theorized at the original hearing.

A. I would say that's correct. We -- the calculation which I made to work backward from stimulated production to non-stimulated production to the atmosphere, was a simplified mathematic calculation which was 10 to 20 percent lenient in the calculation.

In other words, the formula which I used gives results which are 10 to 20 percent higher than those results which would be obtained if a very long drawn-out calculation were made, taking into effect such things as tubing friction and all of the various factors.

The calculations here are conservative in the government's favor, so to speak.

MR. STAMETS: Are there any other questions of the witness? He may be excused.

Anything further in this case?

MR. CARR: Nothing further.

MR. STAMETS: The case will be taken under advisement.

The hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7986, heard by me on 8-3 1981.

Richard L. Stamets, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

RECEIVED
OCT 08 1981
OIL CONSERVATION DIVISION
SANTA FE

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

18 C.F.R. Part 271

High-Cost Gas Produced from Tight Formations; Notice of Proposed Rulemaking

Docket No. RM79-76 (New Mexico-7)

AGENCY : Federal Energy Regulatory Commission

ACTION : Notice of Proposed Rulemaking

SUMMARY : The Federal Energy Regulatory Commission is authorized by section 107(c)(5) of the Natural Gas Policy Act of 1978 to designate certain types of natural gas as high-cost gas where the Commission determines that the gas is produced under conditions which present extraordinary risks or costs. Under section 107(c)(5), the Commission issued a final regulation designating natural gas produced from tight formations as high-cost gas which may receive an incentive price (18 C.F.R. § 271.703). This rule established procedures for jurisdictional agencies to submit to the Commission recommendations of areas for designation as tight formations. This notice of proposed rulemaking by the Director of the Office of Pipeline and Producer Regulation contains the recommendation of the State of New Mexico that the Pictured Cliffs Formation be designated as a tight formation under § 271.703(d).

DATE : Comments on the proposed rule are due on November 2, 1981

Public Hearing : No public hearing is scheduled in this docket as yet. Written requests for a public hearing are due on October 19, 1981.

ADDRESS : Comments and requests for hearing must be filed with the Office of the Secretary, 825 North Capitol Street, N. E., Washington, D. C. 20426.

FOR FURTHER INFORMATION CONTACT :

Leslie Lawner, (202) 357-8307, or Victor Zabel, (202) 357-8616

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

High-Cost Gas Produced from Tight Formations	)))	Docket No. RM79-76 (New Mexico-7)

NOTICE OF PROPOSED RULEMAKING
BY DIRECTOR, OPPR

(Issued October 2, 1981)

I. BACKGROUND

On September 16, 1981, the State of New Mexico Oil Conservation Division (New Mexico) submitted to the Commission a recommendation, in accordance with § 271.703 of the Commission's regulations (45 Fed. Reg. 56034, August 22, 1980), that the Pictured Cliffs Formation located in San Juan and Rio Arriba Counties, New Mexico, be designated as a tight formation. Pursuant to § 271.703(c)(4) of the regulations, this Notice of Proposed Rulemaking is hereby issued to determine whether New Mexico's recommendation that the Pictured Cliffs Formation be designated a tight formation should be adopted. The United States Geological Survey concurs with New Mexico's recommendation. New Mexico's recommendation and supporting data are on file with the Commission and are available for public inspection.

II. DESCRIPTION OF RECOMMENDATION

The recommended formation underlies certain lands in San Juan and Rio Arriba Counties, New Mexico, and is located on the northeast flank of the San Juan Basin of northwest New Mexico. The recommended area contains approximately 33,500 acres within portions of Townships 30 and 31 North, Ranges 7 and 8 West, and Township 31 North, Range 6 West, NMPM.

The recommended formation ranges in thickness from 150 to 250 feet. The average depth to the top of the formation is approximately 3,200 feet.

III. DISCUSSION OF RECOMMENDATION

New Mexico claims in its submission that evidence gathered through information and testimony presented at a public hearing in Case No. 7086 convened by New Mexico on this matter demonstrates that:

(1) The average in situ gas permeability throughout the pay section of the proposed area is not expected to exceed 0.1 millidarcy;

(2) The stabilized production rate, against atmospheric pressure, of wells completed for production from the recommended formation, without stimulation, is not expected to exceed the maximum allowable production rate set out in § 271.703(c)(2)(i)(B); and

(3) No well drilled into the recommended formation is expected to produce more than five (5) barrels of oil per day.

New Mexico further asserts that existing State and Federal Regulations assure that development of this formation will not adversely affect any fresh water aquifers.

Accordingly, pursuant to the authority delegated to the Director of the Office of Pipeline and Producer Regulation by Commission Order No. 97, issued in Docket No. RM80-68 (45 Fed. Reg. 53456, August 12, 1980), notice is hereby given of the proposal submitted by New Mexico that the Pictured Cliffs Formation, as described and delineated in New Mexico's recommendation as filed with the Commission, be designated as a tight formation pursuant to § 271.703.

IV. PUBLIC COMMENT PROCEDURES

Interested persons may comment on this proposed rulemaking by submitting written data, views or arguments to the Office of the Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, N. E., Washington, D.C. 20426, on or before November 2, 1981 . Each person submitting a comment should indicate that the comment is being submitted in Docket No. RM79-76 (New Mexico-7), and should give reasons including supporting data for any recommendations. Comments should include the name, title, mailing address, and telephone number of one person to whom communications concerning the proposal may be addressed. An original and 14 conformed copies should be filed with the Secretary of the Commission. Written comments will be available for public inspection at the Commission's Office of Public Information, Room 1000, 825 North Capitol Street, N. E., Washington, D.C., during business hours.

Any person wishing to present testimony, views, data, or otherwise participate at a public hearing should notify the Commission in writing that they wish to make an oral presentation and therefore request a public hearing. Such request shall specify the amount of time requested at the hearing. Requests should be filed with the Secretary of the Commission no later than October 19, 1931.

(Natural Gas Policy Act of 1978, 15 U.S.C. §§ 3301 - 3342.)

Accordingly, the Commission proposes to amend the regulations in Part 271, Subchapter H, Chapter 1, Title 18, Code of Federal Regulations, as set forth below, in the event New Mexico's recommendation is adopted.

(S E A L)

Kenneth A. Williams
Director, Office of Pipeline
and Producer Regulation

Section 271.703(d) is amended by adding new subparagraph (69) to read as follows:

§ 271.703 Tight formations.

* * * * *

(d) Designated tight formations. The following formations are designated as tight formations. A more detailed description of the geographical extent and geological parameters of the designated tight formations is located in the Commission's official file for Docket No. RM79-76, subindexed as indicated, and is also located in the official files of the jurisdictional agency that submitted the recommendation.

* * * * *

(55) through (68) [RESERVED]

(69) Pictured Cliffs Formation in New Mexico. RM79-76 (New Mexico-7).

(i) Delineation of formation. The Pictured Cliffs Formation is found in the San Juan Basin and underlies portions of Townships 30 and 31 North, Ranges 7 and 8 West, and Township 31 North, Range 6 West, NMPM, in San Juan and Rio Arriba Counties, New Mexico.

(ii) Depth. The average depth to the top of the Pictured Cliffs Formation is approximately 3,200 feet. The thickness of the Pictured Cliffs Formation ranges from 150 to 250 feet.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
3 June 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: William F. Carr, Esq.
CAMPBELL, BYRD, & BLACK P.A.
Jefferson Place
Santa Fe, New Mexico 87501

I N D E X

CHARLES BLACKWOOD

Direct Examination by Mr. Carr 4

Cross Examination by Mr. Stamets 20

E X H I B I T S

Applicant Exhibit One, (Revised) Map 7

Applicant Exhibit Eighteen, DST 8

Applicant Exhibit Nineteen, Tests, etc. 8

Applicant Exhibit Twenty, Tests, etc. 12

Applicant Exhibit Twenty-one, Cross Section 15

Applicant Exhibit Twenty-two, Cross Section 16

Applicant Exhibit Twenty-three, Cross Section 17

Applicant Exhibit Twenty-four, Isopach 17

Applicant Exhibit Twenty-five, Structure Map 18

Applicant Exhibit B, Summary 18

MR. STAMETS: The hearing will please come to order.

We'll call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. CARR: May it please the Examiner, my name is William F. Carr, with the law firm Campbell, Byrd, and Black, P. A., Santa Fe, appearing on behalf of the applicant.

We have one witness who needs to be sworn.

MR. STAMETS: I believe this is a continuation of the case. The witness was previously sworn and he still is.

MR. CARR: Would the record also reflect that he has been previously qualified as a geological engineer and remains so qualified to testify in this matter?

MR. STAMETS: Yes, it will.

MR. CARR: Mr. Charles Blackwood.

CHARLES BLACKWOOD

being called as a witness and being previously sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. CARR:

Q. Mr. Blackwood, for the purpose of bringing this hearing today, I think it would be useful to the Examiner for you to state your name and your title with Blackwood and Nichols, and then briefly to summarize materials covered in the prior hearing.

A. My name is Charles Blackwood. I am a general partner, and the managing general partner of Blackwood and Nichols.

We, at the previous hearing, submitted evidence which is already a part of the record. Basically, we told the area that we were interested in having designated a tight reservoir in the Pictured Cliffs zone, and that is approximately 33,500-acre area composing the Northeast Blanco Unit.

We entered evidence that showed that from 1951 until 1977 we had drilled over 100 wells in the area and completed none of them in the Pictured Cliffs formation because we considered it noncommercial and too tight.

We also gave evidence showing that we comply with all Federal and State regulations concerning drilling, casing and cementing programs in order to protect fresh water sands.

And we testified to the average depth of the top of the Pictured Cliffs formation. We made a statement and testified to evidence that all wells that have been completed in the Pictured Cliffs in that area of our unit and adjacent to the northern edge of the unit produce less than 90 Mcf per day, nonstimulated, to the atmosphere, which is important in that it relates to the depth versus rate table that the government requires to have this tight reservoir designated.

We also gave evidence saying that none of the wells produce as much as 5 barrels of oil per day.

We also stated that the Pictured Cliffs formation does not have an infill drilling order applicable.

The hearing was continued from November 12th, 1980, because we did not have adequate permeability data available at the time in order to satisfy the permeability requirements. We were asked at that hearing to produce either additional permeability data or reserves and economic data, and inasmuch as these were very new wells, we thought that the reserve criteria would be extremely difficult for

several years because of the new -- new wells and the tight character of the reservoir.

So during the period after November 12th to this period, we have drilled additional wells through the Pictured Cliffs zone and we have collected additional permeability data, which shows that the permeability is indeed extremely low and meets the criteria required.

That's basically what we intend to put on today, is our new permeability data.

MR. CARR: And, Mr. Stamets, we do not, as Mr. Blackwood has just indicated, intend to go through again the data presented November the 12th, but if you have any questions concerning that or desire any portion of it be represented, we certainly can do that.

MR. STAMETS: Okay, let's just proceed as you had planned.

MR. CARR: I think at this time it's important to note that at that hearing Blackwood and Nichols had admitted into the record their Exhibits One through Seventeen, and also Exhibit A, which is a summary of the -- of their geological and engineering presentation.

Today what we will do is present a supplement to that written engineering and geological report, which will be our Exhibit B. We will present a revised

Exhibit One, which was the plat, that has some additional data on it. We will not deal with Exhibits One through Seventeen, which we previously submitted, but will start and present Exhibits Eighteen through Twenty-five, which relate to the permeability data collected since the previous hearing.

Q. Mr. Blackwood, have you prepared additional exhibits for introduction at this hearing?

A. Yes, I have.

Q. Were these exhibits previously submitted to the Oil Conservation Division and to the United States Geological Survey, as required by Oil Conservation Division rule?

A. Yes, they were.

Q. Will you please refer to what has been marked for identification as Blackwood and Nichols Company Exhibit Number One and review for Mr. Stamets what this is and what it shows?

A. Exhibit Number One is a map which shows the outline of the Northeast Blanco Unit. That is the area that we are requesting the tight reservoir designation for.

Also, in pink we have designated all of the wells within the unit and adjacent to the northern edge of the unit which produce gas from the Pictured Cliffs formation.

The trace of three cross sections is also shown on this exhibit, A-A' is basically an east/west cross section; B-B' is basically a north/south cross section; and C-C' is another east/west cross section.

In addition to that, in yellow we have marked the location of the new wells drilled since November, in which we have collected permeability data.

Q. Mr. Blackwood, will you now refer to what has been marked for identification as Exhibit Number Eighteen, and explain to Mr. Stamets what that is and what it shows?

A. Exhibit Number Eighteen is a drill stem test taken of the Northeast Blanco Unit Well No. 13-A. That is located at the southern part of the unit and shown on the map.

This was our first attempt to collect adequate permeability data and unfortunately, the time period was too short in order to yield accurate permeability data. We -- we do have pressure and we do have some minute flow rates, but the basic overall interpretation of this test is that two hours is just not adequate time to test a formation with such low permeability.

Q. Will you now refer to Exhibit Number Nineteen and review this for Mr. Stamets?

A. Exhibit Number Nineteen consists of several pressure tests and flow tests and permeability calculations, a log of the well, and several charts showing the actual results obtained during the flow testing and shut-in testing.

The -- it might be best just to review how this was obtained.

When this new well was drilled, Well 206, the casing was run and cemented. Then tubing was run into the hole and the well was swabbed dry or almost dry. Then we perforated an interval from 3518 to 3549 feet, basically a 31-foot interval. Then tubing was rerun into the hole and landed, and the well was shut-in for a 7-day pressure build-up test. That occurred from April 7th through April 14th, 1981.

In 7 days the pressure built to 755 psig and was still building.

Then the well was shut-in for about 2-1/2 days until April 24th, at which time we employed B & R Wireline Services to run a 3-hour flow test and determine the rate of flow on the well.

After this flow test they calculated a rate of approximately 30 Mcf per day.

The well was then shut-in again for an

additional 3-day pressure build-up, and the pressure built up to only 306 pounds on the tubing and 421 pounds on the casing.

The pressure build-up data was plotted and calculations were made to determine the permeability of this Pictured Cliffs formation in the 206 Well, and the permeability was found to be 0.016 millidarcy per foot, which is considerably lower than the 0.1 millidarcy per foot standard for a tight reservoir.

I think that's just --

Q. Copies of all the tests and the calculations to establish the permeability are attached and included with this exhibit, is that correct?

A. Yes, that's right.

Q. Will you now refer to Exhibit Number Twenty and --

MR. STAMETS: Let me ask one question while we're at this point.

I believe you indicated a shut-in pressure of 700 pounds?

A. Yes. The initial test taken prior to any flow of the well, the well built to 755 pounds in 7 days.

MR. STAMETS: Is that a bottom hole pressure?

A. Yes.

MR. STAMETS: And then the 426 pounds shown on Form C-122, does that represent a surface pressure or a shut-in pressure after some sort of a flow?

A. Just a moment. I believe this is a top hole pressure.

MR. STAMETS: Okay, then that would --

A. The --

MR. STAMETS: -- correspond with your 378 feet of water -- I presume that is the cause for the rather large pressure differential between surface and bottom hole pressure?

A. Well, 378 feet of water might account for some 200 pounds of pressure difference.

MR. STAMETS: Okay.

A. Less than -- less than 200 pounds.

MR. STAMETS: Would the gradient of the gas account for the other 100 pounds?

A. I don't think so. I think that the -- the length of time, if you look at the 7-day pressure build-up, from the -- there was a bomb in the hole during the 7-day pressure build-up, and if we take a 72-hour pressure, which would be approximately equivalent to 3 days, we have -- we had -- the well had only built to 506 pounds during that period,

so I believe that it's basically a time problem. Had the well been shut-in loger, it would have built to higher pressures.

MR. STAMETS And did you get any kind of a flow rate when the well was opened after being shut-in for a 700-pound build-up?

A. It -- we did open it, and it flowed at such low rates that we were unable to measure it. And it, it essentially died because we didn't have a tiny enough choke on it then, and that's why we had to start the process all over again.

Had we been successful in having a larger flow rate at that time, we wouldn't have had to rerun all the tests, but we had to come back with a 1/16th inch choke and run the tests again because we were not able to establish a flow rate on a larger choke.

MR. STAMETS: Okay.

Q. Mr. Blackwood, will you now review Exhibit Number Twenty for Mr. Stamets?

A. Again, Exhibit Number Twenty is the same type of pressure build-up and flow test information which was run on the Northeast Blanco Well No. 208.

Again, to briefly review the procedure, the well was drilled, casing cemented, tubing was run into the hole and the water blown out by the use of nitrogen.

Then the tubing was pulled out of the hole and an interval was perforated from 3477 feet to 3570, a 93-foot interval.

Then the well was shut-in for a 7-day pressure build-up and this well built to only 486 pounds during the 7 days.

MR. STAMETS: What was the perforated inteval, please?

A. 3477 was the top perforation and 3570 were the bottom perforations.

MR. STAMETS: Okay, the 122 showed 3561 for the bottom perfs.

A. Well, my log, let's see, there is an "X" here on my log just above 3570 that might be 3567.

MR. STAMETS: And the field data sheet says 3520 for the bottom perforations.

A. Well, I have a marked log which was sent to me from our field office in which the -- apparently the bottommost perforation was at 3567. I definitely show two sets of perforations below the 3561.

MR. STAMETS: Uh-huh, right. Well, that's a small matter.

A. Okay. Anyway, after the well was perforated, it was shut-in for a 7-day pressure build-up, and

that test is included, and it built to 468 psig during the 7 days.

The well was then opened on a 1/16th inch orifice and flowed for 24 hours and the flow rate chart is included.

The rate of flow was calculated to be 2.026 Mcf per day, and after the flow test the well was shut-in for an additional 7 days. During that 7-day flow test the well built up to, I think that shows 411 pounds per square inch.

No, it's -- pardon me, it's -- instead of 411, it's 491.

From this, a plot was made of this pressure build-up data and the calculations were made to determine permeability, and the permeability was calculated to be 0.003 millidarcy per foot in this interval.

Q Mr. Blackwood, is this data on permeability what you would anticipate for Pictured Cliffs wells drilled throughout the subject area?

A Of course there is some variance between the permeability between these two wells, but our experience would indicate that it's certainly going to be in this order and very likely to be less than the 0.1 of a millidarcy per foot throughout the entire area.

Q. And would Pictured Cliffs wells in this area be produced without stimulation?

A. No. Well, you can see the rates here, 2 Mcf per day and 30 Mcf per day, and the 30 was actually, that probably would be 10 three days later.

Q. Would you now refer to your Exhibit Number Twenty-one and explain to Mr. Stamets what this is and what it shows?

A. Exhibit Twenty-one is a cross section across from the west to the east, across the northern part of the unit.

Basically, it shows that we have the top and bottom of the Pictured Cliffs zone and the thickness, and gives logs from which these picks were taken.

It shows that there is sandstone present and shale and that there are -- hydrocarbons are present throughout each of the intervals shown on the Pictured Cliffs.

MR. STAMETS: Excuse me. Now, there's a horizontal line on there and that's the datum on which the logs are all hung.

A. Yes.

MR. STAMETS: Then there are two other lines that vary from log to log. Is the uppermost line the top of the Pictured Cliffs?

A. Yes.

MR. STAMETS: And then the lowermost line is the base?

A. Is the base.

MR. STAMETS: Okay.

Q. Will you now refer to Exhibit Number Twenty-two and review this for Mr. Stamets?

A. Exhibit Number Twenty-two is a north/south cross section across the Northeast Blanco Unit. Again, it shows the top and bottom of the Pictured Cliffs. It shows the relative thickness between wells. It shows that sandstones and shales are generally present and that hydrocarbon is also present in all of the wells shown on the cross section.

Q. Mr. Blackwood, Blackwood and Nichols was asked at the prior hearing to designate a type log for this area. Does -- is there a log on this cross section which would serve that purpose?

A. Actually, almost any log would serve that purpose. I would think that in the interest of using the more common logs that we've run in the area, probably log 17-A would be a good type section log. It is at the intersection of our B-B' cross section and the C-C' cross section.

Q. Will you now refer to Exhibit Twenty-three and review this for the Examiner?

A. Exhibit Twenty-three is another cross section, this one running from west to east along the southern portion of the unit.

Again it shows the top and bottom of the Pictured Cliffs and it shows that there is sandstone present along with shales, and that hydrocarbon is also present within the Pictured Cliffs within each of these wells shown on the cross section.

Q. What general conclusions can you reach concerning the Pictured Cliffs formation from these cross sections?

A. Well, that the entire area of the unit is underlain by the Pictured Cliffs formation; that it has a generally common character of -- of fairly thick sandstones interbedded with shales; that hydrocarbon is present throughout the entire area.

Q. Will you now review Exhibit Twenty-four for the Examiner?

A. Exhibit Twenty-four is an Isopachous map which shows the gross interval of Pictured Cliffs formation throughout the area of the Northeast Blanco Unit.

It basically shows that the formation

is from 150 feet thick to a maximum of approximately 250 feet thick in this area; that there are two lobes of thicker sands over 200 feet thick shown, and nowhere is the sand less than 150 feet thick in the -- well, pardon me -- almost nowhere is the sand less than 150 thick. There is a very small area of 130 to 140 foot thickness in the southeast portion of the unit.

Q. Will you now review Exhibit Twenty-five?

A. Exhibit Twenty-five is a structure map drawn on the top of the Pictured Cliffs formation in the area of the Northeast Blanco Unit.

The numbers shown on the contours are feet above sea level and basically this area is between 3100 feet above sea level and 3250 feet above sea level.

In the northern part of the unit there is a higher area running approximately east/west, elongated in an east/west direction, where the topmost point measured is 3266 feet above sea level.

Q. Mr. Blackwood, I'd now direct your attention to what has been marked as Blackwood and Nichols Exhibit B, which is our supplemental information sheet, and ask you to review this for Mr. Stamets.

A. This supplemental information has to do with the production from the wells from the Pictured Cliffs zone in the area of the unit and directly adjacent to the

northern edge.

At the first hearing in November, we presented information which showed that none of the wells exceeded the 90 Mcf per day flow rate prior to stimulation to the atmosphere. That is one of the guidelines for the order. This simply brings up to date the current production on all of the wells in the area and to summarize the entire exhibit, the average calculated non-stimulated production rate of the seven producing wells from the Pictured Cliffs in this area, as of March, 1981, is 27 Mcf per well per day.

This is somewhat reduced from the average calculated non-stimulated production rate of these same seven wells as they were producing back in July of 1980. In July of 1980 their average rate was 35 Mcf per day. Now the rate has declined to 27 Mcf per day.

Q. Mr. Blackwood, were Exhibits One, as revised, Eighteen through Twenty-five, and Exhibit B, prepared by you or under your direction and supervision?

A. Yes, they were.

MR. CARR: At this time, Mr. Stamets, we would offer Blackwood and Nichols Exhibits 1-R, Twenty-eight through Twenty-five, and B, into evidence.

MR. STAMETS: These additional exhibits are admitted.

MR. CARR: We have nothing further on direct.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Blackwood, referring back now to Exhibit Number Eighteen, which is the drill stem test of the No. 13-A, did that well recover any free gas? Or only gas-cut mud?

A. Only gas-cut mud, as far as I have been able to determine from this. There was -- there was a blow at the surface, but the blow never became pure gas. There was a, you know, slight air blow.

Q. So on that basis it would be fair to say that this well would not be capable of producing more than 90 Mcf per day of unstimulated production?

A. Yes, sir.

Q. Actually, it would be substantially less than that.

A. Yes, it was -- it was such a small rate, it was -- well, actually, I asked Halliburton to make some permeability calculations from this test, and we calculated the theoretical amount of gas we would have had in that small amount of gas-cut mud, and the permeability number was

considerably less than either of the two given in Exhibit Nineteen or Exhibit Twenty.

Q. Now on Exhibit Nineteen you have a flow rate of 17 Mcf and that's a 1. flow rate and that's through a -- what sort of a testing device do you have on that well?

A. It was an orifice, a 1/16th of an inch orifice well tester.

Q. Okay. Then you have calculated the absolute open flow at 30 Mcf a day, and what's the factor that goes into that final calculation?

A. Well, all sorts of -- there are pressures at the surface and pressures at the bottom of the hole. There are -- there are corrections for the friction, you know, in the -- in the pipe, so that when you -- when you take these squared functions at the bottom, you calculate for the absolute flow at zero pressure at the bottom of the hole.

Q. What slope "N" did you use in that calculation?

A. I didn't make the calculation personally. They were made by Mr. Wagner of the B & R Wireline, and I would have to go back and do some work to tell you what that slope "N" was.

Q. I presume the slope "N", as shown there down to the right below that point, it says 0.85.

A. I -- I -- yes, there it is.

Q. Is that the slope which is commonly used for Pictured Cliffs wells in the northwestern part of the state?

A. I really couldn't say. This is our first experience with -- with trying to test the Pictured Cliffs wells.

MR. STAMETS: Let's go off the record for a minute.

(There followed a discussion off the record.)

MR. STAMETS: Okay, let's go back on the record now, Sally.

I am advised that that slope of 0.85 is the standard slope used in this area for calculations concerning absolute open flow, so that would appear to be standard Oil Conservation Division policy.

Q. It would appear, Mr. Blackwood, that everything that has transpired since the original hearing has confirmed all of the conclusions you made at that time, and -- and perhaps has even -- the evidence indicates that the unstimulated deliverability is going to be much less than

what you theorized at the original hearing.

A. I would say that's correct. We -- the calculation which I made to work backward from stimulated production to non-stimulated production to the atmosphere, was a simplified mathematic calculation which was 10 to 20 percent lenient in the calculation.

In other words, the formula which I used gives results which are 10 to 20 percent higher than those results which would be obtained if a very long drawn-out calculation were made, taking into effect such things as tubing friction and all of the various factors.

The calculations here are conservative in the government's favor, so to speak.

MR. STAMETS: Are there any other questions of the witness? He may be excused.

Anything further in this case?

MR. CARR: Nothing further.

MR. STAMETS: The case will be taken under advisement.

The hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. ____, heard by me on _____ 19____.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

17 FERC ¶61,239

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: C. M. Butler III, Chairman; Georgiana Sheldon, J. David Hughes and A. G. Sousa.

High-Cost Gas Produced From Tight Formations) Docket No. RM79-76 (New Mexico - 7)

ORDER NO. 198

FINAL RULE

(Issued December 16, 1981)

The Commission hereby amends § 271.703(d) of its regulations to include the Pictured Cliffs Formation in New Mexico as a designated tight formation eligible for incentive pricing under § 271.703. The amendment was proposed in a Notice of Proposed Rulemaking by the Director, OPPR, issued October 2, 1981 (46 Fed. Reg. 50085, October 9, 1981) 1/ based on a recommendation by the New Mexico Oil Conservation Division (New Mexico) in accordance with § 271.703(c) that the Pictured Cliffs Formation be designated as a tight formation.

Evidence submitted by New Mexico supports the assertion that the Pictured Cliffs Formation meets the guidelines contained in § 271.703(c)(2). The Commission adopts the New Mexico recommendation.

The amendment shall become effective immediately. The Commission has found that the public interest dictates that new natural gas supplies be developed on an expedited basis, and, therefore, incentive prices should be made available as soon as possible. The need to make incentive prices immediately available establishes good cause to waive the thirty-day publication period.

1/ Comments were invited and one comment supporting the recommendation was received. No party requested a hearing and no hearing was held.

DC-C-50

(Department of Energy Organization Act, 42 U.S.C. § 7101 et seq.; Natural Gas Policy Act of 1978, 15 U.S.C. § 3101 - 3342; Administrative Procedure Act, 5 U.S.C. § 553.)

In consideration of the foregoing, Part 271 of Subchapter H, Chapter I, Title 18, Code of Federal Regulations, is amended as set forth below, effective December 16, 1981.

By the Commission.

(S E A L)

Lois D. Cashell

Lois D. Cashell
Acting Secretary.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

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

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

Blackwood and Nichols Co., Ltd., pursuant to Section 107 of the Natural Gas Policy Act, 18 CFR §271.703 of the FERC regulations, and the Special Rules and Procedures for Tight Formation Designations under Section 107 of the Natural Gas Policy Act of 1978 of the Oil Conservation Division, petitioned the Oil Conservation Division for tight formation designation of a portion of the Pictured Cliffs formation in San Juan and Rio Arriba Counties, New Mexico.

After notice and hearing on the application of Blackwood and Nichols Co., Ltd., the Oil Conservation Division hereby recommends that that portion of the Pictured Cliffs formation which is described in Exhibit A (being Oil Conservation Division Order No. R-6746) attached hereto and incorporated by reference, be designated a tight formation. Additionally, the Oil Conservation Division, submits herewith Exhibits B and C, attached hereto and incorporated herein by reference, which are supporting data required under 18 CFR §271.703(c)(3) of the FERC regulations and United States Geological Survey ratification of this recommendation, respectively.

Respectfully submitted,

W. PERRY PEARCE
Attorney for the
Oil Conservation Division

VERIFICATION

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

W. PERRY PEARCE, being first duly sworn, on oath, states that he is an attorney for the Oil Conservation Division of the Energy and Minerals Department of the State of New Mexico; that he has executed the foregoing document with full power and authority to do so; and that the matters and facts set forth therein are true to the best of his information, knowledge and belief.

W. PERRY PEARCE

Subscribed and sworn to before me, this _____ day of September, 1981.

NOTARY PUBLIC

My Commission Expires:

October 28, 1981

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of the foregoing Recommendation to Blackwood and Nichols Co., Ltd., in accordance with the requirements of Section 1.17 of the Rules of Practice and Procedure.

Dated this _____ day of September, 1981.

W. PERRY PEARCE

United States Department of the Interior

GEOLOGICAL SURVEY
South Central Region
P. O. Box 26124
Albuquerque, New Mexico 87125

SEP 4 1981

Mr. W. Perry Pearce
Oil Conservation Division
State of New Mexico
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Pearce:

This jurisdictional agency concurs in the recommendation of the State of New Mexico, Case No. 7086, Order No. R-6746, dated August 7, 1981, that the Pictured Cliffs formation underlying the described lands in subject order in San Juan and Rio Arriba Counties, New Mexico, be designated as a Section 107 tight formation.

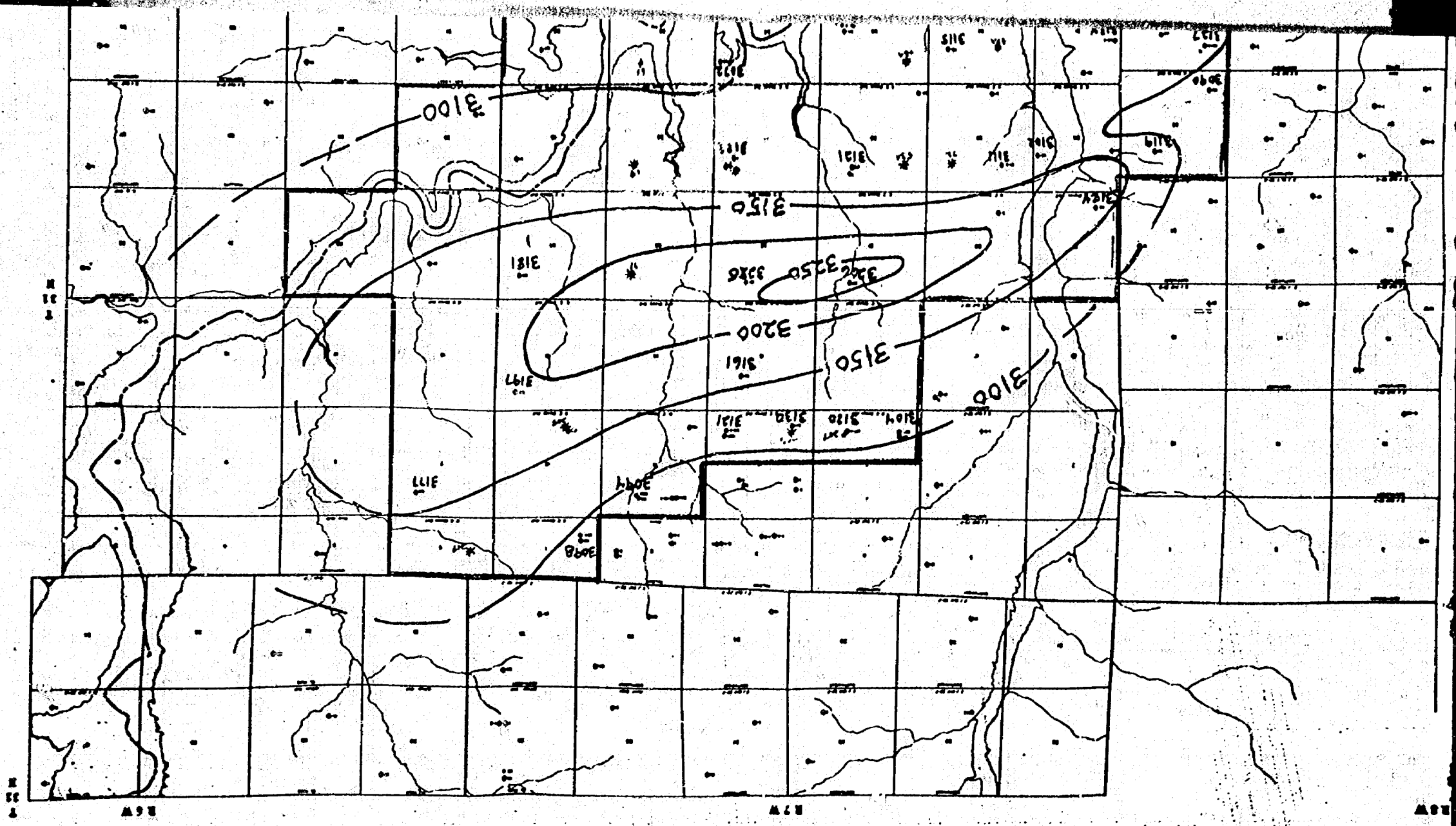
It is requested that this concurrence be included with the recommendation submitted to the Federal Energy Regulatory Commission.

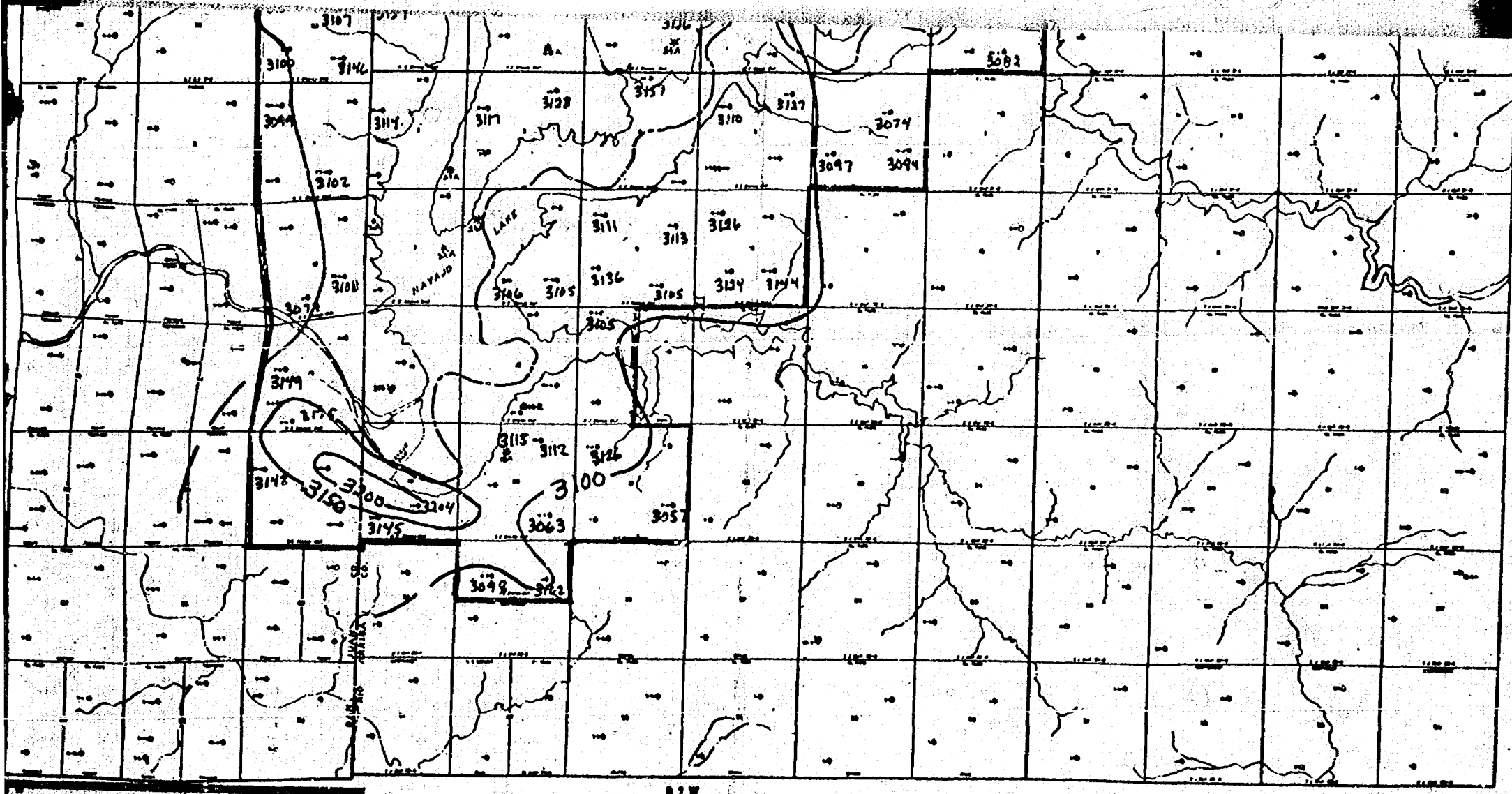
Sincerely yours,

James W. Shelton

FOR Gene F. Daniel
Deputy Conservation Manager
Oil and Gas

Exhibit "C"


3100
3150
3200
3250
3300
T 31 N
R 36 W
R 37 W



BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 25
CASE NO. 7086
Submitted by Blackwood
Hearing Date June 3, 1981

PICTURED CLIFFS FORMATION
STRUCTURE MAP ON TOP FT. ABOVE SEA LEVEL

BLACKWOOD & NICHOLS CO., LTD.
NORTHEAST BLANCO UNIT
SAN JUAN & RIO ARRIBA COS., N. M.

Exhibit # 25

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

August 7, 1981

Re: CASE NO. 7086
ORDER NO. R-6746

Mr. William F. Carr
Campbell, Byrd & Black
Attorneys at Law
Post Office Box 2208
Santa Fe, New Mexico

Applicant:

Blackwood & Nichols Company, Ltd.

Dear Sir:

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

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCD X
Artesia OCD X
Aztec OCD X

Other

CAMPBELL, BYRD & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
HARL D. BYRD
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
BRADFORD C. BERGE
WILLIAM G. WARDLE

JEFFERSON PLACE
SUITE 1 - 110 NORTH GUADALUPE
POST OFFICE BOX 2208
SANTA FE, NEW MEXICO 87501
TELEPHONE: (505) 988-4421
TELECOPIER: (505) 983-6043

July 7, 1981

Mr. R. L. Stamets
Technical Support Chief
Oil Conservation Division
New Mexico Department of
Energy and Minerals
Post Office Box 2088
Santa Fe, New Mexico 87501

Re: Oil Conservation Division Case 7086:
Application of Blackwood & Nichols Co., Ltd.
for Designation of a Tight Formation, San Juan
and Rio Arriba Counties, New Mexico

Dear Mr. Stamets:

Pursuant to your request, I am enclosing a copy of a proposed Order granting the application of Blackwood & Nichols Co., Ltd. in the above-referenced case.

If you need additional data to process this application, please advise.

Very truly yours,

William F. Carr

William F. Carr

WFC:lr

Enclosure

cc: Mr. Charles Blackwood

BEFORE THE

OIL CONSERVATION DIVISION

NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

IN THE MATTER OF THE APPLICATION OF
BLACKWOOD & NICHOLS COMPANY, LTD.,
FOR DESIGNATION OF TIGHT FORMATION,
SAN JUAN AND RIO ARRIBA COUNTIES,
NEW MEXICO

CASE 7086

A P P L I C A T I O N

COMES NOW, BLACKWOOD & NICHOLS COMPANY, LTD., by and through its undersigned attorneys 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 Oil Conservation Division Order No. R-6388 on June 30, 1980, hereby makes application 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 would show the Division:

1. Applicant is the owner and operator of certain interests in the Pictured Cliffs formation underlying the following described lands situated in San Juan and Rio Arriba Counties, New Mexico:

Township 30 North, Range 7 West, N.M.P.M.
Sections 2 through 21: All
Section 22: W/2 W/2
Section 29: N/2

Township 30 North, Range 8 West, N.M.P.M.
Section 1: All
Section 12: All
Section 13: All
Section 24: All

Township 31 North, Range 6 West, N.M.P.M.
Section 6: Lots 8, 9, 10 and 11, S/2
Section 7: All
Sections 18 through 20: All
Section 30: All

Township 31 North, Range 7 West, N.M.P.M.
Section 1: Lots 5, 6, 7 and 8, S/2
Sections 9 through 16: All
Sections 19 through 36: All

Township 31 North, Range 8 West, N.M.P.M.
Section 25: All
Section 36: All

Containing a total of 33,500 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 3200 feet and the stabilized production rate, 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 on this application, together with a statement of the meaning and purpose of each exhibit. (See report entitled "Geographical and Geological Description of the Formation"). These exhibits cover all aspects of the required evidentiary date described in Section D of 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 prays that this application be set for hearing before a duly appointed examiner of the Oil Conservation Division 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 proper in the premises.

Respectfully submitted,

CAMPBELL & BLACK, P.A.

By William F. Carr

William F. Carr
Attorneys for Applicant
Post Office Box 2208
Santa Fe, NM 87501
Telephone: (505) 988-4421

Certificate of Service

I hereby certify that 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 mailed to the United State Geological Survey at Post Office Box 26124, Albuquerque, New Mexico, 87125, on this 23rd day of October, 1980.

William F. Carr

William F. Carr

BLACKWOOD & NICHOLS CO., LTD.
2013 FIRST NATIONAL CENTER WEST
OKLAHOMA CITY, OKLAHOMA 73102

405 235-8505

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
APPLICANTS EXHIBIT NO. A
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80

PICTURED CLIFFS FORMATION

GEOGRAPHICAL AND GEOLOGICAL DESCRIPTION OF THE FORMATION

Geographical

The San Juan Basin of northwest New Mexico is a major gas producing area, which is approximately 80 miles long in a NW - SE trend and 40 miles wide from SW - NE. The center of this gas producing area is approximately 25 miles SE of Aztec, New Mexico. Most of the gas produced in this area is found in stratigraphic reservoirs of the Mesaverde Group and Dakota formation. Smaller volumes of gas have been produced from the Pictured Cliffs and Fruitland formations.

Blackwood & Nichols Co., Ltd. operates the Northeast Blanco Unit, a 33,500 acre area located on the northeast flank of the San Juan Basin. The Northeast Blanco Unit is located in Townships 30 & 31N and Range 6 & 7W also Sections 25 & 36, T31N-R8W and Sections 1, 12, 13 & 24, T30N-R8W. A map of the Northeast Blanco unit is provided.

The surface area is a part of the Colorado Plateau province and contains broad tablelands and rolling hills, interrupted by steep cliffs and canyons.

Geological

The Pictured Cliffs formation in this area is of upper cretaceous age. This formation consists of sandstones, shales and coal seams. The sandstones within the formation are gray to grayish white, with a salt and pepper look, fine to medium grained, well sorted, angular to subrounded, composed mainly of quartz with some ferromagnesium minerals and glauconite cemented with calcite and bentonite. These sandstones are a series of lenses or benches that were deposited as the shoreline phase of a sea that regressed northeastward across the area. These benches show a definite northwest - southeast trend and overlap one another. They become stratigraphically higher from the southwest to the norteast. A general geologic section of the San Juan Basin is attached.

In the Northeast Blanco Unit area no wells were completed in or produced gas from the Pictured Cliffs formation prior to 1979. Over 100 wells have penetrated the Pictured Cliffs and been completed in the deeper Mesaverde and Dakota formations. The Pictured Cliffs formation has been observed to contain natural gas at abnormally high pressures. In order to control these pressures it is necessary to raise the mud weight to approximately 12 lbs/gallon.

The information gathered while drilling and logging the Pictured Cliffs formation has indicated tight sandstone stringers, coal seams and shales which contain natural gas and water (very fresh) at abnormally high pressures.

No Drill stem test information or other form of pressure information is available from which in situ permeability can be directly calculated. The stabilized flow rates of the newly completed Pictured Cliffs wells is used to justify the designation of a "tight reservoir".

Blackwood & Nichols Co., Ltd. operates the Northeast Blanco Unit. We have taken all necessary precautions to insure that all fresh water zones are protected and not adversely affected by our operations. Our procedures have been in accord with all State and Federal rules and regulations.

A part of the pertinent Federal regulations are attached. They are the pages 1 through 5 of supplement to U.S.G.S. NTL - 6.
Pages C-6, C-7 & C-8 of New Mexico Oil Conservation Division of the Energy and Minerals Department are also attached.

We believe that compliance with these rules and regulations adequately protects and will not adversely affect or impair any fresh water aquifers that are being used or expected to be used in the foreseeable future for domestic or agricultural supplies.

Geological and Engineering Data

The Pictured Cliffs formation of the northeast flank of the San Juan Basin/and Rio Arriba County, New Mexico is composed primarily of sandstone lenses, shales and coal seams. Information has been obtained from Electric, Radiactivity, Gamma Ray Neution, Sonic, Formation Density, Sidewall Neution and other logs run on more than 100 wells within the area of the Northeast Blanco Unit from 1950-1979. The analysis of these logs has shown that natural gas and water (of near drinking quality) is present in the pore space in the Pictured Cliffs formation.

While drilling the Pictured Cliffs zone gas kicks have made it necessary to raise the weight of the drilling mud to approximately 12 lbs/gallon in order to control against blow outs. This indicates abnormally high pressure. The fact that this abnormally high pressure has not been able to escape the Pictured Cliffs sandstones is and indication of extremely low permeability within the formation.

The flow rates of all the wells producing from the Pictured Cliffs formation in the Northeast Blanco Unit area and those adjacent to the north boundary support the "tight reservoir" designation. All of the Pictured Cliffs producers were stimulated prior to production. Calculations to determine non stimulated stabilized flow rates to the atmosphere for each well will be shown.

Stabilized production vs depth guidelines

Blackwood & Nichols Co., Ltd. drilled five holes in the Northeast Blanco Unit area to test shallow gas possibilities. All five wells encountered Pictured Cliffs sandstones which appeared to possibly be productive. Completions in the Pictured Cliffs formation were attempted in all five wells. Three of those five wells produced small volumes of gas & water. All three wells were incapable of commercial gas production from the Pictured Cliffs formation and had to be re-worked. The Pictured Cliffs zone was abandoned in the Northeast Blanco Unit well # 201, Northeast Blanco Unit well # 203 and Northeast Blanco Unit well # 205. Only two wells were successfully completed in the Pictured Cliffs formation. These Two wells were also completed in the Fruitland formation and are now producing with the Pictured Cliffs formation and the Fruitland formation commingled. In order to allocate production between the two zones 50% of the production from the Northeast Blanco Unit well # 202 and Northeast Blanco Unit well # 204 has been allocated to each zone.

All the Northeast Blanco Unit wells were stimulated prior to production. The calculated productivity improvements ratio is 10-11. The Western Company has furnished a "Fracture stimulation Recommendation" for the Northeast Blanco Unit well # 203. A copy of this recommended procedure which shows fluids, rates, pressures, proppants, costs etc. is enclosed. In order to approximate stabilized production rates without stimulation computations have been made. A theoretical stabilized production rate to the atmosphere has been calculated in the following manner. The pressure differential between shut in pressure and pipeline pressure has been ascertained for each producing well. This pressure differential is then used with pipeline pressure and actual production to calculate the theoretical stabilized production rate to the atmosphere. The following formula has been used

$$\frac{\Delta p}{\text{Shut in pressure}} = \frac{\text{Production (to the pipeline)}}{\text{Production (to the atmosphere)}}$$

Where Δp = Shut in pressure psig-pipeline pressure psig

Then in order to estimate the "non stimulated" stabilized production rate, the calculated production to the atmosphere has been divided by 10, for wells stimulated in a manner simular to that recommended for the Northeast Blanco Unit well # 203. This factor of 10 is the smaller of the productivity encreases calculated by the Western Company as being created by the stimulation which has already occured in several wells. A productivity increase of 4 times has been assumed for other stimulation treatments (performed on Palmer Oil & Gas Company-Tenneco wells).

Northeast Blanco Unit well # 202
NE/4 Section 11, T31N-R7W
San Juan County, New Mexico
(Fruitland - Pictured Cliffs commingled)

	Mcf	Days	Mcf/pd	Mcfpd/zone
June, 1980	17,584	32	550	275
July, 1980	12,606	24	526	263

Each zone has produced an average of 270 Mcfpd for the last two months into the pipeline. The "production against atmosphere pressure" is estimated to be 395 Mcfpd.

$$\frac{922 - 292}{922} \quad \frac{270}{\text{Production (atmosphere)}}$$

The well was previously stimulated and productive capacity theoretically increased 10 fold. The pre stimulation "stabilized production rate to the atmosphere" is calculated to be 40 Mcfpd from the Pictured Cliffs reservoir. A copy of the completion report is enclosed.

Northeast Blanco Unit well # 204
SW/4 Section 1, T31N-R7W
San Juan County, New Mexico
(Fruitland-Pictured Cliffs commingled)

Using 120 Mcfpd/zone as the average production into the pipeline, we calculate that the production to the atmosphere would be 162 Mcfpd.

$$\frac{942 - 246}{942} \quad \frac{120}{\text{Productic.. (atmosphere)}}$$

This well was stimulated prior to production. If we reduce the 162 Mcfpd/zone by a factor of five based on the theoretical productivity increase obtained by stimulation we estimate 34 Mcfpd. The Pictured Cliffs zone is calculated to have 34 Mcfpd " stabilized production rate against atmospheric pressure" in this well. A copy of the completion report is enclosed.

Three other holes penetrated and logged the Pictured Cliffs formation in the Northeast Blanco Unit area in 1979. These were the # 201, # 203 and # 205 wells. The Northeast Blanco Unit well # 201 was perforated and fracture stimulated in the Pictured Cliffs formation but was not able to flow gas at commercial rate from the Pictured Cliffs perforations. The Pictured Cliffs perforations were shut off and abandoned during a re-work of the well. A copy of the re-completion report is atttached.

The Northeast Blanco Unit well # 203 was also originally perforated and fractured in the Pictured Cliffs formation. The Pictured Cliffs zone failed to flow commercial quantities of gas. The perforation in the Pictured Cliffs formation were abandoned during a re-work of the well in 1980. A copy of the re-completion report is attached.

The Northeast Blanco Unit well # 205 was originally completed in the Pictured Cliffs reservoir in August, 1979. When the well was turned on and production attempted, it would not flow gas because of too much water. It was necessary to abandon the Pictured Cliffs perforations and re-complete the well in the Fruitland formation. A copy of the re-completion report is enclosed.

The experience of Blackwood & Nichols Co., Ltd. indicates that there is a high risk of successfully completing commercial gas wells in the Pictured Cliffs formation in the Northeast Blanco Unit area. Five completions have been attempted and only two were successful and resulted in gas wells. Sixty percent of the attempted completions in the Pictured Cliffs formation have not been successful. The reasons for this high risk of completing wells are numerous. The reservoir rocks are extremely tight sandstones. Some gas is present in the coal seams. The sandstones are not continuous, but are numerous lenses which probably are not in pressure communication with one-another. The resistivity logs are very difficult to interpret precisely as to gas and or water saturations. The very fresh highly resistive water which occurs in the sandstones is not easy to differentiate from natural gas by resistivity measurements. This difficulty in precise gas and water saturations along with the unknown very low permeability of the Fruitland formations makes it almost impossible at this time to determine which locations will be productive from the Pictured Cliffs formation without actually drilling, setting pipe, perforating, fracturing and testing the formation. Our success to date has been only 40% in the Pictured Cliffs formation.

Palmer Oil and Gas drilled and completed several wells adjacent to the northern boundary of the Northeast Blanco Unit. These wells were purchased by Tenneco Oil & Gas who is now the operator. Production and completion information on these adjacent wells is shown below.

Tenneco Yager # 3
SW/4 Section 3, T31N - R7W
San Juan County, New Mexico

The Pictured Cliffs formation produced 1169 Mcf of gas in July, 1980. This is approximately 36 Mcfpd into the pipeline. When adjusted to flow rate against atmospheric pressure the rate becomes 46 Mcfpd.

$$\frac{1461 - 311}{1467} = \frac{36 \text{ Mcfpd}}{\text{Production (atmosphere)}}$$

The 46 Mcfpd rate is approximately four times the rate which would have been possible without stimulation. The calculated "stabilized production rate to the atmosphere" without stimulation is therefore 12 Mcfpd. A 1978 deliverability test and a completion report are enclosed.

Tenneco State # 3
SW/4 Section 3, T31N - R7W
San Juan County, New Mexico

This well is completed in the Pictured Cliffs reservoir and produced 4197 Mcf during July, 1980. This is approximately 131 Mcfpd. When this pipeline production is adjusted to approximate stabilized flow rate against atmospheric pressure the daily rate becomes approximately 180 Mcfpd.

$$\frac{1138 - 310}{1138} = \frac{131}{\text{Production (atmosphere)}}$$

The 180 Mcfpd stabilized rate to the atmosphere must be divided by four in order to determine the "non stimulated" rate. The calculated "non stimulated stabilized production and rate to the atmosphere" for this well is 45 Mcfpd. A completion report and the 1978 deliverability test are enclosed.

Tenneco State # 2
SW Section 2, T31N - R7W
San Juan County, New Mexico

This well produces from the Pictured Cliffs formation. The July, 1980 production was 4728 Mcf to the pipeline or 148 Mcfpd. When this rate is adjusted to atmospheric pressure using the pressures taken from the 1978 deliverability test the approximate daily rate to the atmosphere is 273 Mcfpd.

$$\frac{1114 - 509}{1114} = \frac{148}{\text{Production (atmosphere)}}$$

The production rate without stimulation is calculated to be only one fourth as great as the "fractured stimulated rate". The calculated "non stimulated stabilized production rate to the atmosphere for this well is 68 Mcfpd. A completion report and the 1978 deliverability test are enclosed.

Tenneco Yager # 4
NW/4 Section 10, T31N - R7W
San Juan County, New Mexico

The Pictured Cliffs formation produced 2407 Mcf of gas in July, 1980 which is approximately 75 Mcfpd. When this rate is adjusted to a flow rate to the atmosphere the approximate rate becomes 96 Mcfpd.

$$\frac{1425 - 310}{1425} = \frac{75}{\text{Production (atmosphere)}}$$

This zone was stimulated with a treatment which theoretically should have increased the production rate by more than four times. The calculated non stimulated stabilized flow rate to the atmosphere for the Pictured Cliffs formation is 25 Mcfpd.

Tenneco Federal # 3
NW/4 Section 10, T31N - R7W
San Juan, New Mexico

The Pictured Cliffs formation produced and sold 477 Mcf of gas in July, 1980, which is approximately 16 Mcfpd. When an adjustment is made to approximate stabilized flow to the atmosphere a rate of 20 Mcfpd is found.

$$\frac{1461 - 310}{1461} = \frac{16}{\text{Production (atmosphere)}}$$

The non stimulated stabilized producing rate to the atmosphere is 20 Mcfpd. (No adjustment for stimulation was made on this well because of lack of information concerning the stimulation procedure used). A deliverability test and completion report are enclosed.

Summary and Conclusions

The Pictured Cliffs formation has been drilled through, logged, evaluated and bypassed for over 30 years in the Northeast Blanco Unit area.

No wells were completed in the Pictured Cliffs formation in the Northeast Blanco Unit area prior to 1979. Palmer Oil and Gas Company drilled and completed the first Pictured Cliffs wells in the area adjacent to the northern boundary of the Northeast Blanco Unit in 1978.

Blackwood & Nichols Co., Ltd. has drilled and completed over 100 producing gas wells in the 33,500 acre Northeast Blanco Unit from 1950 to 1978 and had never attempted a Pictured Cliffs completion. The information gathered while drilling the more than 100 wells indicated that the Pictured Cliffs reservoir was very tight (extremely low permeability) and contained both natural gas and fresh water.

In 1979 Blackwood & Nichols Co., Ltd. drilled five holes along the northern boundary of the Northeast Blanco Unit. Completions were attempted in the Pictured Cliffs formation. Three of the five completion attempts were unsuccessful and these three holes had to be abandoned in the Pictured Cliffs formation and re-completed in the Fruitland formation. At this time it is very difficult (if not impossible) to precisely calculate gas and water saturations within the sandstone lenses of the Pictured Cliffs formation.

It can be shown that natural gas occurs in the Pictured Cliffs formation in this area. It is known that the Pictured Cliffs formation is extremely tight. The low permeability and uncertainty as to gas and water saturations has caused this zone to be bypassed prior to 1979. The low permeability, high cost and high risk made trying to produce the Pictured Cliffs an uneconomic venture. The designation of the Pictured Cliffs as a "tight" reservoir will enable gas to be produced from this formation which would otherwise be left in the ground as non-commercial.

The Pictured Cliffs wells which have recently been completed and produced in this area have the calculated "non stabilized flow rates to the atmosphere" shown below.

Northeast Blanco Unit well # 202	40 Mcfpd
Northeast Blanco Unit well # 204	34 Mcfpd
Tenneco Yager # 3	12 Mcfpd
Tenneco State # 3	45 Mcfpd
Tenneco State # 2	68 Mcfpd
Tenneco Yager # 4	25 Mcfpd
Tenneco Federal # 3	20 Mcfpd
Seven well total	244 Mcfpd

The average Pictured Cliffs well 35 Mcfpd/well.

All available data collected to date support the designation of the Pictured Cliffs formation as a "tight" reservoir in the Northeast Blanco Unit area. The average wells current calculated stabilized producing rate to the atmosphere without stimulation is 35 Mcfpd. None of the seven newly completed Pictured Cliffs wells in the area have a flow rate which exceeds the 91 Mcfpd rate which is the published (depth vs rate) guideline. The high cost of drilling, completing, fracture, stimulating etc. when combined with the risk of unsuccessful completions make a tight reservoir designation necessary for the recovery of these gas reserves.

SUPPLEMENTAL INFORMATION

Gathered after October 1980

In Support of the Tight Reservoir Designation

PRODUCTION

	Well # 202 Mcf		Well # 204 Mcf	
Month	@15.025	@14.73	@15.025	@14.73
Oct. 1980	9573	9764	7118	7260
Nov. 1980	9899	10097	7130	7273
Dec. 1980	10006	10206	6173	6296
Jan. 1981	7798	7954	6341	6468
Feb. 1981	5959	6078	4043	4124
Mar. 1981	9337	9524	5995	6115

Production from the two wells given above is from the commingled Fruitland and Pictured Cliff reservoirs. To estimate production by zone we have assigned the total production equally to each formation.

Northeast Blanco Unit Well # 202

In March, 1981 the production rate (Pictured Cliffs) was 146 Mcfpd. The estimated stabilized production rate (stimulated) to the atmosphere is calculated to be 922/(922-292) x 146 = 214 Mcfpd. The stimulation procedure theoretically improved the producing capacity by a factor greater than ten. Therefore, the "non stimulated stabilized production rate to the atmosphere" is estimated to be 21 Mcfpd for March 1981 from the Pictured Cliffs formation.

Northeast Blanco Unit Well # 204

In March, 1981 the production rate (Pictured Cliffs) was 96 Mcfpd. The estimated production rate to the atmosphere is calculated to be 942/(942-246) x 96 = 130 Mcfpd. The stimulation procedure theoretically improved the producing capacity by a factor greater than five. Therefore the "non stimulated stabilized producing rate to the atmosphere" is estimated to be 26 Mcfpd for March, 1981.

Production from the nearby gas wells operated by Tenneco for the month of March, 1981 is shown below.

Tenneco Yager # 3

1025 Mcf @15.025 psi 31 days
34 Mcfpd @14.73 psi

$\frac{1467}{(1467-311)}$ x 34 = 43 Mcfpd to the atmosphere

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 3
CASE NO. 7086
Submitted by Blackwood
Hearing Date June 3 1981

Tenneco Yager # 4

1652 Mcf @15.025 psi 31 days
54 Mcfpd @14.73 psi

$\frac{1425}{(1425-310)}$ x 54 = 76 Mcfpd to the atmosphere

The production of this well was enhanced by stimulation by a procedure which theoretically increased productive capacity four fold. Therefore the estimated "stabilized non stimulated productive rate to the atmosphere" is 19 Mcfpd for March, 1981.

Tenneco State # 2

3874 Mcf @15.025 psi 31 days
126 Mcfpd @14.73 psi

This zone was stimulated by a fracture treatment which theoretically increased productive capacity by a factor of four. Therefore the "stabilized non stimulated production rate to the atmosphere" is estimated to be 31 Mcfpd.

Tenneco State # 3

3613 Mcf @15.025 psi 31 days
119 Mcfpd @14.73 psi

The well was fractured to increase productiivity by more than four times. Therefore the estimated "stabilized non stimulated production rate to the atmosphere" is 30 Mcfpd.

Tenneco Federal # 3

498 Mcf @15.025 psi 31 days
16 Mcfpd @14.73 psi

The seven producing Pictured Cliffs wells in this area have an average "non stimulated stabilized production rate to the atmosphere" of 27 Mcfpd in March 1981.

PERMEABILITY TESTING NEW WELLS

Blackwood & Nichols Co., Ltd. has drilled and tested three new wells in the Pictured Cliffs formation since 1980. The Northeast Blanco Unit Well # 13-A was drill stem tested on November 29, 1981. Copies of the Drill Stem Test are attached (Exhibit No. 18). The data collected indicates that the formation is too tight to yield precise permeability information during the length of this test. The risk of sticking the drill stem test tools in the hole and losing the hole increases with the length of the test. It was therefore decided to test additional wells through casing in order to obtain permeability information.

The Northeast Blanco Unit Well # 206 (Section 12, 31N-7W) was drilled and production casing set to 3690' on March 25, 1981. The Pictured Cliffs formation was perforated with four holes per foot per interval (3518', 3529', 3537', and 3549'. 2 3/8 inch tubing was run to 3588' and the hole swabbed dry. A seven day pressure build up test was taken from April 7th through 14th, 1981. The

well was opened to flow but died in an hour. The well was shut in and new plans for testing were considered. On April 24, 1981 the Northeast Blanco Unit Well # 206 was flow tested for three hours. A rate of 17 Mcfpd was recorded. The well was then shut in for three days and the pressures recorded. The information collected during these tests has been evaluated and calculated to obtain "in situ" permeability. The calculated permeability for this well (not stimulted) is 0.0116 Md/ft (millidarcies per foot). Copies of the seven day pressure test, three day pressure build up, three hour flow test chart, permeability calculation and pressure build up graphs are enclosed as Exhibit 19, "Permeability Information, Northeast Blanco Unit Well # 206".

Northeast Blanco Unit Well # 208 was drilled and production casing set to 3661' on April 9, 1981. The Pictured Cliff formation was perforated with four holes per foot per interval 3477', 3489', 3521', 3547', 3561', and 3570'. A seven day pressure build up test was run from April 14-21, 1981. The Northeast Blanco Unit Well # 208 was flow tested on April 22, 2981. A rate of 2.026 Mcfpd was recorded. The well was shut in and a pressure build up was taken from 4-23-81 to 4030-81. The information collected during these tests has been evaluated and calculated to obtain "in situ" permeability. The calculated permeability for this well (not stimulated) is 0.003 md/ft. Copies of the pressure build up tests, one point back pressure test, flow test, and pressure build up graphs are enclosed as Exhibit No. 20, "Permeability Information Northeast Blanco Unit WEll # 208".

SUMMARY AND CONCLUSIONS

The additional permeability data collected since November 1980 supports the "Tight Reservoir" designation. Three new wells were drilled and the Pictured Cliffs formation tested for pressure, flow rate, and permeability.

A Drill Stem Test of the Northeast Blanco Unit Well # 13-A, recorded data which indicated that the Pictured Cliffs formation was too "tight" to collect precise permeability data during a two hour drill stem test.

The Northeast Blanco Unit Well # 206 flowed 17 Mcfpd natural (no stimulation) and had a calculated permeability of 0.0116 md/ft.

The Northeast Blanco Unit Well # 208 flowed 2 Mcfpd natural (no stimulation) and had a calulated permeability of 0.003 md/ft.

The average calculated "non stimulated production rate" of the seven producing Pictured Cliffs wells in this area as of March 1981 is 27 Mcfpd per well. This is less than the 35 Mcfpd per well average shown for July, 1980.

Geologic Cross Sections, An Isopachous Map and a Structure Map of the Pictured Cliffs formation have been included in this application. They are identified as follows:

Geologic Cross Section A-A is Exhibit No. 21
Geologic Cross Section B-B is Exhibit No. 22
Geologic Cross Section C-C is Exhibit No. 23
The Gross Interval Isopachous Map is Exhibit No. 24
The Structure Map is Exhibit No. 25.

All the data collected to date indicates that the Pictured Cliffs formation within the area of the Northeast Blanco Unit qualifies as a "Tight Reservoir".

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

12 November 1980

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7085

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: William F. Carr, Esq.
CAMPBELL & BLACK P. A.
Jefferson Place
Santa Fe, New Mexico 87501

I N D E X

CHARLES F. BLACKWOOD

Direct Examination by Mr. Carr 4

Cross Examination by Mr. Chavez 26

Cross Examination by Mr. Padilla 29

Cross Examination by Mr. Stamets 33

E X H I B I T S

Applicant Exhibit A, Map 7

Applicant Exhibit 1, Plat 6

Applicant Exhibit 2, Section 9

Applicant Exhibit 3, Regulations 10

Applicant Exhibit 4, Regulations 10

Applicant Exhibit 5, Recommendation 13

Applicant Exhibit 6, Report 15

Applicant Exhibit 7, Report 15

Applicant Exhibit 8, Report 16

Applicant Exhibit 9, Report 16

Applicant Exhibit 10, Report 17

Applicant Exhibit 11, Report 18

Applicant Exhibit 12, Report 19

Applicant Exhibit 13, Report 19

E X H I B I T S

Applicant Exhibit 14, Report 19

Applicant Exhibit 15, Report 19

Applicant Exhibit 16, Report 20

Applicant Exhibit 17, Report 20

MR. STAMETS: Call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd, for a designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. CARR: May it please the Examiner, I'm William F. Carr, Campbell and Black, Santa Fe, appearing on behalf of the applicant.

I have one witness who needs to be sworn.

(Witness sworn.)

CHARLES F. BLACKWOOD

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. CARR:

Q Will you state your name and place of residence?

A Charles F. Blackwood, Oklahoma City, Oklahoma.

Q By whom are you employed and in what capacity?

A. I'm employed by Blackwood and Nichols Company as a general partner and geological and engineering consultant.

Q. Have you previously testified before this Commission, had your credentials accepted and made a matter of record?

A. Yes.

Q. Are you familiar with the application in this case?

A. Yes.

Q. Are you familiar with the subject area?

A. Yes.

MR. CARR: Are the witness qualifications acceptable?

MR. STAMETS: Yes, they are.

Q. Mr. Blackwood, would you briefly state what Blackwood and Nichols Company, Limited, is seeking with this application?

A. We are requesting that the Pictured Cliffs reservoir be designated a tight reservoir under the terms of paragraph 107 of the Natural Gas Production Act.

Q. Have you prepared certain exhibits for introduction in this case?

A. Yes, I have.

Q. Have these exhibits previously been submitted to the Oil Conservation Division and the USGS with a statement of the meaning and purpose of the exhibits?

A. Yes, they have.

Q. Will you please refer to what has been marked for identification as Exhibit Number One, which is the land plat, and explain to Mr. Stamets what this is and what it shows?

A. This is a map which shows an area of the San Juan Basin. The boundary of the Northeast Blanco Unit, which Blackwood and Nichols Company is the operator, is shown on the plat by a dotted line all around the boundary.

This is approximately a 33,500 acre area which Blackwood and Nichols operates, and it also shows on there marked in red wells which are currently producing from the Pictured Cliffs formation. They're all along the northern boundary. Only two of which of these wells are inside the Northeast Blanco Unit. The remaining five wells are outside the boundary and have been included merely for information, because these are the only wells in the area and they're just additional information which has been put in for your perusal.

The Mesaverde gas wells are also shown in black on this well.

MR. CARR: Mr. Stamets, for clarifica-

tion, we have 17 numbered exhibits and we have an additional exhibit, which has been marked Exhibit A, which is a summary of the testimony which Mr. Blackwood will present here today, and so at this time I'm going to ask him to refer to Exhibit A and then as he works through Exhibit A he will be making reference to the other exhibits.

MR. STAMETS: Fine.

Q. Mr. Blackwood, will you refer to Exhibit A and review this for Mr. Stamets?

A. I have prepared a geographical and geological description, and I think it might be easiest if I just read this. This was prepared as written testimony and I believe the easiest -- well, I'll just read this into the record and if at any point you have a question, please feel free to stop me and I'll answer any kind of questions that come up.

MR. STAMETS: Okay.

A. Geographical: The San Juan Basin of northwest New Mexico is a major gas-producing area, which is approximately 80 miles long in a northwest to southeast trend, and 40 miles wide from the southwest to the northeast.

The center of this gas-producing area is approximately 25 miles southeast of Aztec, New Mexico. Most of the gas produced in this area is found in stratigraphic

reservoirs of the Mesaverde group and Dakota formation. Smaller volumes of gas have been produced from the Pictured Cliffs-Fruitland formations.

Blackwood and Nichols Co., Ltd., operates the Northeast Blanco Unit, a 33,500 acre area located on the northeast flank of the San Juan Basin. The Northeast Blanco Unit is located in Townships 30 and 31 North and Range 6 and 7 West; also Sections 25 and 36 of Township 31 North, Range 8 West; and Sections 1, 12, 13, and 24 of Township 30 North, 8 West. A map of the Northeast Blanco Unit is provided. This is the Exhibit One, which we've referred to.

The surface area is a part of the Colorado Plateau province and contains broad tablelands and rolling hills, interrupted by steep cliffs and canyons.

Geological: The Pictured Cliffs formation in this area is of upper cretaceous age. This formation consists of sandstones, shales, and coal seams. The sandstones within the formation are grey to greyish-white with a salt and pepper look; fine to medium grained, well sorted, angular to subrounded, composed mainly of quartz with some ferromagnesium minerals and glauconite cemented with calcite and bentonite.

These sandstones are a series of lenses or benches that were deposited on the -- as the shoreline

phase of a sea that regressed northeastward across the area. These benches show a definite northwest to southeast trend and overlap one another. They become stratigraphically higher from the southwest to the northeast, a general geologic section of the San Juan basin is attached. That is our Exhibit Two.

In the Northeast Blanco Unit area no wells were completed in or produced gas from the Pictured Cliffs formation prior to 1979. Over 100 wells have penetrated the Pictured Cliffs and have been completed in the deeper Mesaverde and Dakota formations. The Pictured Cliffs formation has been observed to contain natural gas at abnormally high pressures. In order to control these pressures it is necessary to raise the mud weight to approximately 12 pounds per gallon.

The information gathered while drilling and logging the Pictured Cliffs formation has indicated tight sandstone stringers, coal seams, and shale, which contain natural gas and water (very fresh) at abnormally high pressures.

No drill stem test information or other form of pressure information is available from which in situ permeability can be directly calculated. The stabilized flow rates of the newly completed Pictured Cliffs wells is used

to justify the designation of tight reservoir.

Blackwood and Nichols Company, Ltd., operates the Northeast Blanco Unit. We have taken all necessary precautions to insure that all fresh water zones are protected and not adversely affected by our operations. Our procedures have been in accord with all State and Federal rules and regulations. A part of the pertinent Federal regulations are attached. They are pages 1 through 5 of Supplement to USGS NTL-6.

Q And that's Exhibit Three?

A That's Exhibit Three.

Pages 6 -- pages, pardon me, pages C-6, C-7, and C-8 of the New Mexico Oil Conservation Division of the Energy and Minerals Department, are also attached.

Q Exhibit Four.

A That would be our Exhibit Four.

We believe that compliance with these rules and regulations adequately protects and will not adversely affect or impair any fresh water aquifers that are being used or expected to be used in the forseeable future for domestic or agricultural purposes.

Geological and Engineering Data: Pictured Cliffs formation of the northeast flank of the San Juan Basin -- pardon me, this should be reread.

The Pictured Cliffs formation of the northeast flank of the San Juan Basin occurs in San Juan and Rio Arriba Counties, New Mexico. It is composed primarily of sandstones, shales, and coal seams. Information has been obtained from electric, radioactivity, gamma ray neutron, sonic, formation density, sidewall neutron, and other logs run on more than 100 wells within the area of the Northeast Blanco Unit from 1950 to 1979. The analysis of these logs has shown that natural gas and water of near drinking quality is present in the pore space of Pictured Cliffs formation.

While drilling the Pictured Cliffs zone gas kicks have made it necessary to raise the weight of the drilling mud to approximately 12 pounds per gallon in order to control against blowouts. This indicates abnormally high pressure. The fact that this abnormally high pressure has not been able to escape the Pictured Cliffs sandstones is an indication of extremely low permeability within the formation.

The flow rates of all the wells producing from the Pictured Cliffs formation in the Northeast Blanco Unit area, and those adjacent to the north boundary, support the tight reservoir designation. All of the Pictured Cliffs producers were stimulated prior to production. Calculations to determine non-stimulated stabilized flow rates to the atmosphere for each well will be shown.

Stabilized production versus depth guidelines: Blackwood and Nichols Co., Ltd., drilled five holes in the Northeast Blanco Unit area to test shallow gas possibilities. All five wells encountered Pictured Cliffs sandstones, which appeared to be possibly productive. Completions in the Pictured Cliffs formation were attempted in all five wells. Three of those five wells produced small volumes of gas and water. All three wells were incapable of commercial gas production from the Pictured Cliffs formation and had to be reworked. The Pictured Cliffs zone was abandoned in the Northeast Blanco Unit Well No. 201, the Northeast Blanco Unit Well No. 203, and the Northeast Blanco Unit Well No. 205. Only two wells were successfully completed in the Pictured Cliffs formation.

These two wells were also completed in the Fruitland formation and are now producing with the Pictured Cliffs formation and the Fruitland formation commingled.

In order to allocate production between the two zones, 50 percent of the production from Northeast Blanco Unit Well No. 202 and Northeast Blanco Unit Well No. 204 has been allocated to each zone.

All Northeast Blanco Unit wells were stimulated prior to production. The calculated productivity improvements ratio is 10 to 11. The Western Company has fur-

nished a fracture stimulation recommendation for the Northeast Blanco Unit Well No. 203. A copy of this recommended procedure which shows fluids, rates, pressures, proppants, costs, et cetera, is enclosed.

Q And that is your Exhibit Number Five?

A Yes, this is Exhibit Number Five.

In order to approximate stabilized production rates without stimulation computations have been made. A theoretical stabilized production rate to the atmosphere has been calculated in the following manner:

The pressure differential between shut-in pressure and pipeline pressure has been ascertained for each producing well. This pressure differential is then used with pipeline pressure and actual production to calculate theoretical stabilized production rate to the atmosphere, and the following formula has been used:

$$\frac{\text{Delta pressure}}{\text{Shut-in pressure}} = \frac{\text{Production (to the pipeline)}}{\text{Production (to the atmosphere)}}$$

Where Delta pressure is equal to the shut-in pressure psig minus the pipeline pressure psig.

Then in order to estimate the non-stimulated stabilized production rate, the calculated production to the atmosphere has been divided by ten for wells stimulated in a manner similar to that recommended for the Northeast

Blanco Unit Well No. 203. This factor of ten is the smaller of the productivity increase calculated by Western Company as being created by the stimulation which has already occurred in the wells.

A productivity increase of four times has been assumed for other stimulation treatment (performed on Palmer Oil and Gas Company-Tenneco Wells.)

Next we will give information about the Northeast Blanco Unit Well No. 202, located in the northeast quarter of Section 11, Township 31 North, Range 7 West, San Juan County, New Mexico. This is a Fruitland-Pictured Cliffs commingled well.

The production is shown for June and July, 1980. I think I will summarize this somewhat in showing that it represents 275 Mcf per day per zone and 263 Mcf per day per zone.

When this production of -- well, I'll just read it.

Each zone has produced an average of 270 Mcf for the last two months into the pipeline. The production against atmosphere pressure is estimated to be 395 Mcf per day.

This well was previously stimulated and the productive capacity theoretically increased tenfold. The

pre-stimulation stabilized production rate to the atmosphere is calculated to be 40 Mcf per day from the Pictured Cliffs reservoir.

A copy of the completion report is enclosed.

Q Exhibit Six.

A That would be Exhibit Six.

The Northeast Blanco Unit Well No. 204, located in the southwest quarter of Section 1, Township 31 North, Range 7 West, San Juan County, New Mexico, a Fruitland-Pictured Cliffs commingled well.

Using 120 Mcf per day per zone as the average production into the pipeline, we've calculated that the production to the atmosphere would be 162 Mcf per day.

This well was stimulated prior to production. If we reduce the 162 Mcf per day per zone by a factor of five, based on theoretical productivity increase obtained by stimulation, we estimate 34 Mcf per day. So the Pictured Cliffs zone is calculated to have a 34 Mcf per day stabilized production rate against atmospheric pressure.

A copy of the completion report for this well is enclosed.

Q Exhibit Seven.

A That's Exhibit Seven.

Three other holes penetrated and logged the Pictured Cliffs formation in the Northeast Blanco Unit area in 1979. These were the No. 201, 203, and 205 Wells. The Northeast Blanco No. 201 was perforated and fracture stimulated in the Pictured Cliffs formation but was not able to flow gas at commercial rate from Pictured Cliffs perforations.

The Pictured Cliffs perforations were shut off and abandoned during a re-work of the well.

A copy of this recompletion report is attached.

Q And that's Exhibit Eight.

A Northeast Blanco Unit Well 203 was also originally perforated and fractured in the Pictured Cliffs formation. The Pictured Cliffs zone failed to flow commercial quantities of gas. The perforations in the Pictured Cliffs formation were abandoned during the re-work of the well in 1980.

A copy of the recompletion report is attached.

Q And that is our Exhibit Nine.

A Northeast Blanco Well No. 205 was originally completed in the Pictured Cliffs reservoir in August of 1979. When the well was turned on and production attempted, it would not flow gas because of too much water. It was neces-

sary to abandon the Pictured Cliffs perforations and recomplete the well in the Fruitland formation.

A copy of this recompletion report is enclosed.

Q That is our Exhibit Number Ten.

A That's right.

The experience of Blackwood and Nichols Co., Ltd., indicates that there is high risk of successfully completing commercial gas wells in the Pictured Cliffs formation in the Northeast Blanco Unit area. Five completions have been attempted and only two were successful and resulted in gas wells. 60 percent of the attempted completions in the Pictured Cliffs have not been successful.

The reasons for this high risk of completing wells are numerous. The reservoir rocks are extremely tight sandstones. Some gas is present in the coal seams. The sandstones are not continuous but are numerous lenses which probably are not in pressure communication with another. The resistivity logs are very difficult to interpret precisely as to gas and/or water saturations. The very fresh, highly resistive water which occurs in the sandstones is not easy to differentiate from natural gas by resistivity measurements.

This difficulty in precise gas and water saturation, along with the unknown, very low permeability of

the Fruitland formation makes it almost impossible at this time to determine which locations will be productive from the Pictured Cliffs formation without actually drilling, setting pipe, perforating, fracturing and testing the formation. Our success to date has only been 40 percent in the Pictured Cliffs formation.

Palmer Oil and Gas drilled and completed several wells adjacent to the northern boundary of the Northeast Blanco Unit. These wells were purchased by Tenneco Oil and Gas, who is now the operator. Production and completion information on these adjacent wells is shown below.

I think I'll summarize this if it's all right. My voice is failing.

The Tenneco Yager No. 3 in the southwest quarter of Section 3, Township 31 North, Range 7 West, San Juan County, New Mexico.

This well, when final calculations were made, ended up with a calculated stabilized production rate to the atmosphere without stimulation of 12 Mcf per day.

A 1976 deliverability test and completion report are enclosed.

Q. That's Exhibit Eleven, and Exhibit Twelve. No, that's just Exhibit Eleven.

A. Just Exhibit Number Eleven.

All right, the Tenneco State No. 3 Well, located in the southwest quarter of Section 3, Township 31 North, Range 7 West, San Juan County, New Mexico.

I'll summarize this to say that the calculated non-stimulated production rate to the atmosphere for this well is 45 Mcf per day.

A completion report and the 1978 deliverability test are enclosed.

Q. And that's Exhibit Twelve and Thirteen.

A. Okay. The Tenneco State No. 2, located in the southwest of Section 2, Township 31 North, Range 7 West, San Juan County, New Mexico.

Again to summarize, the calculated non-stimulated stabilized production rate to the atmosphere for this well is 68 Mcf per day.

A completion report and the 1978 deliverability test are enclosed.

Q. And that is Exhibit Fourteen and Exhibit Fifteen.

A. The Tenneco Yager No. 4 from the northwest quarter of Section 10, Township 31 North, Range 7 West, San Juan County, New Mexico.

Again to summarize, the calculated non-stimulated stabilized flow rate to the atmosphere for the Pic-

tured Cliffs formation is 25 Mcf per day.

And the Tenneco Federal No. 3, and again I'll summarize, the non-stimulated stabilized production rate to the atmosphere is 20 Mcf per day.

A deliverability test and the completion report are enclosed.

Q. And those are Exhibits Sixteen and Seventeen.

Mr. Blackwood, what conclusions can be drawn from this engineering and geological data?

A. Let me read my conclusions, if it's all right.

The Pictured Cliffs formation has been drilled through, logged, evaluated, and bypassed over thirty years in the Northeast Blanco Unit area. No wells were completed in the Pictured Cliffs formation in the Northeast Blanco Unit area prior to 1979.

Palmer Oil and Gas Company drilled and completed the first Pictured Cliffs wells in the area adjacent to the northern boundary of the Northeast Blanco Unit in 1978.

Blackwood and Nichols Co., Ltd., has drilled and completed over 100 producing gas wells in the 33,500 acre Northeast Blanco Unit area from 1950 to 1978, and had never attempted a Pictured Cliffs completion.

MR. STAMETS: Mr. Blackwood, I'm sorry to interrupt you but I have to take a phone call.

(Thereupon a recess was taken.)

MR. STAMETS: Okay, we can go back on the record. I'm sorry for the interruption, Mr. Blackwood, and if you'd like to pick up wherever you choose on this, we will go ahead, hopefully with no more interruptions.

MR. BLACKWOOD: Thank you.

Blackwood and Nichols Company, Ltd., has drilled and completed over 100 producing gas wells in the 33,500 acre Northeast Blanco Unit from 1950 to 1978, and never attempted Pictured Cliffs completion. The information gathered while drilling the more than 100 wells indicated that the Pictured Cliffs reservoir was very tight and contained both natural gas and fresh water.

In 1979 Blackwood and Nichols Co., Ltd., drilled five holes along the northern boundary of the Northeast Blanco Unit. Completions were attempted in the Pictured Cliffs formation. Three of the five completion attempts were unsuccessful and three holes had to be abandoned in the Pictured Cliffs formation and recompleted in the Fruitland forma-

tion.

At this time it is very difficult, if not impossible, to precisely calculate gas and water saturations within the sandstone lenses of the Pictured Cliffs formation.

It can be shown that natural gas occurs in the Pictured Cliffs formation in this area. It is known that the Pictured Cliffs formation is extremely tight. The low permeability and uncertainty as to gas and water saturations has caused this zone to be bypassed prior to 1979.

The low permeability, high cost, and high risk trying to produce the Pictured Cliffs was an uneconomic venture. The designation of the Pictured Cliffs as a tight reservoir will enable gas to be produced from this formation which would otherwise be left in the ground as noncommercial.

The Pictured Cliffs wells which we have -- which have recently been completed and produced in this area have the calculated non-stabilized flow rates to the atmosphere shown below:

Northeast Blanco Unit Well 204, 40 Mcf per day.

Northeast Blanco Unit Well No. -- pardon me. I believe I misread. It's 202 is 40 Mcf per day.

The Northeast Blanco Unit Well No. 204,

34 Mcf per day.

Tenneco Yager No. 3, 12 Mcf per day.

Tenneco State No. 3, 45 Mcf per day.

Tenneco State No. 2, 68 Mcf per day.

Tenneco Yager No. 4, 25 Mcf per day.

Tenneco Federal No. 3, 20 Mcf per day.

A seven-well total, 244 Mcf per day.

The average Pictured Cliffs well, 35 Mcf per day per well.

All available data collected to date support the designation of Pictured Cliffs formation as a tight reservoir in the Northeast Blanco Unit area. The average well's current calculated stabilized producing rate to the atmosphere without stimulation is 35 Mcf per day. None of the seven newly completed Pictured Cliffs wells in the area have a flow rate which exceeds the 91 Mcf per day rate which is published (depth versus rate guideline.)

The cost of drilling, completing, fracture stimulating, et cetera, when combined with the risks of unsuccessful completions, make a tight reservoir designation necessary for the recovery of these gas reserves.

Q. In assembling this data, have you used methods, techniques, and tests that are acceptable throughout the oil and gas industry?

A. Yes.

Q Does the data available to you and presented at this hearing support the conclusion thatthe entire area governed by this application should qualify for a tight formation designation?

A. I believe it should.

Q In your opinion does the Fruitland formation underlie all the acreage which is included within this application?

A. I believe you mean the Pictured Cliffs. Yes.

Q. I mean the Pictured Cliffs.

A. Yes, it does.

Q. Is this formation productive throughout the area?

A. We cannot prove that it will be productive throughout the area, but we believe that it will be productive over the entire area at numerous locations and at certain locations it will not be. It will be spottily productive throughout the entire area.

Q Without the higher price authorized for tight formations, will the area be developed?

A. I don't believe so.

Q. Now, in determining that 90 Mcf was authorized per day by the Oil Conservation Division rules, what

average depth were you using for the top of the Pictured Cliffs formation?

A. I think we used about 3200 feet.

Q. Are any fluids produced from any of these wells?

A. Yes, they make varying amounts of fresh water.

Q. Is there any oil or condensate produced?

A. A tiny amount of condensate that's so far been too small to even collect.

Q. So it would be safe to say that any well drilled in the portion of the Pictured Cliffs covered by this application would not be anticipated to produce five barrels of crude oil per day prior to any sort of treatment.

A. No, certainly not.

Q. Has this formation been authorized for development with an infill drilling program?

A. No.

Q. Were Exhibits A and One through Seventeen prepared by you or under your direction and supervision?

A. Yes, they were.

MR. CARR: At this time, Mr. Examiner, we would offer Applicant's Exhibit A and One through Seventeen.

MR. STAMETS: These exhibits will be admitted.

Q. Mr. Blackwood, in your opinion will granting this application be in the best interest of conservation, prevention of waste, and protection of correlative rights?

A. Yes, it will.

MR. CARR: At this time I have nothing further on direct and would pass the witness.

MR. STAMETS: Are there questions of this witness?

CROSS EXAMINATION

BY MR. CHAVEZ:

Q. Mr. Blackwood, on your calculations, why did you use the direct proportional method productivity index instead of using the back pressure type curve to calculate what would have been the volumes that would have been produced by a well to atmosphere?

A. Well, because we were dealing with actual production figures into a pipeline, and we felt that what we were dealing with was the pressure loss required to produce gas against the pipeline back pressure, and we felt that the most reasonable proportion there would be merely to increase

the pressure in a direct relationship down to the pipeline pressure of zero.

Q. You felt that that gave you a little more accuracy than a back pressure type curve?

A. We thought it was -- yeah, the same accuracy.

Q. You're aware now that these wells are in a pool already.

A. Yes.

Q. That pool itself extends up into Township 32 North, 7 West.

A. Uh-huh.

Q. Was there a particular reason why you wanted one section of that pool designated as tight and leave out the other?

A. The only reason that I limited this area to the area that my company operates, was because we're a small company and I represent the entire engineering staff of the company, with the exception of one field completion engineer, and that the Federal regulations require that I introduce evidence as to every producing well from the reservoir in the area which my application covers, and I thought that I would prefer to limit the area of my application to the area that we operate.

Q. Mr. Blackwood, we've noticed up in this area and further to the northeast, that there are at times problems in defining where actually the Pictured Cliffs formation begins, and due to the different coal seams. Now, what the accepted definition has been, has been the first gas producing sand below the last Fruitland coal; however, in this area and further to the northeast, we find that the USGS and other agencies have designated a Fruitland tongue within the Pictured Cliffs formation.

Now does this -- do you foresee any problems in defining the Pictured Cliffs, say, with what the OCC has used to date and what seems like a trend is being with this coal -- coal tongue?

A. Well, if you'll go back to my first just talking about the Pictured Cliffs, let me -- let me mention, it says that the -- the lenses in the Pictured Cliffs do intertongue with the lenses in the Fruitland, and it is a difficult problem to define precisely the Fruitland-Pictured Cliffs boundary. I -- I have not attempted to make a specific definition here. I think that needs more to be left up to the -- probably a large study committee involving numerous geologists, but the way that I have handled this, is I have also a sister application, which is coming up next, in which we talk about the Fruitland, and inasmuch as Fruitland and Pictured Cliffs

are allowed to be commingled for production, I believe we can skip that definition problem at this point.

So I have not really faced that problem.

Q Okay.

MR. CHAVEZ: That's -- that's all I have right now.

MR. STAMETS: Are there other questions of the witness?

MR. PADILLA: I have a couple, Mr. Examiner.

CROSS EXAMINATION

BY MR. PADILLA:

Q Mr Blackwood, the Pictured Cliffs formation is not being developed by infill drilling at this time in the area -- in the proposed area.

A I don't believe that there's any infill drilling on it.

Q And the only -- the only wells, Pictured Cliffs wells, in the proposed area are the two wells up in the north, is that correct?

A Yes, that's correct.

Q Have you calculated any type of permeability factors on those -- either of those two wells that

would be characteristic of the entire -- that you would -- in your opinion would be characteristic of the entire area?

A. No, I have not.

Q. You're just going on the assumption that historically the Pictured Cliffs has been -- has -- is a tight formation?

A. We are basing our entire application on the fact that the rates of flow are substantially below the rate versus depth guideline tables and the fact that this area is, yeah, is basically known to be a very tight area. We do not have any hard permeability data that we can submit on this application.

Q. You're aware that one of the guidelines that the FERC has set is that the average in situ permeability is 0.1 millidarcy or less.

A. Yes. In our Fruitland formation application we have hard evidence to show that; however, in this we are going on the alternate method, which we cannot prove the permeability is -- we simply do not have data on the permeability.

Q. Do you have any estimates as to -- at all as to what the permeability characteristics of this are?

A. Merely from the -- from the depths and the flow rates and the amount of perforated producing interval,

I would assume it is less than 0.1 millidarcy per foot, but I don't have hard engineering data to prove it.

Q. My problem is that if -- that you have no evidence of low permeability characteristics; this might also be interpreted as being low deliverability type of wells. In other words, they just don't produce very much and the permeability may be not low characteristics -- or not low permeability characteristics,

A SPECTATOR: Is what, sir?

Q. May not have low permeability characteristics. In other words, I'm trying to distinguish between a situation where we have low type of deliverability wells and wells that have low permeability.

A. I don't believe such a distinction can be made. If -- if a fairly thick area of reservoir has even reasonable permeability, its deliverability will be high. The permeability is directly related to deliverability and the only way that you're going to have a well with extremely low deliverability is to have extremely low permeability.

Q. Well, couldn't you have wells that have a very thin pay section that would have low deliverability as opposed to wells that have a thicker --

A. Well, permeability is -- the permeability number that we're talking about here is related to thickness.

It's millidarcy -- 0.1 of a millidarcy per foot thickness. So these things are automatically rolled in together. If you have a very -- a 2-inch thick reservoir, then you could indeed have a migh permeability and a low deliverability.

But we don't have that. We have normal thickness throughout in the range of 30 or 40 feet of thickness, and we have low deliverabilities, which when you relate back to thickness, have to have very low permeability, on the order of 0.1 of a millidarcy per foot of permeability, or less.

Q What evidence have you introduced that indicates that? In other words, that you don't have a high permeability, low pay?

A Okay, the completion reports on each of the wells show the perforated interval, which indicates the thickness of the reservoir, so that we have, although I have not specifically talked about it, each of the completion reports does give the perforated interval; therefor, the interval of the reservoir, and none of these are, you know, very think, 1-foot thick reservoirs or anything.

Q Now, as far as the protection of the fresh water in the area, you've indicated -- pointed to Federal and State regulations specifically, you're talking about the casing requirements.

A. Yes, casing and cementing requirements, uh-huh.

Q. And those are sufficient in your opinion to protect the fresh water aquifers.

A. I believe that they are.

MR. PADILLA: I believe that's all I have, Mr. Examiner.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Blackwood, some of this is going to be repeat, but I want to just go through what we list as evidence in our Order Number R-6388, so that I'll assure myself that everything is in there, or at least we've talked about everything.

Starting from the top, then, you've indicated that you have no evidence of the in situ gas permeability in the Pictured Cliffs in the area.

A. We -- we have no direct evidence from which a bonafide calculation can be made.

Q. No core analysis, no --

A. No core analysis.

Q. -- Horner plots.

A. That's right.

Q. Okay.

A. We have indirect evidence that would lead us to believe the permeability is within that area, but --

Q. Then as to the stabilized production rates, you have no stabilized production rates on wells that have not been treated before the rates were obtained.

A. That's true. All of these wells were completed and fractured prior to our knowledge that anyone would ever want such a thing --

Q. Right.

A. -- as a non-stimulated --

Q. Right.

A. -- production curve.

Q. Right, and you have utilized a set of calculations to try to estimate what those might be.

A. Yes, that's right.

Q. Okay, and all of those that you estimated fall below the 91 Mcf per day that is set out in the regulations.

A. That's true.

Q. Okay. And you've indicated that there is very little hydrocarbon liquids produced at all and nothing that would be called a crude oil.

A. That's true.

Q. Okay. Now, in Rule 2-D of R-6388 it says, if an application meets the guidelines contained in sub-paragraphs B and C above, B and C being stabilized rates and liquids production, but does not meet the guidelines contained in sub-paragraph 2-A, which is the permeability, 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.

Now, where is the evidence as to the extraordinary risk and cost and that the incentive price is needed before you go out and try and make some completions here?

A. The evidence that I gave earlier about only two of the five wells being successfully completed in the Pictured Cliffs, and that three of the five had to be abandoned in the Pictured Cliffs, I think is evidence that -- that there is extraordinarily high risk, that this is not a cinch. We go out and we drill the wells and we -- we hope that about half of them will be producers in the Pictured Cliffs formation.

Our evidence to date is 40 percent have produced and 60 percent have been unsuccessful. The --

Q. Well --

A. No, I think we can add to this. We need --

Q. Okay, I --

A. I appreciate your questions.

Q. Let me state that that's interesting, but I don't believe that that is proof.

I think what we'd have to have would be something which would have the costs of these wells, plus the reserves that you developed, and what you would expect to receive back from these reserves, and basically, how much money you're going to get back for the investment in the five wells.

A. Well, I think that would be desireable to have. The only thing I can say, let me tell you that these wells cost approximately $150,000 each when they were drilled; that three of them had to be reworked at a cost of approximately $50,000 each, and were then unsuccessful; that the stimulation treatments for each of these wells cost approximately $50,000.

Q. That's over and above the $150,000?

A. No, that was in the initial $150,000.

Q. Okay.

A. Then we are unable to give you an accu-

rate reserve picture at this time because the two wells -- one of the wells has only been producing for 90 days, and although I could come up with a volumetric number, I would not have the confidence in a reserve number that's developed after 90 days production that I would from a well that's produced for a year.

Q. How about the other well, how long has it been on production?

A. The one well has produced now almost a year, the Well No. 204. Well No. 204 has produced almost a year and I could probably come up with a reasonable reserve estimate for that one well. I have not done so at this time.

Q. It would seem to me that something like that has to be done in order to say that we have a situation here where we have extraordinary risk and to demonstrate that the incentive price is needed to develop this.

MR. CARR: Can you keep the record open to enable us to submit that data?

MR. STAMETS: I'm certain that we can. I'm not certain that submitting that without an opportunity for cross examination would be appropriate in this case. This is -- these things -- these cases are not routine at this point, and this is the first one where we've not had at least some evidence as to the permeability.

I might prefer that we simply continue the case for additional testimony on another day. I --

A. That would be acceptable with me.

Q. I can appreciate that you might not want to come back that day.

A. I always like to visit Santa Fe.

Q. We'd like to do these first ones right.

MR. CARR: And if it's continued, we would like to have it continued to one of your hearings, and so that would be what, December the 10th?

MR. STAMETS: Right, I believe that's correct.

MR. CARR: We can be here then if you would like to continue it.

A. I can prepare some additional information and return December 10th, if that would be agreeable.

MR. STAMETS: Okay, let's go on and look at some more of these issues here and make certain that everything is clear in everybody's mind where we stand and what additional data we might need.

Under Two-D-1 it says an application based on the guideline outline in sub-paragraph Two-D shall include data to support the contention that the guidelines contained in Two-B and Two-C are met, and in addition thereto

shall contain the types and extent of enhanced recovery -- enhanced production techniques which are expected to be necessary. Now you've included that in your report from Western?

A. Yes.

Q. Okay. The estimated expenditures necessary for employing these techniques --

A. Those are part of this report.

Q. Okay, and an estimate of the degree of increased production from use of such techniques, together with engineering and geological data to support that estimate.

A. That -- those are also included.

Q. Okay, and you're satisfied with those. I haven't, of course, had time to read through those today. I will, subsequent to the hearing, if I have any questions on those, I'll relay them to you so that you'll be prepared when the case is reopened.

A. Fine.

Q. Okay. Another thing that I think should be -- that is needed in this case, is a simple cross section, probably north to south, since that's the longer axis of the area, which would demonstrate the formation, its appearance on the logs and its top and bottom.

A. All right.

Q. And the selection of a type log. I

would suggest that perhaps this would be coordinated with the Geological Survey and our Aztec District Office. Probably that could be done even over the telephone.

A. Yeah, we can do that.

Q. Now, let's assume for the minute that -- that we're finally satisfied with all of the information that we have. Information on permeability could be developed as new wells are completed, is that not correct?

A. Yes, that's correct.

Q. Cores could be taken and analyzed and/ or wells --

A. I understand that cores will really not help you much; that the better method of obtaining permeability data would be from pressure testing, from drill stem tests and /or perforation into the zone prior to stimulation; that cores themselves are subject to other -- a number of problems when you start talking about in situ permeability, because you don't -- the cores have already changed by the time you have removed them from the borehole and -- and they have -- they self-fracture; therefor, that your permeabilities are different. So I would submit that cores are probably not going to be one of the more desireable ways to go forward with.

Q. Would Blackwood and Nichols be willing

to take an actual flow test and calculate permeabilities on a certain number of wells to be completed within the area?

A. Yes. In fact, we're planning on doing that on some future wells. We -- this thing caught us unawares, you know, by the time we knew what the rules were for testing, we had already stimulated all of these previous wells.

MR. STAMETS: Does anyone have any other questions of this witness?

MR. CHAVEZ: I've got one more, just to clear up my own confusion.

You're asking for this tight determination just within the unit boundary?

A. Yes.

MR. CHAVEZ: Okay. Also, on figure two in your exhibit from WEstern, you used a productivity index contrast (sic). Have you used the Vogel inflow performance relationship curves, also, just to make a determination as to increase in permeability or what should I say, increase in production?

A. The only -- the only data which we have used is a relationship in productivity improvement that's based on these curves in the Western. We have not used any other method.

MR. CHAVEZ: Okay, in your -- the next

page, Exhibit -- well, after Exhibits One and Two, the permeability to stimulation fluid and permeability to reservoir fluid, these were assumed permeabilities of the formation that you used?

A. Yes, that's right.

MR. CHAVEZ: Did the stimulation records -- the pressures during the actual stimulations coincide with the or come pretty close to what was predicted to be the pressures that you would --

A. Yes, in this -- in this No. 203 Well, when the Fruitland zone was stimulated, we reached a maximum injection pressure of 2800 pounds when they had estimated a 2700 pound pressure, and we were able to exceed the rate slightly, but they were -- they were close, yes. The actual occurrence of the stimulation procedure was very similar to the predicted occurrence.

MR. CHAVEZ: Do you think that was due in part to the correct -- or the assumption of permeability?

A. I believe so.

MR. CHAVEZ: Okay, that's all I have.

MR. STAMETS: Does anyone have any other questions of Mr. Blackwood at this time? He may be excused. And if there is nothing further, this case will be continued to the December 10th Examiner Hearing.

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

_____

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____, heard by me on _____ 19____.

_____, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
20 May 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. NUTTER: Call Case Number 7086.

MR. PADILLA: Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. NUTTER: Applicant has requested continuance.

Case Number 7086 will be continued to the Examiner Hearing scheduled to be held at 9:00 o'clock a. m. at this same place, June 3rd, 1981.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7086 heard by me on 5/20, 19 81.

Oil Conservation Division Examiner

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
20 May 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. NUTTER: Call Case Number 7086.

MR. PADILLA: Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. NUTTER: Applicant has requested continuance.

Case Number 7086 will be continued to the Examiner Hearing scheduled to be held at 9:00 o'clock a. m. at this same place, June 3rd, 1981.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7086 heard by me on 5/20 1981.

, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

SUPPLEMENTAL INFORMATION

Gathered after October 1980

In Support of the Tight Reservoir Designation

PRODUCTION

Month	Well # 202 Mcf		Well # 204 Mcf	
	@15.025	@14.73	@15.025	@14.73
Oct. 1980	9573	9764	7118	7260
Nov. 1980	9899	10097	7130	7273
Dec. 1980	10006	10206	6173	6296
Jan. 1981	7798	7954	6341	6468
Feb. 1981	5959	6078	4043	4124
Mar. 1981	9337	9524	5995	6115

Production from the two wells given above is from the commingled Fruitland and Pictured Cliff reservoirs. To estimate production by zone we have assigned the total production equally to each formation.

Northeast Blanco Unit Well # 202

In March, 1981 the production rate (Pictured Cliffs) was 146 Mcfpd. The estimated stabilized production rate (stimulated) to the atmosphere is calculated to be 922/(922-292) x 146 = 214 Mcfpd. The stimulation procedure theoretically improved the producing capacity by a factor greater than ten. Therefore, the "non stimulated stabilized production rate to the atmosphere" is estimated to be 21 Mcfpd for March 1981 from the Pictured Cliffs formation.

Northeast Blanco Unit Well # 204

In March, 1981 the production rate (Pictured Cliffs) was 96 Mcfpd. The estimated production rate to the atmosphere is calculated to be 942/(942-246) x 96 = 130 Mcfpd. The stimulation procedure theoretically improved the producing capacity by a factor greater than five. Therefore the "non stimulated stabilized producing rate to the atmosphere" is estimated to be 26 Mcfpd for March, 1981.

Production from the nearby gas wells operated by Tenneco for the month of March, 1981 is shown below.

Tenneco Yager # 3

1025 Mcf @15.025 psi 31 days
34 Mcfpd @14.73 psi

$\frac{1467}{(1467-311)}$ x 34 = 43 Mcfpd to the atmosphere

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 8
CASE NO. 7086
Submitted by Gladwood
Hearing Date June 3, 1981

Tenneco Yager # 4

1652 Mcf @15.025 psi 31 days
54 Mcfpd @14.73 psi

$\frac{1425}{(1425-310)}$ x 54 = 76 Mcfpd to the atmosphere

The production of this well was enhanced by stimulation by a procedure which theoretically increased productive capacity four fold. Therefore the estimated "stabilized non stimulated productive rate to the atmosphere" is 19 Mcfpd for March, 1981.

Tenneco State # 2

3874 Mcf @15.025 psi 31 days
126 Mcfpd @14.73 psi

This zone was stimulated by a fracture treatment which theoretically increased productive capacity by a factor of four. Therefore the "stabilized non stimulated production rate to the atmosphere" is estimated to be 31 Mcfpd.

Tenneco State # 3

3613 Mcf @15.025 psi 31 days
119 Mcfpd @14.73 psi

The well was fractured to increase productiivity by more than four times. Therefore the estimated "stabilized non stimulated production rate to the atmosphere" is 30 Mcfpd.

Tenneco Federal # 3

498 Mcf @15.025 psi 31 days
16 Mcfpd @14.73 psi

The seven producing Pictured Cliffs wells in this area have an average "non stimulated stabilized production rate to the atmosphere" of 27 Mcfpd in March 1981.

PERMEABILITY TESTING NEW WELLS

Blackwood & Nichols Co., Ltd. has drilled and tested three new wells in the Pictured Cliffs formation since 1980. The Northeast Blanco Unit Well # 13-A was drill stem tested on November 29, 1980. Copies of the Drill Stem Test are attached (Exhibit No. 18). The data collected indicates that the formation is too tight to yield precise permeability information during the length of this test. The risk of sticking the drill stem test tools in the hole and losing the hole increases with the length of the test. It was therefore decided to test additional wells through casing in order to obtain permeability information.

The Northeast Blanco Unit Well # 206 (Section 12, 31N-7W) was drilled and production casing set to 3690' on March 25, 1981. The Pictured Cliffs formation was perforated with four holes per foot per interval 3528', 3529', 3537', and 3549'. 2 3/8 inch tubing was run to 3588' and the hole swabbed dry. A seven day pressure build up test was taken from April 7th through 14th, 1981. The

well was opened to flow but died in an hour. The well was shut in and new plans for testing were considered. On April 24, 1981 the Northeast Blanco Unit Well # 206 was flow tested for three hours. A rate of 17 Mcfpd was recorded. The well was then shut in for three days and the pressures recorded. The information collected during these tests has been evaluated and calculated to obtain "in s[illegible]u" permeability. The calculated permeability for this well (not stimulted) is 0.0116 Md/ft (millidarcies per foot). Copies of the seven day pressure test, three day pressure build up, three hour flow test chart, permeability calculation and pressure build up graphs are enclosed as Exhibit 19, "Permeability Information, Northeast Blanco Unit Well # 206".

Northeast Blanco Unit Well # 208 was drilled and production casing set to 3661' on April 9, 1981. The Pictured Cliff formation was perforated with four holes per foot per interval 3477', 3489', 3521', 3547', 3561', and 3570'. A seven day pressure build up test was run from April 14-21, 1981. The Northeast Blanco Unit Well # 208 was flow tested on April 22, 2981. A rate of 2.026 Mcfpd was recorded. The well was shut in and a pressure build up was taken from 4-23-81 to 4030-81. The information collected during these tests has been evaluated and calculated to obtain "in situ" permeability. The calculated permeability for this well (not stimulated) is 0.003 md/ft. Copies of the pressure build up tests, one point back pressure test, flow test, and pressure build up graphs are enclosed as Exhibit No. 20, "Permeability Information Northeast Blanco Unit WEll # 208".

SUMMARY AND CONCLUSIONS

The additional permeability data collected since November 1980 supports the "Tight Reservoir" designation. Three new wells were drilled and the Pictured Cliffs formation tested for pressure, flow rate, and permeability.

A Drill Stem Test of the Northeast Blanco Unit Well # 13-A, recorded data which indicated that the Pictured Cliffs formation was too "tight" to collect precise permeability data during a two hour drill stem test.

The Northeast Blanco Unit Well # 206 flowed 17 Mcfpd natural (no stimulation) and had a calculated permeability of 0.0116 md/ft.

The Northeast Blanco Unit Well # 208 flowed 2 Mcfpd natural (no stimulation) and had a calulated permeability of 0.003 md/ft.

The average calculated "non stimulated production rate" of the seven producing Pictured Cliffs wells in this area as of March 1981 is 27 Mcfpd per well. This is less than the 35 Mcfpd per well average shown for July, 1980.

Geologic Cross Sections, An Isopachous Map and a Structure Map of the Pictured Cliffs formation have been included in this application. They are identified as follows:

Geologic Cross Section A-A is Exhibit No. 21
Geologic Cross Section B-B is Exhibit No. 22
Geologic Cross Section C-C is Exhibit No. 23
The Gross Interval Isopachous Map is Exhibit No. 24
The Structure Map is Exhibit No. 25.

All the data collected to date indicates that the Pictured Cliffs formation within the area of the Northeast Blanco Unit qualifies as a "Tight Reservoir".

Western Petroleum Services

FRACTURE STIMULATION RECOMMENDATION

FOR

BLACKWOOD & NICHOLS CO., LTD

NEBU NO. 203

PICTURED CLIFFS AND FRUITLAND FORMATIONS

BLANCO PICTURED CLIFFS FIELD

SAN JUAN COUNTY, NEW MEXICO

Sec.11, T31N, R7W

Prepared for:
Mr. Loos
Blackwood & Nichols Co., LTD
Farmington, New Mexico

Prepared by:
Randy LaFollette
The Western Company
Denver, Colorado

August 12, 1980

Service Point:
Farmington, New Mexico
505-327-6222

410 17th Street • Suite 1920 • Denver, Colorado 80202 • Phone 303/623-6037

DISCUSSION:

The customer requested fracture stimulation designs for the Pictured Cliffs and Fruitland zones in the #203 well. Mini Max III-30 gel is recommended with a 2% condensate phase for fluid loss control. Mini Max III is a titanate cross-linked hydroxy-propyl guar gum gel featuring very low leak-off, perfect proppant support and neutral pH.

Figure I shows the anticipated rate-pressure relationship for treatment via 4½" casing. At the recommended rate of 30 BPM, a surface pressure of 2,600 psi is expected. Treatment with 100,000 gallons of Mini Max III-30/2% HC and 190,000# 10/20 mesh sand is recommended to yield a propped length of 972 feet. Average sand concentration in the fracture is .73#/ft^2 (see Exhibit II). Figure II shows the McGuire and Sikora productivity increase chart. With the reservoir and fracture parameters given, a theoretical 10 fold production increase is calculated.

The expected rate-pressure graph for the Fruitland is presented in Figure III. At the recommended 17 BPM rate, a surface treating pressure of 2,700 psi is expected. Treatment with 40,000 gallons of Mini Max III-30/2% HC and 76,000# 10/20 mesh sand is recommended to yield a propped length of 1,200 feet. Average sand concentration in the fracture is .75#/ft^2 (see Exhibit II). Figure IV shows the McGuire-Sikora graph. After scaling, an 11 fold productivity increase is calculated.

WELL DATA:

Formation:	Pictured Cliffs
Average Depth To Zone:	3,500 ft.
Zone Height:	133 ft.
Casing Size:	4½"
Perforated Interval:	3456, 3478, 3492, 3518, 3534, 3554, 2 jspf, .34" diameter
Bottom Hole Temperature:	120° F
Fracture Gradient:	.65 psi/ft
Bottom Hole Fracture Pressure:	2,275 psi
Bottom Hole Pressure:	1,375 psi
Overburden:	900 psi
Hydrostatic Head:	1,515 psi with fresh water
ISDP (fresh water):	760 psi
Porosity:	10%
Permeability:	.06 md
Well Spacing:	160 acres

TREATMENT PROCEDURE:

It is recommended that the Pictured Cliffs zone be fracture stimulated via 4½" casing with 100,000 gallons of Mini Max III-30/2% HC gel containing 190,000# 10/20 mesh sand. Average anticipated injection rate and surface treating pressure are 30 BPM and 2,600 psi, respectively. Stage fluid and sand as follows:

1. Pump 20,000 gallons of Mini Max III-30/2% HC as a pad to initiate the fracture and establish sufficient fracture width to accept sand. (Add 1#/1000 B-5.)
2. Pump 20,000 gallons of Mini Max III-30/2% HC with 1 ppg 10/20 mesh sand. (Add 1#/1000 B-5.)
3. Pump 20,000 gallons of Mini Max III-30/2% HC with 2 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
4. Pump 20,000 gallons of Mini Max III-30/2% HC with 3 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
5. Pump 20,000 gallons of Mini Max III-30/2% HC with 3½ ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
6. Cut sand, start flush with 500 gallons of Mini Max III-30 gel.
7. Continue to flush to top perforation with 1,815 gallons of fresh water.
8. Shut in for at least 6 hours to allow gel to break and fracture to heal and recover treating fluid load.

NOTE: All gel to contain 2% condensate, 1 gal/1000 Aquaflow, 1 gal/1000 Adocide.

TREATMENT PROCEDURE:

Treating Conductor	4½" casing
Injection Rate	30 BPM
Expected Surface Treating Pressure	2,600 psi
Total Pumpable Volume of Mini Max III-40 Gel Phase	100,000 gallons
Total Pumpable Volume of Condensate	2,000 gallons
Total Pumpable Volume of Fresh Water Flush & Reserve	5,000 gallons
Total 10/20 Mesh Sand Required	190,000#

Auxiliary Materials:

161# B-5 gel breaker

105 gallons Adocide bactericide

105 gallons Aquaflow surfactant

COST ESTIMATE:

100,500 gallons of Mini Max III-30/2% HC @ .24/gal	$24,120.00
161# B-5 @ 2.15/lb	346.15
105 gallons Adocide @ 29.40/gal	3,087.00
105 gallons Aquaflow @ 25.85/gal	2,714.25
Chemical Delivery Charge @ .68/T mi x 3.5 T x 75 mi	178.50
190,000# 10/20 Sand @ 5.25/cwt	9,975.00
Sand Pumping Charge @ .70/cwt	1,330.00
Proppant Delivery Charge @ .68/T mi x 95 T x 75 mi	4,845.00
30 BPM Master Mixer @ 760.00	760.00
1,912 HHP @ 3.15/HHP	6,022.80
Mileage Charge @ 1.90/unit mi x 6 units x 75 mi	855.00
Sandmaster @ 875.00	875.00
Ratiometer @ 134.00	134.00
TOTAL	$55,242.70

Subject to terms and conditions in the published price schedule of The Western Company of North America.

WELL DATA:

Formation:	Fruitland
Average Depth To Zone:	3,380 ft.
Zone Height:	42 ft.
Casing Size:	4½" - 10.5#
Perforated Interval:	3368, 3374, 3384, 3392, 2 jspf, .34" diameter
Bottom Hole Temperature:	120° F
Fracture Gradient:	.9 psi/ft
Bottom Hole Fracture Pressure:	3,050 psi
Bottom Hole Pressure:	1,375 psi
Overburden:	1,675 psi
Hydrostatic Head:	1,450 psi with fresh water
ISDP (fresh water):	1,600 psi
Porosity:	10%
Permeability:	.06 md
Well Spacing:	160 acres

TREATMENT PROCEDURE:

It is recommended that the Fruitland zone be fracture stimulated via 4½" casing with 40,000 gallons of Mini Max III-30/2% HC gel and 76,000# 10/20 mesh sand. Average anticipated injection rate and surface treating pressure are 17 BPM and 2,700 psi, respectively. Stage fluid and proppant as follows:

1. Pump 8,000 gallons of Mini Max III-30/2% HC as a pad to initiate the fracture and establish sufficient fracture width to accept sand. (Add 1#/1000 B-5.)

2. Pump 8,000 gallons of Mini Max III-30/2% HC with 1 ppg 10/20 mesh sand. (Add 1#/1000 B-5.)

3. Pump 8,000 gallons of Mini Max III-30/2% HC with 2 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)

4. Pump 8,000 gallons of Mini Max III-30/2% HC with 3 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)

5. Pump 8,000 gallons of Mini Max III-30/2% HC with 3½ ppg 10/20 mesh sand. (Add 2#/1000 B-5.)

6. Cut sand, start flush with 500 gallons of Mini Max III-30 gel.

7. Continue to flush to top perforation with 1,750 gallons of fresh water.

8. Shut in for at least 6 hours to allow gel to break and fracture to heal and recover treating fluid load.

NOTE: All gel to contain 2% condensate, 1 gal/1000 Aquaflow, 1 gal/1000 Adocide.

TREATMENT REQUIREMENTS:

Treating Conductor	4½" casing
Injection Rate	17 BPM
Expected Surface Treating Pressure	2,700 psi
Total Pumpable Volume of Mini Max III-30 Gel Phase	40,000 gallons
Total Pumpable Volume of Condensate	800 gallons
Total Pumpable Volume of Fresh Water Flush & Reserve	5,000 gallons
Total 10/20 Mesh Sand Required	76,000#

Auxiliary Materials:

42 gallons Aquaflow surfactant

42 gallons Adocide bactericide

65# B-5 gel breaker

COST ESTIMATE:

40,000 gallons of Mini Max III-30/2% HC @ .24/gal	$ 9,600.00
65# B-5 @ 2.15/lb	139.75
42 gallons Adocide @ 29.40/gal	1,234.80
42 gallons Aquaflow @ 25.85/gal	1,085.70
Chemical Delivery Charge @ .68/T mi x 1.5 T x 75 mi	76.50
76,000# 10/20 Sand @ 5.25/cwt	3,990.00
Sand Pumping Charge @ .70/cwt	532.00
Proppant Delivery Charge @ .68/T mi x 38 T x 75 mi	1,938.00
17 BPM Master Mixer @ 730.00	730.00
1,125 HHP @ 3.15/HHP	3,543.75
Mileage Charge @ 1.90/unit mi x 6 units x 75 mi	855.00
Ratiometer @ 134.00	134.00
TOTAL	$23,859.50

Subject to terms and conditions in the published price schedule of The Western Company of North America.

I.C.

FIGURE 3

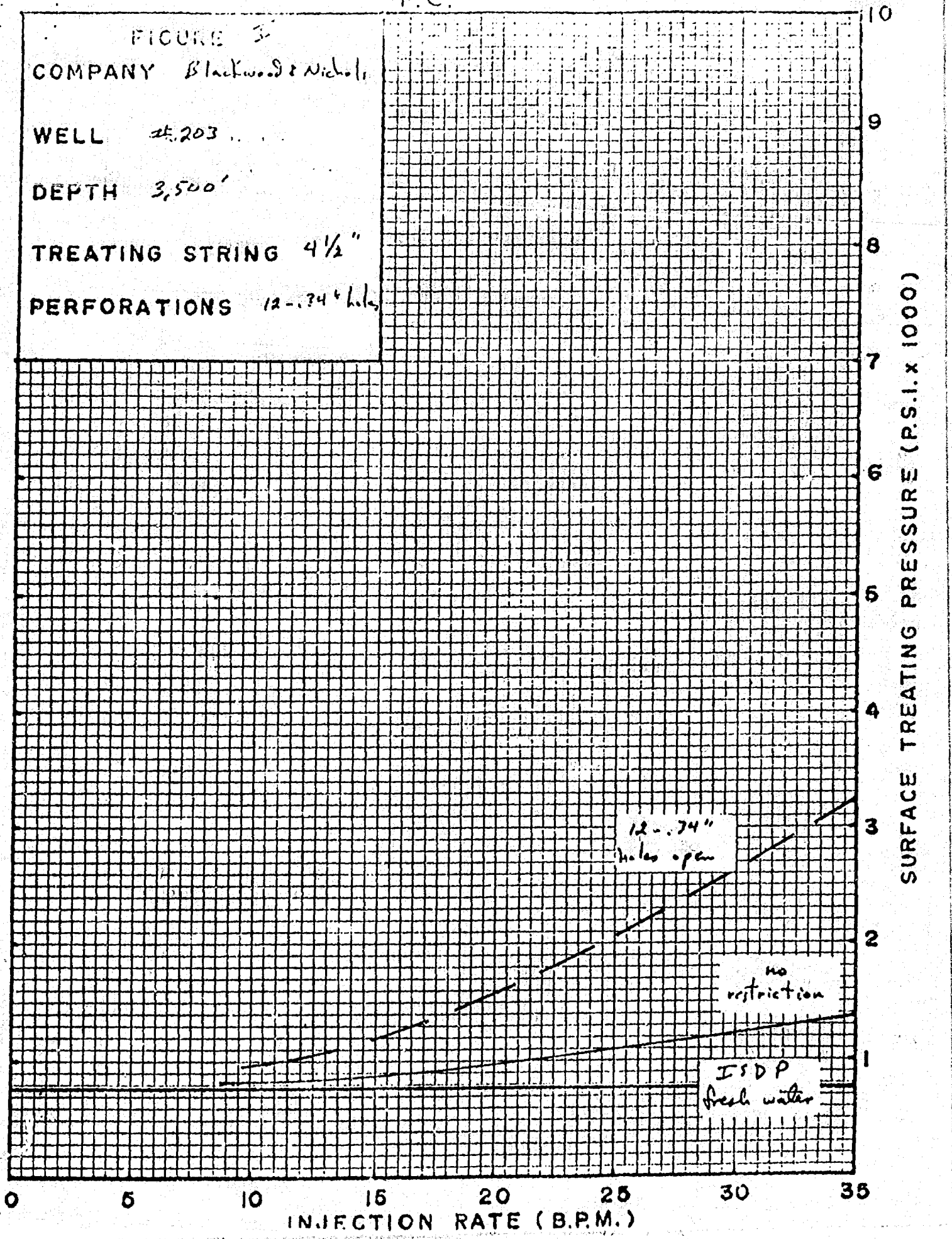
COMPANY Blackwood & Nichols

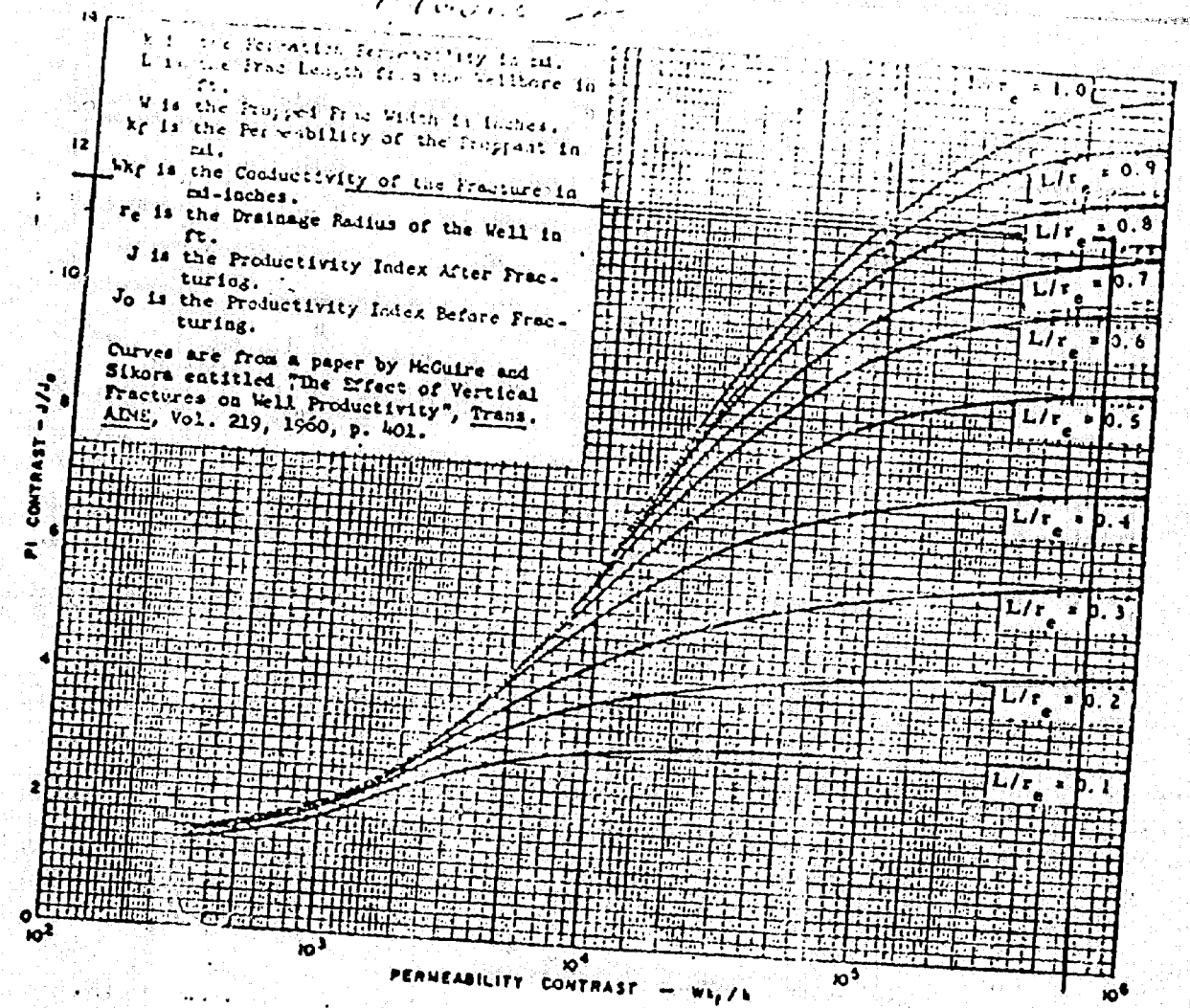
WELL #203

DEPTH 3,500'

TREATING STRING 4½"

PERFORATIONS 12-.74" holes





INCREASES IN PRODUCTION FROM VERTICAL FRACTURES

J/Jo = 10 after scaling

Note: This graph is based on a well spacing (A) of 40 acres and a wellbore radius (r_w) of 3 inches. It can be converted to other well spacing and wellbore radii by use of the following scaling factors:

Well Spacing	Drainage Radii	Scaling Factors for Abscissa (Wk_f/k)	Scaling Factors for Ordinate (J/J_o)
For spacing shown and 3-inch wellbore radius.			
10 Acres	330 ft	2.00	1.11
20 Acres	467 ft	1.42	1.05
40 Acres	660 ft	1.00	1.00
80 Acres	933 ft	0.71	0.95
160 Acres	1320 ft	0.50	0.91
320 Acres	1867 ft	0.35	0.87
640 Acres	2640 ft	0.25	0.84

For other spacing (A) and wellbore radii (r_w).

A	$104\sqrt{A}$	$\sqrt{40/A}$	$\frac{3.095}{\log(.472)(r_e/r_w)}$

FIGURE #1

COMPANY Blackwood & Nichols

WELL #203

DEPTH 3,380'

TREATING STRING 4½"

PERFORMATIONS 8-.34" holes

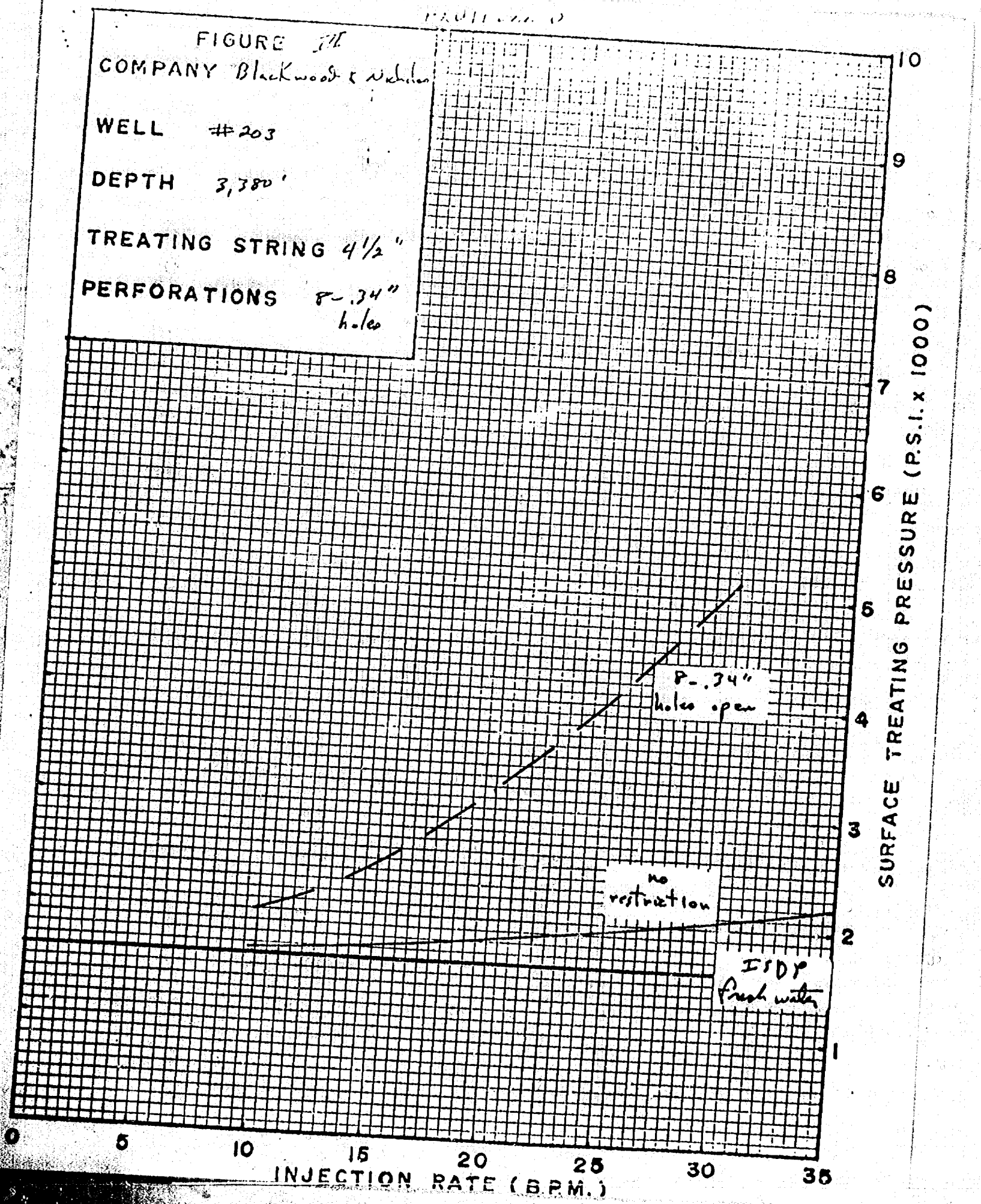
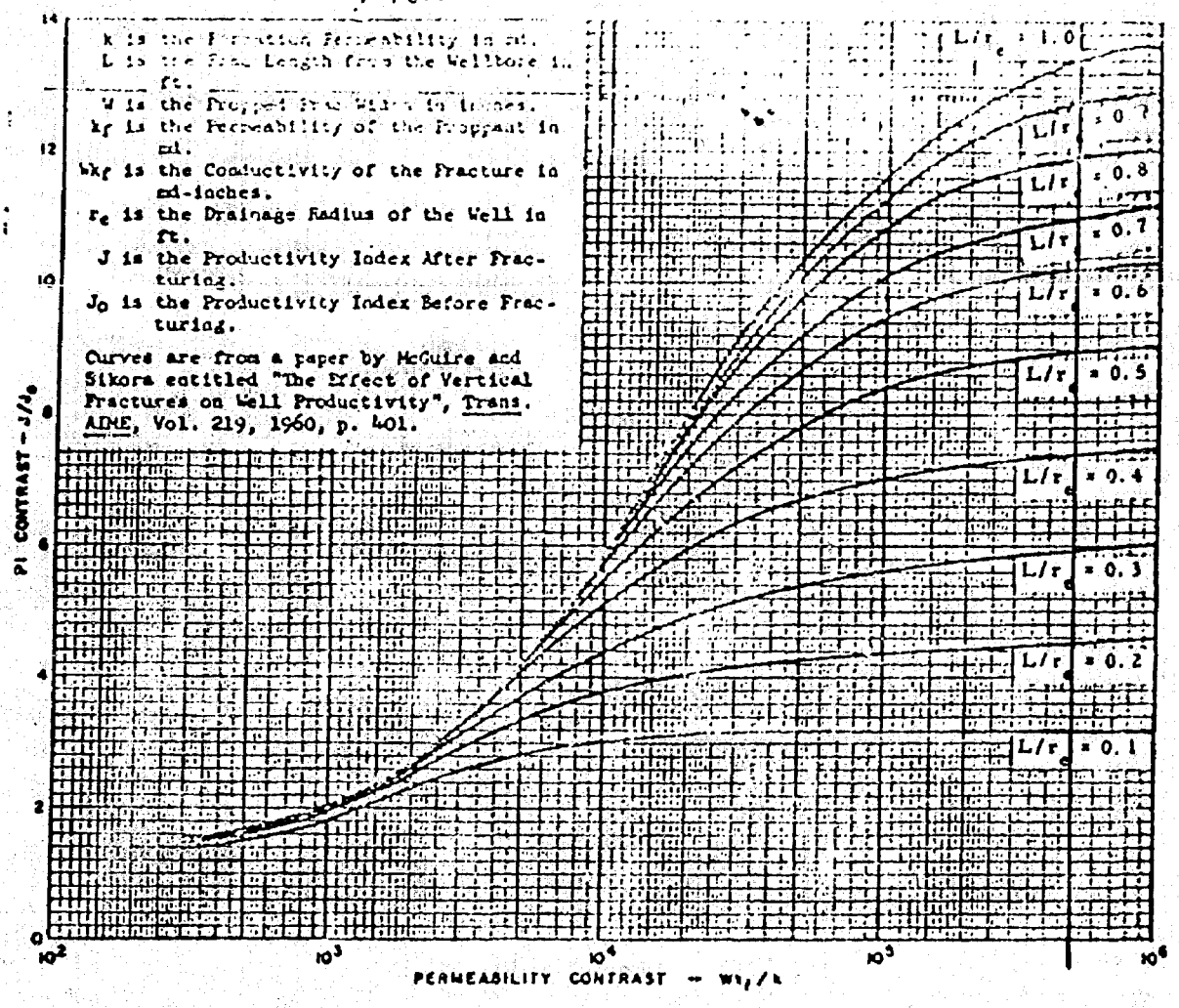


FIGURE 1.



INCREASES IN PRODUCTION FROM VERTICAL FRACTURES

J/Jo = 11 after scaling

Note: This graph is based on a well spacing (A) of 40 acres and a wellbore radius (r_w) of 3 inches. It can be converted to other well spacing and wellbore radii by use of the following scaling factors:

Well Spacing	Drainage Radii	Scaling Factors for Abscissa (Wk_f/k)	Scaling Factors for Ordinate (J/J_o)
For spacing shown and 3-inch wellbore radius.			
10 Acres	330 ft	2.00	1.11
20 Acres	467 ft	1.42	1.05
40 Acres	660 ft	1.00	1.00
80 Acres	933 ft	0.71	0.95
160 Acres	1320 ft	0.50	0.91
320 Acres	1867 ft	0.35	0.87
640 Acres	2640 ft	0.25	0.84
For other spacing (A) and wellbore radii (r_w).			
A	$104\sqrt{A}$	$\sqrt{40/A}$	$\frac{3.095}{\log(.472)(r_e/r_w)}$

EXHIBIT 1

THE WESTERN COMPANY

PROPPANT PROFILE STUDY

PERFECT SUPPORT FLUIDS

FLUID STUDIED - MINI MAX III 30/2%HC
TOTAL VOLUME - 108616 GAL
FLUID PENETRATION - 1121 FT

PERM. TO STIMULATION FLUID - .060
PERM. TO RESERVOIR FLUID - .060
LEAK-OFF FLUID VISCOSITY - 1.00
RESERVOIR FLUID VISCOSITY - .01
RESERVOIR FLUID COMP. - 4.00E-04
STIMULATION FLUID C-III - 0.00080
FRACTURE HEIGHT - 133
COMBINED C - 0.00060

FRAC. PRESSURE - 2275
RESERVOIR PRESSURE - 1375
N PRIME - .690
K PRIME - 0.013000
YOUNGS MODULUS - 5.00E+06
WIDTH - .396
INJECTION RATE - 30.0

FLUID VOLUME (GAL)	SURFACE PROPPANT CONC (LB/GAL)	LOCATION IN FRACTURE (FT)	FRACTURE PROPPANT CONC (LB/FT^2)	CUMLATIVE PROPPANT (LB)
20000	.00	972 TO 1121	.000	0
20000	1.00	795 TO 972	.425	20000
20000	2.00	582 TO 795	.705	60000
20000	3.00	320 TO 582	.862	120000
20000	3.50	0 TO 320	.821	190000

USED 4.63 UNITS

EXHIBIT II

THE WESTERN COMPANY

PROPPANT PROFILE STUDY

PERFECT SUPPORT FLUIDS

FLUID STUDIED - MINI MAX III 30/2% HC
TOTAL VOLUME - 43446 GAL
FLUID PENETRATION - 1377 FT

PERM. TO STIMULATION FLUID - .060
PERM. TO RESERVOIR FLUID - .060
LEAK-OFF FLUID VISCOSITY - 1.00
RESERVOIR FLUID VISCOSITY - .01
RESERVOIR FLUID COMP. - 4.40E-04
STIMULATION FLUID C-III - 0.00080
FRACTURE HEIGHT - 42
COMBINED C - 0.00083

FRAC. PRESSURE - 3050
RESERVOIR PRESSURE - 1375
N PRIME - .655
K PRIME - 0.024000
YOUNGS MODULUS - 5.00E+06
WIDTH - .383
INJECTION RATE - 17.0

FLUID VOLUME (GAL)	SURFACE PROPPANT CONC (LB/GAL)	LOCATION IN FRACTURE (FT)	FRACTURE PROPPANT CONC (LB/FT^2)	CUMLATIVE PROPPANT (LB)
8000	.00	1203 TO 1377	.000	0
8000	1.00	994 TO 1203	.455	8000
8000	2.00	736 TO 994	.739	24000
8000	3.00	411 TO 736	.880	48000
8000	3.50	0 TO 411	.810	76000

4.76 UNITS

BLACKWOOD & NICHOLS CO., LTD.
2013 FIRST NATIONAL CENTER WEST
OKLAHOMA CITY, OKLAHOMA 73102

405 235-8505

PICTURED CLIFFS FORMATION

GEOGRAPHICAL AND GEOLOGICAL DESCRIPTION OF THE FORMATION

Geographical

The San Juan Basin of northwest New Mexico is a major gas producing area, which is approximately 80 miles long in a NW - SE trend and 40 miles wide from SW - NE. The center of this gas producing area is approximately 25 miles SE of Aztec, New Mexico. Most of the gas produced in this area is found in stratigraphic reservoirs of the Mesaverde Group and Dakota formation. Smaller volumes of gas have been produced from the Pictured Cliffs and Fruitland formations.

Blackwood & Nichols Co., Ltd. operates the Northeast Blanco Unit, a 33,500 acre area located on the northeast flank of the San Juan Basin. The Northeast Blanco Unit is located in Townships 30 & 31N and Range 6 & 7W also Sections 25 & 36, T31N-R8W and Sections 1, 12, 13 & 24, T30N-R8W. A map of the Northeast Blanco unit is provided.

The surface area is a part of the Colorado Plateau province and contains broad tablelands and rolling hills, interrupted by steep cliffs and canyons.

Geological

The Pictured Cliffs formation in this area is of upper cretaceous age. This formation consists of sandstones, shales and coal seams. The sandstones within the formation are gray to grayish white, with a salt and pepper look, fine to medium grained, well sorted, angular to subrounded, composed mainly of quartz with some ferromagnesium minerals and glauconite cemented with calcite and bentonite. These sandstones are a series of lenses or benches that were deposited as the shoreline phase of a sea that regressed northeastward across the area. These benches show a definite northwest - southeast trend and overlap one another. They become stratigraphically higher from the southwest to the norteast. A general geologic section of the San Juan Basin is attached.

In the Northeast Blanco Unit area no wells were completed in or produced gas from the Pictured Cliffs formation prior to 1979. Over 100 wells have penetrated the Pictured Cliffs and been completed in the deeper Mesaverde and Dakota formations. The Pictured Cliffs formation has been observed to contain natural gas at abnormally high pressures. In order to control these pressures it is necessary to raise the mud weight to approximately 12 lbs/gallon.

The information gathered while drilling and logging the Pictured Cliffs formation has indicated tight sandstone stringers, coal seams and shales which contain natural gas and water (very fresh) at abnormally high pressures.

No Drill stem test information or other form of pressure information is available from which in situ permeability can be directly calculated. The stabilized flow rates of the newly completed Pictured Cliffs wells is used to justify the designation of a "tight reservoir".

Blackwood & Nichols Co., Ltd. operates the Northeast Blanco Unit. We have taken all necessary precautions to insure that all fresh water zones are protected and not adversely affected by our operations. Our procedures have been in accord with all State and Federal rules and regulations.

A part of the pertinent Federal regulations are attached. They are the pages 1 through 5 of supplement to U.S.G.S. NTL - 6.
Pages C-6, C-7 & C-8 of New Mexico Oil Conservation Division of the Energy and Minerals Department are also attached.

We believe that compliance with these rules and regulations adequately protects and will not adversely affect or impair any fresh water aquifers that are being used or expected to be used in the foreseeable future for domestic or agricultural supplies.

Geological and Engineering Data

The Pictured Cliffs formation of the northeast flank of the San Juan Basin and Rio Arriba County, New Mexico is composed primarily of sandstone lenses, shales and coal seams. Information has been obtained from Electric, Radiactivity, Gamma Ray Neution, Sonic, Formation Density, Sidewall Neution and other logs run on more than 100 wells within the area of the Northeast Blanco Unit from 1950-1979. The analysis of these logs has shown that natural gas and water (of near drinking quality) is present in the pore space in the Pictured Cliffs formation.

While drilling the Pictured Cliffs zone gas kicks have made it necessary to raise the weight of the drilling mud to approximately 12 lbs/gallon in order to control against blow outs. This indicates abnormally high pressure. The fact that this abnormally high pressure has not been able to escape the Pictured Cliffs sandstones is and indication of extremely low permeability within the formation.

The flow rates of all the wells producing from the Pictured Cliffs formation in the Northeast Blanco Unit area and those adjacent to the north boundary support the "tight reservoir" designation. All of the Pictured Cliffs producers were stimulated prior to production. Calculations to determine non stimulated atabilized flow rates to the atmosphere for each well will be shown.

Stabilized production vs depth guidelines

Blackwood & Nichols Co., Ltd. drilled five holes in the Northeast Blanco Unit area to test shallow gas possibilities. All five wells encountered Pictured Cliffs sandstones which appeared to possibly be productive. Completions in the Pictured Cliffs formation were attempted in all five wells. Three of those five wells produced small volumes of gas & water. All three wells were incapable of commercial gas production from the Pictured Cliffs formation and had to be re-worked. The Pictured Cliffs zone was abandoned in the Northeast Blanco Unit well # 201, Northeast Blanco Unit well # 203 and Northeast Blanco Unit well # 205. Only two wells were successfully completed in the Pictured Cliffs formation. These Two wells were also completed in the Fruitland formation and are now producing with the Pictured Cliffs formation and the Fruitland formation commingled. In order to allocate production between the two zones 50% of the production from the Northeast Blanco Unit well # 202 and Northeast Blanco Unit well # 204 has been allocated to each zone.

All the Northeast Blanco Unit wells were stimulated prior to production. The calculated productivity improvements ratio is 10-11. The Western Company has furnished a "Fracture stimulation Recommendation" for the Northeast Blanco Unit well # 203. A copy of this recommended procedure which shows fluids, rates, pressures, proppants, costs etc. is enclosed. In order to approximate stabilized production rates without stimulation computations have been made. A theoretical stabilized production rate to the atmosphere has been calculated in the following manner. The pressure differential between shut in pressure and pipeline pressure has been ascertained for each producing well. This pressure differential is then used with pipeline pressure and actual production to calculate the theoretical stabilized production rate to the atmosphere. The following formula has been used

$$\frac{\Delta p}{\text{Shut in pressure}} = \frac{\text{Production (to the pipeline)}}{\text{Production (to the atmosphere)}}$$

Where Δp = Shut in pressure psig-pipeline pressure psig

Then in order to estimate the "non stimulated" stabilized production rate, the calculated production to the atmosphere has been divided by 10, for wells stimulated in a manner simular to that recommended for the Northeast Blanco Unit well # 203. This factor of 10 is the smaller of the productivity encreases calculated by the Western Company as being created by the stimulation which has already occured in several wells. A productivity increase of 4 times has been assumed for other stimulation treatments (performed on Palmer Oil & Gas Company-Tenneco wells).

Northeast Blanco Unit well # 202
NE/4 Section 11, T31N-R7W
San Juan County, New Mexico
(Fruitland - Pictured Cliffs commingled)

	Mcf	Days	Mcf/pd	Mcfpd/zone
June, 1980	17,584	32	550	275
July, 1980	12,606	24	526	263

Each zone has produced an average of 270 Mcfpd for the last two months into the pipeline. The "production against atmosphere pressure" is estimated to be 395 Mcfpd.

$$\frac{922 - 292}{922} = \frac{270}{\text{Production (atmosphere)}}$$

The well was previously stimulated and productive capacity theoretically increased 10 fold. The pre stimulation "stabilized production rate to the atmosphere" is calculated to be 40 Mcfpd from the Pictured Cliffs reservoir. A copy of the completion report is enclosed.

Northeast Blanco Unit well # 204
Sw/4 Section 1, T31N-R7W
San Juan County, New Mexico
(Fruitland-Pictured Cliffs commingled)

Using 120 Mcfpd/zone as the average production into the pipeline, we calculate that the production to the atmosphere would be 162 Mcfpd.

$$\frac{942 - 246}{942} = \frac{120}{\text{Production (atmosphere)}}$$

This well was stimulated prior to production. If we reduce the 162 Mcfpd/zone by a factor of five based on the theoretical productivity increase obtained by stimulation we estimate 34 Mcfpd. The Pictured Cliffs zone is calculated to have 34 Mcfpd " stabilized production rate against atmospheric pressure" in this well. A copy of the completion report is enclosed.

Three other holes penetrated and logged the Pictured Cliffs formation in the Northeast Blanco Unit area in 1979. These were the # 201, # 203 and # 205 wells. The Northeast Blanco Unit well # 201 was perforated and fracture stimulated in the Pictured Cliffs formation but was not able to flow gas at commercial rate from the Pictured Cliffs perforations. The Pictured Cliffs perforations were shut off and abandoned during a re-work of the well. A copy of the re-completion report is atttached.

The Northeast Blanco Unit well # 203 was also originally perforated and fractured in the Pictured Cliffs formation. The Pictured Cliffs zone failed to flow commercial quantities of gas. The perforation in the Pictured Cliffs formation were abandoned during a re-work of the well in 1980. A copy of the re-completion report is attached.

The Northeast Blanco Unit well # 205 was originally completed in the Pictured Cliffs reservoir in August, 1979. When the well was turned on and production attempted, it would not flow gas because of too much water. It was necessary to abandon the Pictured Cliffs perforations and re-complete the well in the Fruitland formation. A copy of the re-completion report is enclosed.

The experience of Blackwood & Nichols Co., Ltd. indicates that there is a high risk of successfully completing commercial gas wells in the Pictured Cliffs formation in the Northeast Blanco Unit area. Five completions have been attempted and only two were successful and resulted in gas wells. Sixty percent of the attempted completions in the Pictured Cliffs formation have not been successful. The reasons for this high risk of completing wells are numerous. The reservoir rocks are extremely tight sandstones. Some gas is present in the coal seams. The sandstones are not continuous, but are numerous lenses which probably are not in pressure communication with one-another. The resistivity logs are very difficult to interpret precisely as to gas and or water saturations. The very fresh highly resistive water which occurs in the sandstones is not easy to differentiate from natural gas by resistivity measurements. This difficulty in precise gas and water saturations along with the unknown very low permeability of the Fruitland formations makes it almost impossible at this time to determine which locations will be productive from the Pictured Cliffs formation without actually drilling, setting pipe, perforating, fracturing and testing the formation. Our success to date has been only 40% in the Pictured Cliffs formation.

Palmer Oil and Gas drilled and completed several wells adjacent to the northern boundary of the Northeast Blanco Unit. These wells were purchased by Tenneco Oil & Gas who is now the operator. Production and completion information on these adjacent wells is shown below.

Tenneco Yager # 3
SW/4 Section 3, T31N - R7W
San Juan County, New Mexico

The Pictured Cliffs formation produced 1169 Mcf of gas in July, 1980. This is approximately 36 Mcfpd into the pipeline. When adjusted to flow rate against atmospheric pressure the rate becomes 46 Mcfpd.

$$\frac{1461 - 311}{1467} = \frac{36 \text{ Mcfpd}}{\text{Production (atmosphere)}}$$

The 46 Mcfpd rate is approximately four times the rate which would have been possible without stimulation. The calculated "stabilized production rate to the atmosphere" without stimulation is therefore 12 Mcfpd. A 1978 deliverability test and a completion report are enclosed.

Tenneco State # 3
SW/4 Section 3, T31N - R7W
San Juan County, New Mexico

This well is completed in the Pictured Cliffs reservoir and produced 4197 Mcf during July, 1980. This is approximately 131 Mcfpd. When this pipeline production is adjusted to approximate stabilized flow rate against atmospheric pressure the daily rate becomes approximately 180 Mcfpd.

$$\frac{1138 - 310}{1138} = \frac{131}{\text{Production (atmosphere)}}$$

The 180 Mcfpd stabilized rate to the atmosphere must be divided by four in order to determine the "non stimulated" rate. The calculated "non stimulated stabilized production and rate to the atmosphere" for this well is 45 Mcfpd. A completion report and the 1978 deliverability test are enclosed.

Tenneco State # 2
SW Section 2, T31N - R7W
San Juan County, New Mexico

This well produces from the Pictured Cliffs formation. The July, 1980 production was 4728 Mcf to the pipeline or 148 Mcfpd. When this rate is adjusted to atmospheric pressure using the pressures taken from the 1978 deliverability test the approximate daily rate to the atmosphere is 273 Mcfpd.

$$\frac{1114 - 509}{1114} = \frac{148}{\text{Production (atmosphere)}}$$

The production rate without stimulation is calculated to be only one fourth as great as the "fractured stimulated rate". The calculated "non stimulated stabilized production rate to the atmosphere for this well is 68 Mcfpd. A completion report and the 1978 deliverability test are enclosed.

Tenneco Yager # 4
NW/4 Section 10, T31N - R7W
San Juan County, New Mexico

The Pictured Cliffs formation produced 2407 Mcf of gas in July, 1980 which is approximately 75 Mcfpd. When this rate is adjusted to a flow rate to the atmosphere the approximate rate becomes 96 Mcfpd.

$$\frac{1425 - 310}{1425} = \frac{75}{\text{Production (atmosphere)}}$$

This zone was stimulated with a treatment which theoretically should have increased the production rate by more than four times. The calculated non stimulated stabilized flow rate to the atmosphere for the Pictured Cliffs formation is 25 Mcfpd.

Tenneco Federal # 3
NW/4 Section 10, T31N - R7W
San Juan, New Mexico

The Pictured Cliffs formation produced and sold 477 Mcf of gas in July, 1980, which is approximately 16 Mcfpd. When an adjustment is made to approximate stabilized flow to the atmosphere a rate of 20 Mcfpd is found.

$$\frac{1461 - 310}{1461} = \frac{16}{\text{Production (atmosphere)}}$$

The non stimulated stabilized producing rate to the atmosphere is 20 Mcfpd. (No adjustment for stimulation was made on this well because of lack of information concerning the stimulation procedure used). A deliverability test and completion report are enclosed.

Summary and Conclusions

The Pictured Cliffs formation has been drilled through, logged, evaluated and bypassed for over 30 years in the Northeast Blanco Unit area.

No wells were completed in the Pictured Cliffs formation in the Northeast Blanco Unit area prior to 1979. Palmer Oil and Gas Company drilled and completed the first Pictured Cliffs wells in the area adjacent to the northern boundary of the Northeast Blanco Unit in 1978.

Blackwood & Nichols Co., Ltd. has drilled and completed over 100 producing gas wells in the 33,500 acre Northeast Blanco Unit from 1950 to 1978 and had never attempted a Pictured Cliffs completion. The information gathered while drilling the more than 100 wells indicated that the Pictured Cliffs reservoir was very tight (extremely low permeability) and contained both natural gas and fresh water.

In 1979 Blackwood & Nichols Co., Ltd. drilled five holes along the northern boundary of the Northeast Blanco Unit. Completions were attempted in the Pictured Cliffs formation. Three of the five completion attempts were unsuccessful and these three holes had to be abandoned in the Pictured Cliffs formation and re-completed in the Fruitland formation. At this time it is very difficult (if not impossible) to precisely calculate gas and water saturations within the sandstone lenses of the Pictured Cliffs formation.

It can be shown that natural gas occurs in the Pictured Cliffs formation in this area. It is known that the Pictured Cliffs formation is extremely tight. The low permeability and uncertainty as to gas and water saturations has caused this zone to be bypassed prior to 1979. The low permeability, high cost and high risk made trying to produce the Pictured Cliffs an uneconomic venture. The designation of the Pictured Cliffs as a "tight" reservoir will enable gas to be produced from this formation which would otherwise be left in the ground as non-commercial.

The Pictured Cliffs wells which have recently been completed and produced in this area have the calculated "non stabilized flow rates to the atmosphere" shown below.

Northeast Blanco Unit well # 202	40 Mcfpd
Northeast Blanco Unit well # 204	34 Mcfpd
Tenneco Yager # 3	12 Mcfpd
Tenneco State # 3	45 Mcfpd
Tenneco State # 2	68 Mcfpd
Tenneco Yager # 4	25 Mcfpd
Tenneco Federal # 3	20 Mcfpd
Seven well total	244 Mcfpd

The average Pictured Cliffs well 35 Mcfpd/well.

All available data collected to date support the designation of the Pictured Cliffs formation as a "tight" reservoir in the Northeast Blanco Unit area. The average wells current calculated stabilized producing rate to the atmosphere without stimulation is 35 Mcfpd. None of the seven newly completed Pictured Cliffs wells in the area have a flow rate which exceeds the 91 Mcfpd rate which is the published (depth vs rate) guideline. The high cost of drilling, completing, fracture, stimulating etc. when combined with the risk of unsuccessful completions make a tight reservoir designation necessary for the recovery of these gas reserves.

GENERAL GEOLOGIC SECTION

ERA	PERIOD	EPOCH	SAN JUAN BASIN
CENOZOIC	TERTIARY	EOCENE	WASATCH-SAN JOSE
		PALEOCENE	ANIMAS-NACIMIENTO
MESOZOIC	CRETACEOUS	UPPER	McDERMOTT CGL.
			KIRTLAND SH.
			FARMINGTON SS.
			FRUITLAND FM.
			PICTURED CLIFFS SS.
			LEWIS SH.
			MESA-VERDE GROUP: CLIFF HOUSE SS. / MENEFEE SH. / POINT LOOKOUT SS.
			MANCOS SHALE: L. HOSTA SS. / GALLUP SS. / SANASTEE FM. / GREENHORN LS. / GRANEROS SH.
			DAKOTA SS.
		LOWER	BURRO CANYON FM.
	JURASSIC		MORRISON FM.
		UPPER	SAN RAFAEL GROUP: SUMMERVILLE FM. / TODILTO LS. / ENTRADA SS. / CARMEL FM.
		MIDDLE	
		LOWER	GLEN CANYON GROUP: NAVAJO SS. / KAYENTA FM. / WINGATE SS.
	TRIASSIC	UPPER	CHINLE SH. / SHINARUMP CGL.
		MIDDLE	MOENKOPI SH.
		LOWER	
PALEOZOIC	PERMIAN	OCHOA-GUADALUPE	
		LEONARD	De CHELLY SS. / ORGAN ROCK SH. / CEDAR MESA SS.
		WOLFCAMP	HALGAITO SH. / CUTLER ARKOSE
	PENNSYLVANIAN	VIRGIL	UPPER HERMOSA LS.
		MISSOURI	
		DES MOINES	? / LOWER HERMOSA LS.
		ATOKA	MOLAS SH.
		MORROW	
	MISS.	CHESTER-MERAMEC	
		OSAGE	LEADVILLE LS.
		KINDER HOOK	
	DEVONIAN	UPPER	OURAY LS. / ELBERT FM. / ANETH DOL.
		MIDDLE	
		LOWER	
	SILURIAN		
	ORDOVICIAN		
	CAMBRIAN	UPPER	IGNACIO QTZTE
		MIDDLE	
		LOWER	
PRECAMBRIAN			PRECAMBRIAN IGNEOUS AND METAMORPHICS

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
8 April 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. STAMETS: The hearing will please come to order.

We'll call first Case 7086.

MR. PADILLA: Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. STAMETS: At the request of the applicant, this case will be continued to the May 20th Examiner Hearing.

(hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7086, heard by me on 4-8, 19 82.

Richard L. Stamets Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
8 April 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. STAMETS: The hearing will please come to order.

We'll call first Case 7086.

MR. PADILLA: Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. STAMETS: At the request of the applicant, this case will be continued to the May 20th Examiner Hearing.

(hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____, heard by me on _____ 19____.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

CAMPBELL, BYRD & BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
HARL D. BYRD
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR
BRADFORD C. BERGE
WILLIAM G. WARDLE

RECEIVED
MAR 31 1981
OIL CONSERVATION DIVISION
SANTA FE

JEFFERSON PLACE
SUITE I - 110 NORTH GUADALUPE
POST OFFICE BOX 2208
SANTA FE, NEW MEXICO 87501
TELEPHONE: (505) 988-4421
TELECOPIER: (505) 983-6043

March 30, 1981

Mr. Joe D. Ramey
Director
Oil Conservation Division
New Mexico Department of
Energy and Minerals
Post Office Box 2088
Santa Fe, New Mexico 87501

Re: Case No. 7086: Application of Blackwood & Nichols Co., Ltd. for Designation of a Tight Formation, San Juan and Rio Arriba Counties, New Mexico

Dear Mr. Ramey:

Blackwood & Nichols Co., Ltd. requests that the above-referenced case be continued from the hearing scheduled for April 8, 1981, to the examiner hearing to be held on May 20, 1981.

Your attention to this request is appreciated.

Very truly yours,

William F. Carr

WFC:lr

cc: Mr. Charles Blackwood
Mr. Alan Buckingham

Western Petroleum Services

FRACTURE STIMULATION RECOMMENDATION

FOR

BLACKWOOD & NICHOLS CO., LTD

NEBU NO. 203

PICTURED CLIFFS AND FRUITLAND FORMATIONS

BLANCO PICTURED CLIFFS FIELD

SAN JUAN COUNTY, NEW MEXICO

Sec.11, T31N, R7W

Prepared for:
Mr. Loos
Blackwood & Nichols Co., LTD
Farmington, New Mexico

Prepared by:
Randy LaFollette
The Western Company
Denver, Colorado

August 12, 1980

Service Point:
Farmington, New Mexico
505-327-6222

410 17th Street • Suite 1920 • Denver, Colorado 80202 • Phone 303/623-6037

DISCUSSION:

The customer requested fracture stimulation designs for the Pictured Cliffs and Fruitland zones in the #203 well. Mini Max III-30 gel is recommended with a 2% condensate phase for fluid loss control. Mini Max III is a titanate cross-linked hydroxy-propyl guar gum gel featuring very low leak-off, perfect proppant support and neutral pH.

Figure I shows the anticipated rate-pressure relationship for treatment via 4½" casing. At the recommended rate of 30 BPM, a surface pressure of 2,600 psi is expected. Treatment with 100,000 gallons of Mini Max III-30/2% HC and 190,000# 10/20 mesh sand is recommended to yield a propped length of 972 feet. Average sand concentration in the fracture is .73#/ft^2 (see Exhibit II). Figure II shows the McGuire and Sikora productivity increase chart. With the reservoir and fracture parameters given, a theoretical 10 fold production increase is calculated.

The expected rate-pressure graph for the Fruitland is presented in Figure III. At the recommended 17 BPM rate, a surface treating pressure of 2,700 psi is expected. Treatment with 40,000 gallons of Mini Max III-30/2% HC and 76,000# 10/20 mesh sand is recommended to yield a propped length of 1,200 feet. Average sand concentration in the fracture is .75#/ft^2 (see Exhibit II). Figure IV shows the McGuire-Sikora graph. After scaling, an 11 fold productivity increase is calculated.

WELL DATA:

Formation:	Pictured Cliffs
Average Depth To Zone:	3,500 ft.
Zone Height:	133 ft.
Casing Size:	4½"
Perforated Interval:	3456, 3478, 3492, 3518, 3534, 3554, 2 jspf, .34" diameter
Bottom Hole Temperature:	120° F
Fracture Gradient:	.65 psi/ft
Bottom Hole Fracture Pressure:	2,275 psi
Bottom Hole Pressure:	1,375 psi
Overburden:	900 psi
Hydrostatic Head:	1,515 psi with fresh water
ISDP (fresh water):	760 psi
Porosity:	10%
Permeability:	.06 md
Well Spacing:	160 acres

TREATMENT PROCEDURE:

It is recommended that the Pictured Cliffs zone be fracture stimulated via 4½" casing with 100,000 gallons of Mini Max III-30/2% HC gel containing 190,000# 10/20 mesh sand. Average anticipated injection rate and surface treating pressure are 30 BPM and 2,600 psi, respectively. Stage fluid and sand as follows:

1. Pump 20,000 gallons of Mini Max III-30/2% HC as a pad to initiate the fracture and establish sufficient fracture width to accept sand. (Add 1#/1000 B-5.)
2. Pump 20,000 gallons of Mini Max III-30/2% HC with 1 ppg 10/20 mesh sand. (Add 1#/1000 B-5.)
3. Pump 20,000 gallons of Mini Max III-30/2% HC with 2 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
4. Pump 20,000 gallons of Mini Max III-30/2% HC with 3½ ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
5. Pump 20,000 gallons of Mini Max III-30/2% HC with 3½ ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
6. Cut sand, start flush with 500 gallons of Mini Max III-30 gel.
7. Continue to flush to top perforation with 1,815 gallons of fresh water.
8. Shut in for at least 6 hours to allow gel to break and fracture to heal and recover treating fluid load.

NOTE: All gel to contain 2% condensate, 1 gal/1000 Aquaflow, 1 gal/1000 Adocide.

TREATMENT PROCEDURE:

Treating Conductor	4½" casing
Injection Rate	30 BPM
Expected Surface Treating Pressure	2,600 psi
Total Pumpable Volume of Mini Max III-40 Gel Phase	100,000 gallons
Total Pumpable Volume of Condensate	2,000 gallons
Total Pumpable Volume of Fresh Water Flush & Reserve	5,000 gallons
Total 10/20 Mesh Sand Required	190,000#

Auxiliary Materials:

161# B-5 gel breaker

105 gallons Adocide bactericide

105 gallons Aquaflow surfactant

COST ESTIMATE:

100,500 gallons of Mini Max III-30/2% HC @ .24/gal	$24,120.00
161 B-5 @ 2.15/lb	346.15
105 gallons Adocide @ 29.40/gal	3,087.00
105 gallons Aquaflow @ 25.85/gal	2,714.25
Chemical Delivery Charge @ .68/T mi x 3.5 T x 75 mi	178.50
190,000# 10/20 Sand @ 5.25/cwt	9,975.00
Sand Pumping Charge @ .70/cwt	1,330.00
Proppant Delivery Charge @ .68/T mi x 95 T x 75 mi	4,845.00
30 BPM Master Mixer @ 760.00	760.00
1,912 HHP @ 3.15/HHP	6,022.80
Mileage Charge @ 1.90/unit mi x 6 units x 75 mi	855.00
Sandmaster @ 875.00	875.00
Ratiometer @ 134.00	134.00
TOTAL	$55,242.70

Subject to terms and conditions in the published price schedule of The Western Company of North America.

WELL DATA:

Formation:	Fruitland
Average Depth To Zone:	3,380 ft.
Zone Height:	42 ft.
Casing Size:	4½" - 10.5#
Perforated Interval:	3368, 3374, 3384, 3392, 2 jspf, .34" diameter
Bottom Hole Temperature:	120° F
Fracture Gradient:	.9 psi/ft
Bottom Hole Fracture Pressure:	3,050 psi
Bottom Hole Pressure:	1,375 psi
Overburden:	1,675 psi
Hydrostatic Head:	1,450 psi with fresh water
ISDP (fresh water):	1,600 psi
Porosity:	10%
Permeability:	.06 md
Well Spacing:	160 acres

TREATMENT PROCEDURE:

It is recommended that the Fruitland zone be fracture stimulated via 4½" casing with 40,000 gallons of Mini Max III-30/2% HC gel and 76,000# 10/20 mesh sand. Average anticipated injection rate and surface treating pressure are 17 BPM and 2,700 psi, respectively. Stage fluid and proppant as follows:

1. Pump 8,000 gallons of Mini Max III-30/2% HC as a pad to initiate the fracture and establish sufficient fracture width to accept sand. (Add 1#/1000 B-5.)
2. Pump 8,000 gallons of Mini Max III-30/2% HC with 1 ppg 10/20 mesh sand. (Add 1#/1000 B-5.)
3. Pump 8,000 gallons of Mini Max III-30/2% HC with 2 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
4. Pump 8,000 gallons of Mini Max III-30/2% HC with 3 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
5. Pump 8,000 gallons of Mini Max III-30/2% HC with 3½ ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
6. Cut sand, start flush with 500 gallons of Mini Max III-30 gel.
7. Continue to flush to top perforation with 1,750 gallons of fresh water.
8. Shut in for at least 6 hours to allow gel to break and fracture to heal and recover treating fluid load.

NOTE: All gel to contain 2% condensate, 1 gal/1000 Aquaflow, 1 gal/1000 Adocide.

TREATMENT REQUIREMENTS:

Treating Conductor	4½" casing
Injection Rate	17 BPM
Expected Surface Treating Pressure	2,700 psi
Total Pumpable Volume of Mini Max III-30 Gel Phase	40,000 gallons
Total Pumpable Volume of Condensate	800 gallons
Total Pumpable Volume of Fresh Water Flush & Reserve	5,000 gallons
Total 10/20 Mesh Sand Required	76,000#

Auxiliary Materials:

42 gallons Aquaflow surfactant

42 gallons Adocide bactericide

65# B-5 gel breaker

COST ESTIMATE:

40,000 gallons of Mini Max III-30/2% HC @ .24/gal	$ 9,600.00
65# B-5 @ 2.15/lb	139.75
42 gallons Adocide @ 29.40/gal	1,234.80
42 gallons Aquaflow @ 25.85/gal	1,085.70
Chemical Delivery Charge @ .68/T mi x 1.5 T x 75 mi	76.50
76,000# 10/20 Sand @ 5.25/cwt	3,990.00
Sand Pumping Charge @ .70/cwt	532.00
Proppant Delivery Charge @ .68/T mi x 38 T x 75 mi	1,938.00
17 BPM Master Mixer @ 730.00	730.00
1,125 HHP @ 3.15/HHP	3,543.75
Mileage Charge @ 1.90/unit mi x 6 units x 75 mi	855.00
Ratiometer @ 134.00	134.00
TOTAL	$23,859.50

Subject to terms and conditions in the published price schedule of The Western Company of North America.

I.C.

FIGURE 3

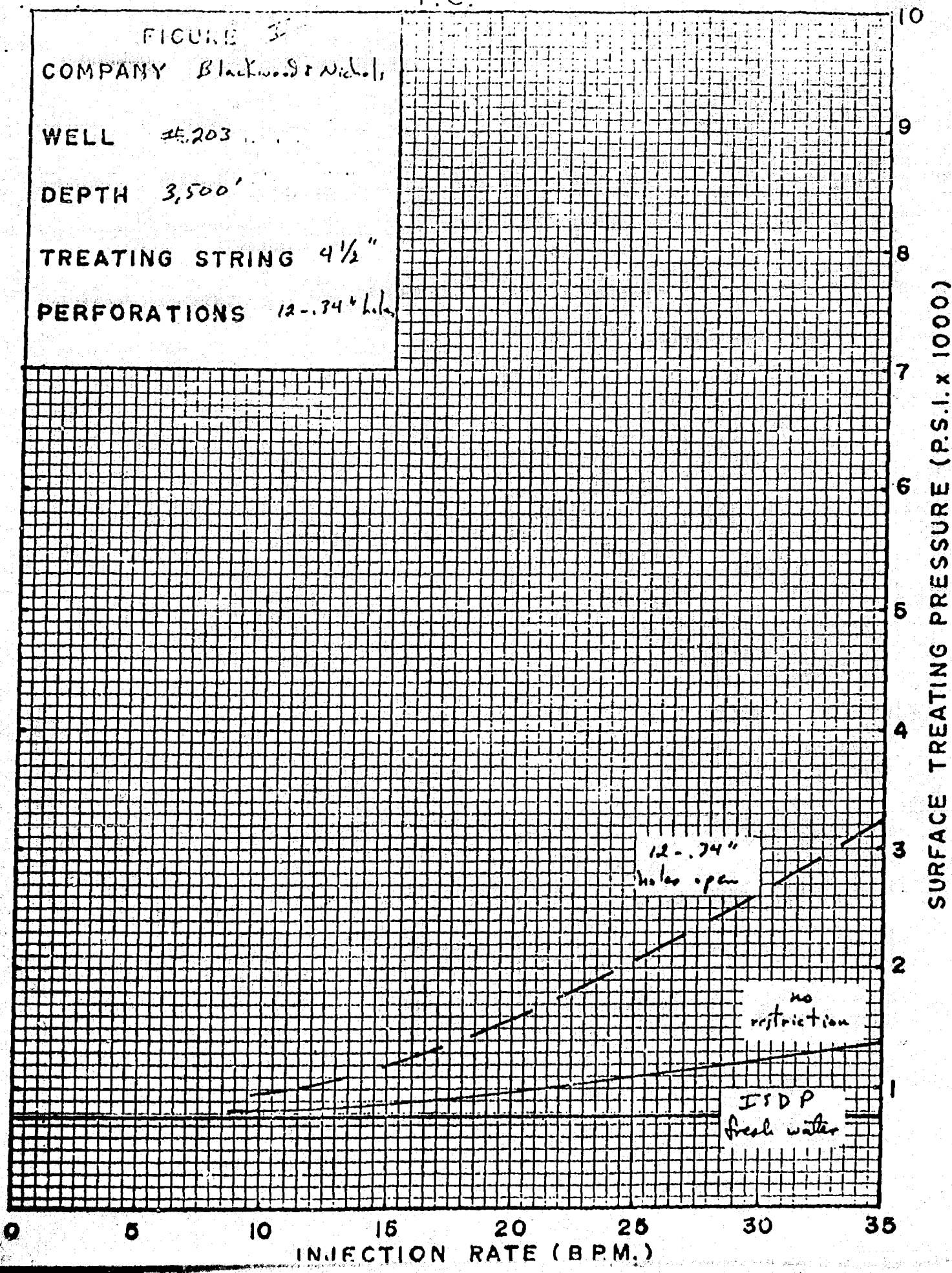
COMPANY Blackwood & Nichols

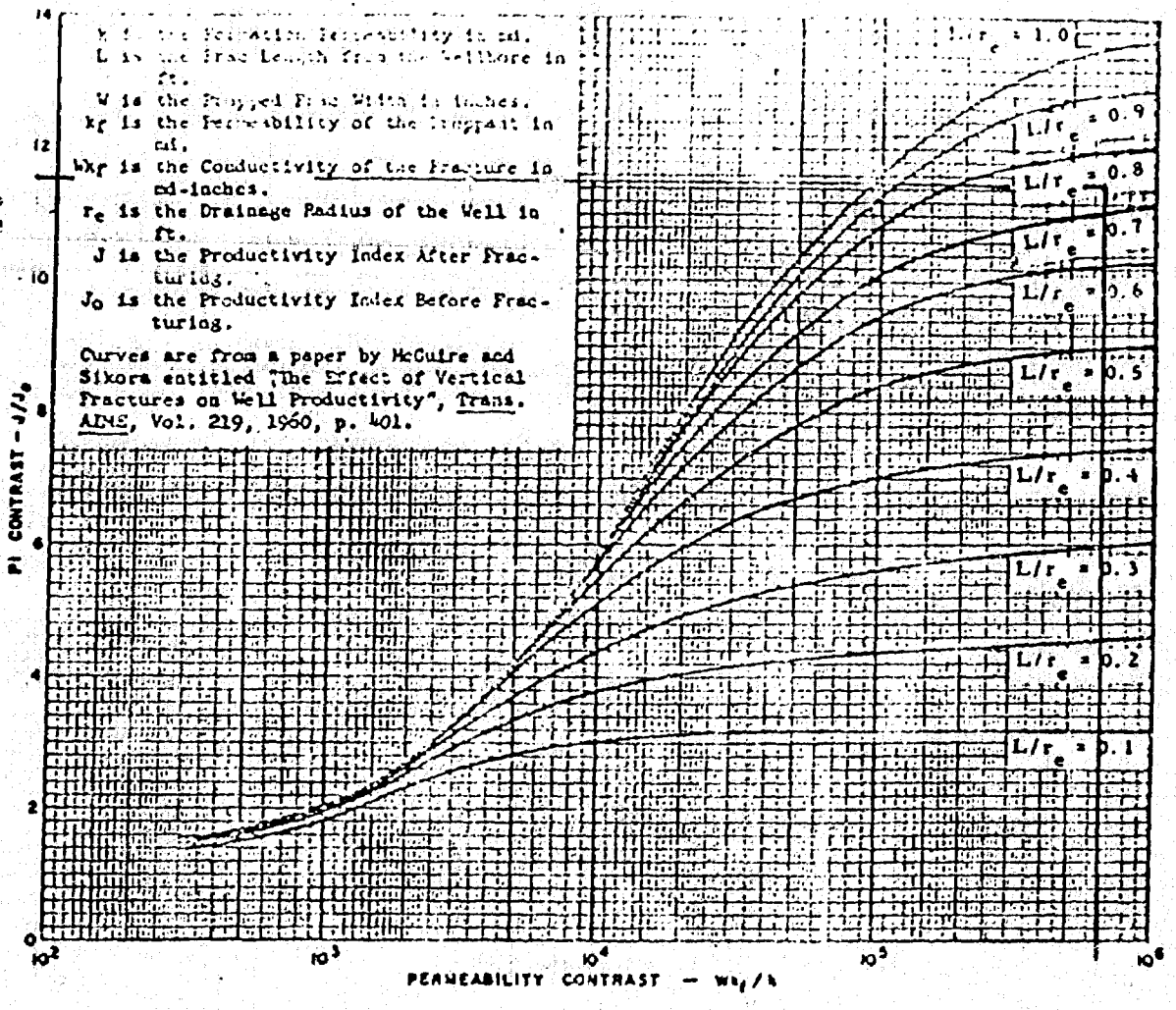
WELL #203

DEPTH 3,500'

TREATING STRING 4½"

PERFORATIONS 12-.74" holes





INCREASES IN PRODUCTION FROM VERTICAL FRACTURES

J/Jo = 10 after scaling

Note: This graph is based on a well spacing (A) of 40 acres and a wellbore radius (r_w) of 3 inches. It can be converted to other well spacing and wellbore radii by use of the following scaling factors:

Well Spacing	Drainage Radii	Scaling Factors for Abscissa (Wk_f/k)	Scaling Factors for Ordinate (J/J_o)
For spacing shown and 3-inch wellbore radius.			
10 Acres	330 ft	2.00	1.11
20 Acres	467 ft	1.42	1.05
40 Acres	660 ft	1.00	1.00
80 Acres	933 ft	0.71	0.95
160 Acres	1320 ft	0.50	0.91
320 Acres	1867 ft	0.35	0.87
640 Acres	2640 ft	0.25	0.84
For other spacing (A) and wellbore radii (r_w).			
A	$104\sqrt{A}$	$\sqrt{40/A}$	$\frac{3.095}{\log(.472(r_e/r_w)}$

FIGURE III

COMPANY Blackwood & Nichols

WELL #203

DEPTH 3,380'

TREATING STRING 4 1/2"

PERFORMATIONS 8-.34" holes

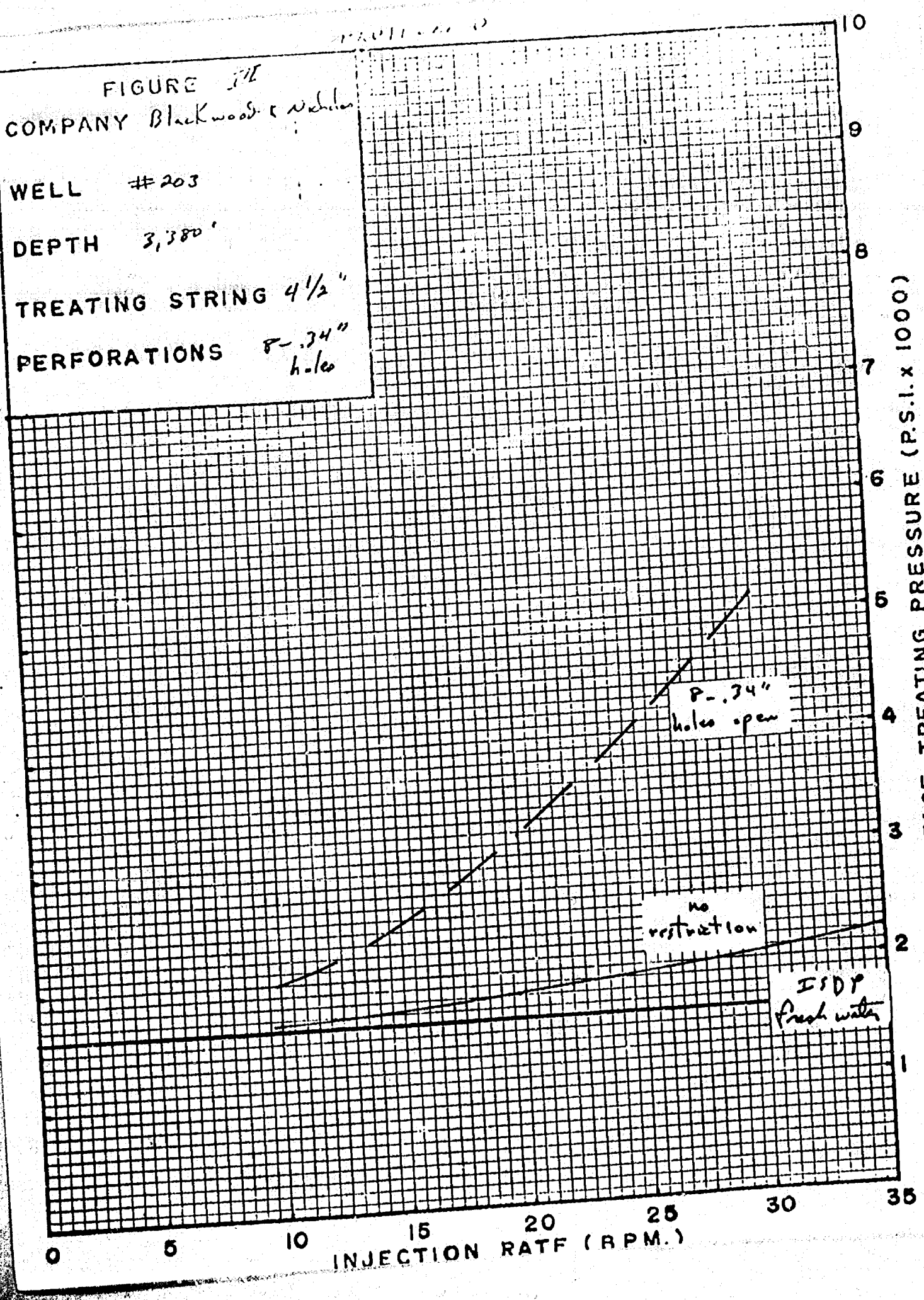
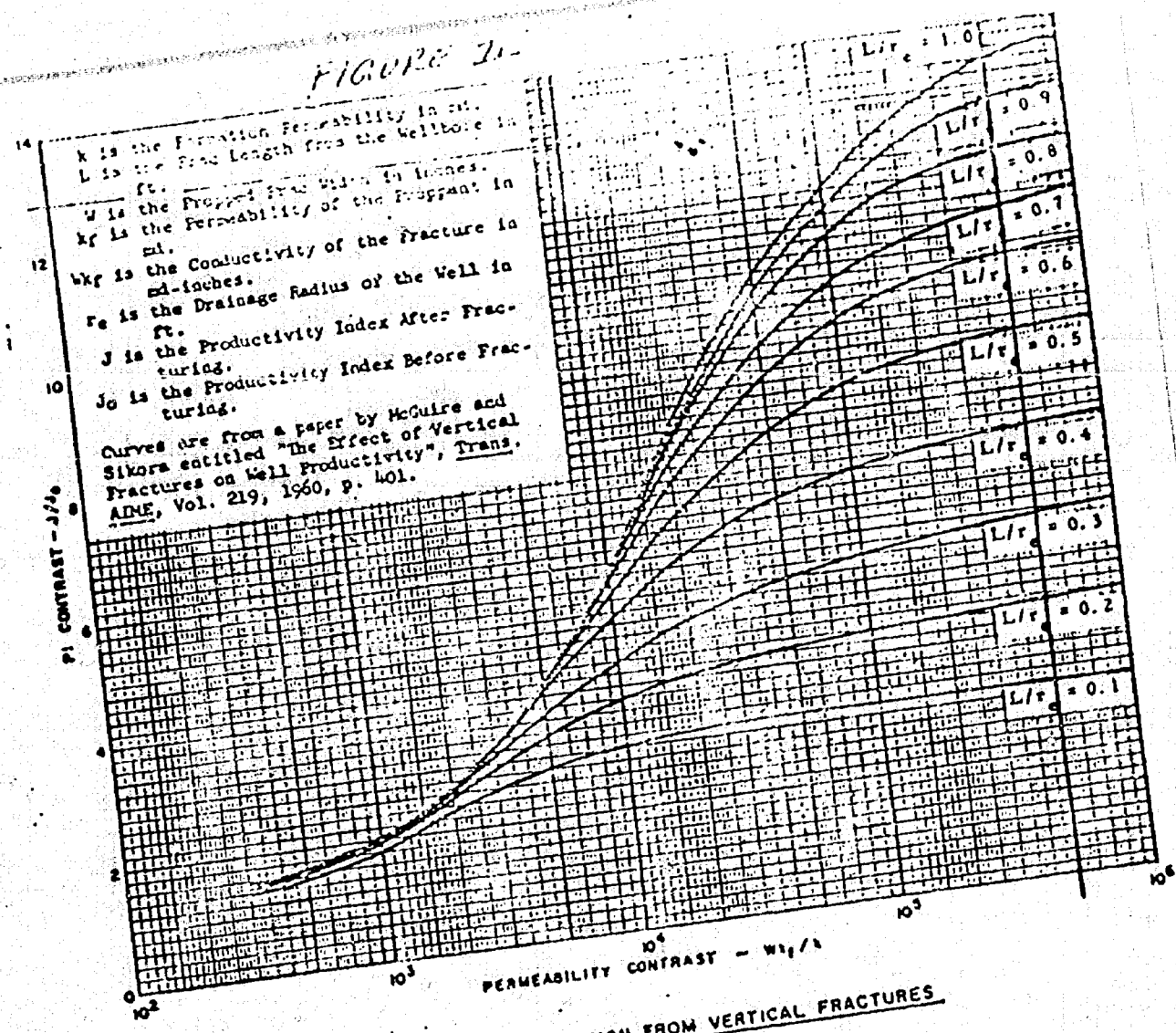


FIGURE 3-



INCREASES IN PRODUCTION FROM VERTICAL FRACTURES

J/Jo = 11 after scaling

Note: This graph is based on a well spacing (A) of 40 acres and a wellbore radius (rw) of 3 inches. It can be converted to other well spacing and wellbore radii by use of the following scaling factors:

Well Spacing	Drainage Radii	Scaling Factors for Abscissa (wx_f/k)	Scaling Factors for Ordinate (J/J_o)
For spacing shown and 3-inch wellbore radius.			
10 Acres	330 ft	2.00	1.11
20 Acres	467 ft	1.42	1.05
40 Acres	660 ft	1.00	1.00
80 Acres	933 ft	0.71	0.95
160 Acres	1320 ft	0.50	0.91
320 Acres	1867 ft	0.35	0.87
640 Acres	2640 ft	0.25	0.84
For other spacing (A) and wellbore radii (rw).			
A		$104\sqrt{A}$	$\sqrt{40/A}$	$\frac{3.005}{\log(.472)(r_e/r_w)}$

EXHIBIT 1

THE WESTERN COMPANY

PROPPANT PROFILE STUDY

PERFECT SUPPORT FLUIDS

FLUID STUDIED - MINI MAX III 30/2%HC
TOTAL VOLUME - 108616 GAL
FLUID PENETRATION - 1121 FT

PERM. TO STIMULATION FLUID - .060
PERM. TO RESERVOIR FLUID - .060
LEAK-OFF FLUID VISCOSITY - 1.00
RESERVOIR FLUID VISCOSITY - .01
RESERVOIR FLUID COMP. - 4.00E-04
STIMULATION FLUID C-III - 0.00080
FRACTURE HEIGHT - 133
COMBINED C - 0.00060

FRAC. PRESSURE - 2275
RESERVOIR PRESSURE - 1375
N PRIME - .690
K PRIME - 0.013000
YOUNGS MODULUS - 5.00E+06
WIDTH - .396
INJECTION RATE - 30.0

FLUID VOLUME (GAL)	SURFACE PROPPANT CONC (LB/GAL)	LOCATION IN FRACTURE (FT)	FRACTURE PROPPANT CONC (LB/FT^2)	CUMLATIVE PROPPANT (LB)
20000	.00	972 TO 1121	.000	0
20000	1.00	795 TO 972	.425	20000
20000	2.00	582 TO 795	.705	60000
20000	3.00	320 TO 582	.862	120000
20000	3.50	0 TO 320	.821	190000

USED 4.63 UNITS

EXHIBIT II

THE WESTERN COMPANY

PROPPANT PROFILE STUDY

PERFECT SUPPORT/FLUIDS

FLUID STUDIED - MINI MAX III 30/2% HC
TOTAL VOLUME - 43446 GAL
FLUID PENETRATION - 1377 FT

PERM. TO STIMULATION FLUID - .060
PERM. TO RESERVOIR FLUID - .060
LEAK-OFF FLUID VISCOSITY - 1.00
RESERVOIR FLUID VISCOSITY - .01
RESERVOIR FLUID COMP. - 4.40E-04
STIMULATION FLUID C-III - 0.00080
FRACTURE HEIGHT - 42
COMBINED C - 0.00083

FRAC. PRESSURE - 3050
RESERVOIR PRESSURE - 1375
N PRIME - .655
K PRIME - 0.024000
YOUNGS MODULUS - 5.00E+06
WIDTH - .383
INJECTION RATE - 17.0

FLUID VOLUME (GAL)	SURFACE PROPPANT CONC (LB/GAL)	LOCATION IN FRACTURE (FT)	FRACTURE PROPPANT CONC (LB/FT^2)	CUMLATIVE PROPPANT (LB)
8000	.00	1203 TO 1377	.000	0
8000	1.00	994 TO 1203	.455	8000
8000	2.00	736 TO 994	.739	24000
8000	3.00	411 TO 736	.880	48000
8000	3.50	0 TO 411	.810	76000

4.76 UNITS

A T T A C H M E N T S

1. Map of Northeast Blanco Unit
2. General Geologic Section
3. Federal Regulations
4. State Regulations
5. Fracture Stimulation Recommendation
6. Completion Report Northeast Blanco Unit well # 202
7. Completion Report Northeast Blanco Unit well # 204
8. Recompletion Report Northeast Blanco Unit well # 201
9. Recompletion Report Northeast Blanco Unit well # 203
10. Recompletion Report Northeast Blanco Unit well # 205
11. Completion Report Tenneco Yager # 3
12. Completion Report Tenneco State # 3
13. Deliverability Test Tenneco State # 3
14. Completion Report Tenneco State # 2
15. Deliverability Test Tenneco State # 2
16. Completion Report Tenneco Federal # 3
17. Deliverability Test Tenneco Federal # 3

Form 9-331
Dec. 1973

Form Approved.
Budget Bureau No. 42-R1424

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☐ gas well ☒ other

2. NAME OF OPERATOR
Blackwood & Nichols Co., Ltd.

3. ADDRESS OF OPERATOR
P.O. Box 1237, Durango, Co. 81301

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 1070' F/NL - 1760' F/EL
AT TOP PROD. INTERVAL: Same
AT TOTAL DEPTH: Same

5. LEASE
NM 03358

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
Northeast Blanco Unit #1, Sec. 929

8. FARM OR LEASE NAME
Northeast Blanco Unit

9. WELL NO.
202

10. FIELD OR WILDCAT NAME
South Los Pinos PC

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
B-11-31N-7W

12. COUNTY OR PARISH
San Juan

13. STATE
New Mexico

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
6440' GL

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☒
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other)			

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

8-15-79 Perforated two holes per foot per interval; 3272', 3282', 3292', 3306', 3318', 3402', 3412', 3420', 3428', 3440', 3446', 3452', 3474'; twenty-six holes. Mini-Max II fractured with 48,000 gals of gelled water, 80,000 lbs 10-20 sand, 500 gallons 10% acetic acid. Ten HCL ball sealers. Maximum treating pressure 3000 PSI; Average treating pressure 1300 PSI; Average injection rate 26 bbls/min.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED DeLasso Loobtle TITLE District Manager DATE 8-21-79

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

BLACKWOOD & NICHOLS CO., LTD.
P. O. BOX 1237
DURANGO, COLORADO 81301
(303) 247-0728

Drilling Report - Pictured Cliffs

Northeast Blanco Unit Well No. 204 LOCATION: 830' F/SL - 990' F/WL
Sec. 1-T31N-R7W
San Juan County, New Mexico
Elevation: 6546' GL

8-8-79 Moved Four Corners Drilling Company's rig on location and rigging up.

8-9-79 350', sand. Nippled up, tested 9 5/8" casing to 800 PSI for thirty minutes; held O.K. Spudded 12¼" hole at 10:30 A.M., 8-8-79. Ran 5 jts 9 5/8" 36.00# H-40 casing; 204' set at 217'. Cemented with 150 sacks class B cement with 1/4# flocele per sack and 2% $CaCl_2$. Plug down 4:00 P.M., 8-8-79; cement circulated. 1/4° at 217'.

8-10-79 1930' sand. 3/4° @ 721', 1° @ 1242', 2° @ 1682'.

8-11-79 2572', sand. 1½° at 2307'.

8-12-79 3128', sand. Mud wt. 10.6#, vis. 43.

8-13-79 3600', shale. Mud wt. 10.6#, vis. 40. 1° at 3128', 1° at 3600'. Laying down 3½" drill pipe.

8-14-79 3680' TD, shale. Mud wt. 10.6# Vis. 48. Ran 113 jts 4½" 10.50# K-55 casing; 3675' set at 3686'. Float collar at 3635'; cemented with 265 sacks Howco Lite cement with 1/4# flocele per sack, followed with 222 sacks 50-50 Pozmix with 2% gel and 1/4# flocele per sack. Plug down 2:15 PM, 8-13-79. Rig released.

8-18-79 3680' TD; 3640' PBTD. Moved Drake Well Services rig on location and rigged up. Picked up 2 3/8" tubing with 3 7/8" bit. Cleaned out to 3640'. Tested 4½" casing to 3400 PSI for thirty minutes, held OK. Spotted 500 gals 10% acetic acid. Ran Gamma Ray Correlation and Cement Bond logs. Perforated two holes per foot per interval; 3404', 3412', 3420', 3428', 3442', 3498', 3518', 3530', 3538', 3548' 3574' 3598' - twenty-four holes. Preparing to fracture.

8-19-79 3680' TD; 3640' PBTD. Mini-Max II fractured with 48,048 gallons gelled water. 75,000 lbs 10-20 sand. Maximum treating pressure 2000 PSI; Average treating pressure 1600 PSI; Average Injection rate 28 bbls/min. Dropped ten HCl ball sealers. Final shut-in pressure 650 PSI. Well now cleaning up.

8-20-79 3640' PBTD. Going in hole with tubing, cleaning out.

8-21-79 3640' PBTD. Cleaning out, preparing to land 2 3/8" tubing.

8-22-79 3640' PBTD. Cleaned out to 3640'. Ran 119 jts 2 3/8" 4.7# J-55 EUE tubing; 3569' landed at 3580'. Seating nipple at 3550'. Released rig 2:00 PM, 8-21-79.

NO. OF COPIES RECEIVED		
DISTRIBUTION		
SANTA FE		
FILE		
U.S.G.S.		
LAND OFFICE		
OPERATOR		

NEW MEXICO OIL CONSERVATION COMMISSION

Form C-103
Supersedes Old
C-102 and C-103
Effective 1-1-65

5a. Indicate Type of Lease
State ☐ Fee ☒

5. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

1. OIL WELL ☐ GAS WELL ☒ OTHER-

7. Unit Agreement Name
Northeast Blanco Unit
Agrmt. #1, Sec. 929

2. Name of Operator
Blackwood & Nichols Co., Ltd.

8. Farm or Lease Name
Northeast Blanco Unit

3. Address of Operator
P. O. Box 1237, Durango, Co. 81301

9. Well No.
201

4. Location of Well
UNIT LETTER M, 990 FEET FROM THE South LINE AND 1030 FEET FROM THE West LINE, SECTION 9 TOWNSHIP 31N RANGE 7W NMPM.

10. Field and Pool, or Wildcat
So. Los Pinos Fruitland

15. Elevation (Show whether DF, RT, GR, etc.)
6652' GL

12. County
San Juan

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐		COMMENCE DRILLING OPNS. ☐	PLUG AND ABANDONMENT ☐
PULL OR ALTER CASING ☐	CHANGE PLANS ☐	CASING TEST AND CEMENT JOB ☐	
OTHER ☐		OTHER Water encroachment ☒	

17. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

7-21-80 3697' PBTD. Pulled 2 3/8" tubing. Ran Gamma Ray and Neutron Logs. Set drillable bridge plug at 3549'. Tested perforation at 3560' - 3588', no decrease in water. Set cement retainer at 3536'. Shut off water and gas. Set drillable cement retainer at 3373'. Squeeze cemented perforations 3441' - 3449', with 50 sacks neat cement, squeezed off at 2500 PSI.

7-22-80 3697' PBTD. Drilled retainer at 3373' and cement to 3459'.

7-23-80 3697' PBTD. Perforated 4 1/2" csg. 3482' - 3494' with 11 holes. Versagel fractured with 30,350 gals. water and 30,000 lbs. 10-20 sand. Maximum pressure 2450 PSI, average treating pressure 2300 PSI, average injection rate 17.5 bbls/min.

7-25-80 3697' PBTD. Reran 111 jts. 2 3/8" 4.7# J-55 EUE tubing; set at 3473'.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED P. DeLasso Loos TITLE District Manager DATE 7-28-80

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

Form 9-331
Dec. 1973

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Budget Bureau No. 42-R1424

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☐ gas well ☒ other

2. NAME OF OPERATOR
Blackwood & Nichols Co., Ltd.

3. ADDRESS OF OPERATOR
P.O. Box 1237, Durango, Colo. 81301

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 990' F/NL - 1490' F/EL
AT TOP PROD. INTERVAL: Same
AT TOTAL DEPTH: Same

5. LEASE
NM 03358

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
NEBU Agmt. No. 1, Sec. 929

8. FARM OR LEASE NAME
Northeast Blanco Unit

9. WELL NO.
203

10. FIELD OR WILDCAT NAME
South Los Pinos-Fruitland - PC

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
C-11-31N-7W

12. COUNTY OR PARISH
San Juan

13. STATE
New Mexico

14. API NO.
30-045-23485

15. ELEVATIONS (SHOW DF, KDB, AND WD)
6546' GL

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Subsequent of water encroachment			X

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

7-13-80 3630' PBTD. Pulled 2 3/8" tubing, Ran Gamma Ray and Neutron Logs. Set Retrievamatic Packer at 3496'. Well made water thru tubing.

7-15-80 3630' PBTD. Reset packer at 3459'. Well making water thru tubing and between tubing and 4 1/2" csg. Reset packer at 3393'. Well making water thru tubing. Dry gas between tubing and 4 1/2" csg. Set cement retainer at 3409'.

7-16-80 3630' PBTD. Set Retrievamatic at 3405', pressured up to 2000 PSI, held OK.

7-17-80 3630' PBTD. Reran 108 jts. 2 3/8" 4.7# J-55 EUE tubing; 3356' landed at 3366'.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct
SIGNED Lasso Loos TITLE District Manager DATE 7-28-80

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

Form 9-331
Dec. 1973

Form Approved
Budget Bureau No 42-R1424

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☐ gas well ☒ other

2. NAME OF OPERATOR
Blackwood & Nichols Co., Ltd.

3. ADDRESS OF OPERATOR
P. O. Box 1237, Durango, Co. 81301

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 1180' F/SL - 925' F/EL
AT TOP PROD. INTERVAL: Same
AT TOTAL DEPTH: Same

5. LEASE
NM 01358

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
NEBU Agrmt. No. 1, Sec. 929

8. FARM OR LEASE NAME
Northeast Blanco Unit

9. WELL NO.
205

10. FIELD OR WILDCAT NAME
South Los Pinos Fruitland - PC

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
P-10-31N-7W

12. COUNTY OR PARISH
San Juan

13. STATE
New Mexico

14. API NO.
30-045-23601

15. ELEVATIONS (SHOW DF, KDB, AND WD)
6560' GL

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Subsequent report for water encroachment			X

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

7-18-80 3620' PBTD. Pulled 2 3/8" tubing, ran Gamma Ray and Neutron Logs. Set cement retainer at 3430'. Tested 4 1/2" csg. to 3000 PSI for 10 minutes, held OK. Perforated 3350' - 3362' with 11 holes. Versagel fractured with 300 gals. 15% HCL acid and 28,640 gals. water, 30,000 lbs. 10-20 sand, Maximum pressure 2700 PSI, average teating pressure 2200 PSI, average injection rate 15 bbls/min.

7-20-80 3620' PBTD. Reran 107 jts. 2 3/8" 4.7# J-55 EUE tubing; set at 3339'.

* Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct
SIGNED Delasso Loos TITLE District Manager DATE 7-28-80

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

NO. OF COPIES RECEIVED	5	
DISTRIBUTION		
SANTA FE	1	
FILE	1	
U.S.G.S.	2	
LAND OFFICE		
OPERATOR	1	1

Form C-105
Revised 1-1-65

NEW MEXICO OIL CONSERVATION COMMISSION
WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5a. Indicate Type of Lease: State ☐ Fee ☒

5. State Oil & Gas Lease No.

7. Unit Agreement Name

8. Farm or Lease Name: Yager

9. Well No.: 3

10. Field and Pool, or Wildcat: Undesignated PC Ext. Los Pi
Fruitland Extension

12. County: San Juan

TYPE OF WELL

TYPE OF COMPLETION: NEW WELL [Y] WORK OVER ☐ DEEPEN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ OTHER

OIL WELL ☐ GAS WELL [X] DRY ☐ OTHER

Name of Operator: Palmer Oil & Gas Company

Address of Operator: P. O. Box 2564, Billings, Montana, 59103

Location of Well: UNIT LETTER N LOCATED 800 FEET FROM THE South LINE AND 1850 FEET FROM THE West LINE OF SEC. 3 TWP. 31N RGE. 7W NMPM

Date Spudded	16. Date T.D. Reached	17. Date Compl. (Ready to Prod.)	18. Elevations (DF, RKB, RT, GR, etc.)	19. Elev. Cashinghead
8/2/77	8/11/77	10/25/77	6597 KB	

Total Depth	21. Plug Back T.D.	22. If Multiple Compl., How Many	23. Intervals Drilled By	Rotary Tools	Cable Tools
3669	3647	two	→	0-TD	

Producing Interval(s), of this completion — Top, Bottom, Name

ctured Cliffs - 3361-3391
uitland: 3155-65, 3182-3209, 3219-27, 3233-39, 3245-51, 3258-63, 3267-71, 3275-95

25. Was Directional Survey Made: No

Type Electric and Other Logs Run
chlumberger - No open hole logs run - ran CBL-GR & TDT thru casing

27. Was Well Cored: No

CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
9 5/8"	36#	237'	13 3/4"	250 sacks	
7 "	20#	3652'	8 3/4"	700 sacks	

LINER RECORD

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN
None				

30. TUBING RECORD

SIZE	DEPTH SET	PACKER SET
2 3/8"	3413	3318' Model "D"
1½"	3232	none

Perforation Record (Interval, size and number)

3361-3391
3155-65
3182-3209
3219-27
3233-39
3245-51
3258-63
3275-95
3267-71
(1 shot/foot)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL	AMOUNT AND KIND MATERIAL USED
3361-3391	1000 gals. 15% MR-1
3361-3391	52,700 gals gelled wtr; 45,000# 10

PRODUCTION

Date First Production	Production Method (Flowing, gas lift, pumping — Size and type pump)	Well Status (Prod. or Shut-in)
SI	Flowing	SI

Date of Test	Hours Tested	Choke Size	Prod'n. For Test Period →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Gas — Oil Ratio

Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Oil Gravity — API (Corr.)
- SITP 1293	PC - SICP 1478					
- SITP 1421						

Disposition of Gas (Sold, used for fuel, vented, etc.): Will be sold

Test Witnessed By

List of Attachments

DEC 27 1977
OIL CON. COM.
DIST. 3

I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief.

Robert D Ballantyne TITLE Drilling Supt. DATE 12/2/77

COPIES RECEIVED	6	
DISTRIBUTION		
SANTA FE	1	
FILE	1	
U.S.G.S.	2	
LAND OFFICE	1	
OPERATOR	1	

NEW MEXICO OIL CONSERVATION COMMISSION
WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5a. Indicate Type of Lease: State [X] Fee [ ]

5. State Oil & Gas Lease No.: LG-3876

4. a. TYPE OF WELL

b. TYPE OF COMPLETION: NEW WELL [X] WORK OVER [ ] DEEPEN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] OTHER [ ]

OIL WELL [ ] GAS WELL [X] DRY [ ] OTHER

7. Unit Agreement Name:

8. Farm or Lease Name: State

2. Name of Operator: Palmer Oil & Gas Company

9. Well No.: 3

3. Address of Operator: P. O. Box 2564, Billings, Montana 59103

10. Field and Pool, or Wildcat: undesignated PC & S Los Pinos Fruitland Ext

4. Location of Well: UNIT LETTER I LOCATED 1620 FEET FROM THE South LINE AND 800 FEET FROM THE East LINE OF SEC. 2 TWP. 31N RGE. 7W NMPM

12. County: San Juan

15. Date Spudded	16. Date T.D. Reached	17. Date Compl. (Ready to Prod.)	18. Elevations (DF, RKB, RT, GR, etc.)	19. Elev. Cashinghead
12/6/77	12/13/77	1/22/78	6542' GR, 6553' KB	

20. Total Depth	21. Plug Back T.D.	22. If Multiple Compl., How Many	23. Intervals Drilled By	Rotary Tools	Cable Tools
3425'	3408'		→	0-T.D.	

24. Producing Interval(s), of this completion — Top, Bottom, Name: 3282 - 3406 Pictured Cliffs

25. Was Directional Survey Made: No

26. Type Electric and Other Logs Run: None

27. Was Well Cored: No

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	24#	256'	12¼'	225 sacks	
5½"	14#	3420'	7-7/8"	400 sacks	

29. LINER RECORD

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN

30. TUBING RECORD

SIZE	DEPTH SET	PACKER SET
2-3/8"	3379'	none

31. Perforation Record (Interval, size and number): 3382-3406 25holes

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL	AMOUNT AND KIND MATERIAL USED
3382-3406	45,500 gal Minimax containing 45,000# 10/20 sand; 750 gals 15% HCl

33. PRODUCTION

Date First Production	Production Method (Flowing, gas lift, pumping — Size and type pump)	Well Status (Prod. or Shut-in)
Shut In	Flowing	Shut In

Date of Test	Hours Tested	Choke Size	Prod'n. For Test Period →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Gas — Oil Ratio
1/22/78	3 hours	3/4"					

Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Oil Gravity — API (Corr.)
SITP 1420	SICP 1420					

34. Disposition of Gas (Sold, used for fuel, vented, etc.): To be sold

Test Witnessed By: Joe Elledge

RECEIVED
FEB 10 1978
OIL CON. COM.
DIST. 3

35. List of Attachments:

36. I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief.

SIGNED Robert D Ballantyne Robert D. Ballantyne TITLE Drilling Superintendent DATE 1/24/78

NEW MEXICO OIL CONSERVATION COMMISSION

WELL DELIVERABILITY TEST REPORT FOR 1978

Form C122-A
Revised 1-1-66

POOL NAME	POOL SLOPE	FORMATION	COUNTY
Wildcat	n= .85	Pictured Cliff	San Juan

COMPANY			WELL NAME AND NUMBER		
Palmer Oil and Gas Company			State #3		
UNIT LETTER	SECTION	TOWNSHIP	RANGE	PURCHASING PIPELINE	
I	2	31N	7W	Northwest Pipeline	
CASING O.D. - INCHES	CASING I.D. - INCHES	SET AT DEPTH - FEET	TUBING O.D. - INCHES	TUBING I.D. - INCHES	TOP - TUBING PERF. - FEET
5.500	5.012	3420	2.375	1.995	3379
GAS PAY ZONE		WELL PRODUCING THRU		GAS GRAVITY	GRAVITY X LENGTH
FROM 3382 TO 3406		CASING	TUBING X	.685	2315
DATE OF FLOW TEST		DATE SHUT-IN PRESSURE MEASURED			
FROM 7-3-78 TO 7-11-78		7-18-78			

PRESSURE DATA - ALL PRESSURES IN PSIA

(a) Flowing Casing Pressure (DWt)	(b) Flowing Tubing Pressure (DWt)	(c) Flowing Meter Pressure (DWt)	(d) Flow Chart Static Reading	(e) Meter Error (Item c - Item d)	(f) Friction Loss (a - c) or (b - c)	(g) Average Meter Pressure (Integr.)
480	303	301	303	-2	2	310
(h) Corrected Meter Pressure (g + e)	**(i) Avg. Wellhead Press. P_t = (h + f)**	**(j) Shut-In Casing Pressure (DWt)**	**(k) Shut-In Tubing Pressure (DWt)**	**(l) P_c = higher value of (j) or (k)**	**(m) Del. Pressure P_d = 80 %P_c**	**(n) Separator or Dehydrator Pr. (DWt) for critical flow only**
308	310	1138	1138	1138	910	

FLOW RATE CORRECTION (METER ERROR)

Integrated Volume - MCF/D	Quotient of $\frac{\text{Item c}}{\text{Item d}}$	$\sqrt{\frac{\text{Item c}}{\text{Item d}}}$	Corrected Volume
170	.9934	.9967	Q = 169 MCF/D

WORKING PRESSURE CALCULATION

$(1-e^{-s})$	$(F_c\ Q_m)^2\ (1000)$	$R^2 = \frac{1}{(1-e^{-s})(F_c\ Q_m)^2(1000)}$	P_t^2	$P_w^2 = P_t^2 + R^2$	$P_w = \sqrt{P_w^2}$
0.155	2,525	391	96,100	96,491	311

DELIVERABILITY CALCULATION

$$D = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = \frac{169}{1}\left[\left(\frac{466,944}{1,198,553}\right)^n = (.3896)^n = .44876\right] = 76 \text{ MCF/D}$$

REMARKS: Initial and Annual test for 1978

SUMMARY

Item h	308	Psia
P_c	1138	Psia
Q	169	MCF/D
P_w	311	Psia
P_d	910	Psia
D	76	MCF/D

Company: Palmer Oil and Gas Company
By: ORIGINAL SIGNED BY JOE E. ELLEDGE
Title: Agent
Witnessed By:
Company:

NO. OF COPIES RECEIVED	6	
DISTRIBUTION		
SANTA FE	1	
FILE	1	
U.S.G.S.	2	
LAND OFFICE	1	
OPERATOR	1	

NEW MEXICO OIL CONSERVATION COMMISSION
WELL COMPLETION OR RECOMPLETION REPORT AND LOG

Form C-105
Revised 1-1-65

5a. Indicate Type of Lease: State [X] Fee [ ]
5. State Oil & Gas Lease No.: LG-3876

1a. TYPE OF WELL
b. TYPE OF COMPLETION: NEW WELL [X] WORK OVER [ ] DEEPEN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] OTHER [ ]
OIL WELL [ ] GAS WELL [X] DRY [ ] OTHER

7. Unit Agreement Name:
8. Farm or Lease Name: State
9. Well No.: 2
10. Field and Pool, or Wildcat: Undesignated PC and So. Los Pinos Fruitland Ext

2. Name of Operator: Palmer Oil & Gas Company
3. Address of Operator: P. O. Box 2564, Billings, Montana 59103
4. Location of Well: UNIT LETTER N LOCATED 1190 FEET FROM THE South LINE AND 1675 FEET FROM THE West LINE OF SEC. 2 TWP. 31N RGE. 7W NMPM

12. County: San Juan

15. Date Spudded	16. Date T.D. Reached	17. Date Compl. (Ready to Prod.)	18. Elevations (DF, RKB, RT, GR, etc.)	19. Elev. Cashinghead
11/1/77	11/10/77	1/13/78	6555 GL, 6566 KB	

20. Total Depth	21. Plug Back T.D.	22. If Multiple Compl., How Many	23. Intervals Drilled By	Rotary Tools	Cable Tools
3390	3386'	two	→	0-TD	

24. Producing Interval(s), of this completion — Top, Bottom, Name
3354-3378 - Pictured Cliffs
3267-3279 & 3174-3222 - Fruitland

25. Was Directional Survey Made: no

26. Type Electric and Other Logs Run
No open hole logs were run

27. Was Well Cored: no

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	24#	260'	12-1/4"	250 sx	
5-1/2"	14#	3390'	7-7/8"	350 sx	

29. LINER RECORD

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN

30. TUBING RECORD

SIZE	DEPTH SET	PACKER SET
2-3/8"	3346	3346

31. Perforation Record (Interval, size and number)
3354-3378 - 25 holes
3267-3279 - 13 holes
3174-3222 - 49 holes

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL	AMOUNT AND KIND MATERIAL USED
3354-3375	300 gal. 15% HCL; 44,730 gal Minimax containing 45,000# 10/20 sand, 400 scf/bbl nitrox

33. PRODUCTION

Date First Production	Production Method (Flowing, gas lift, pumping — Size and type pump)	Well Status (Prod. or Shut-in)
Shut-in	Flowing	Shut-in

Date of Test	Hours Tested	Choke Size	Prod'n. For Test Period	Oil — Bbl.	Gas — MCF	Water — Bbl.	Gas — Oil Ratio
1-13/78	3 hrs	3/4"	→				

Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate	Oil — Bbl.	Gas — MCF	Water — Bbl.	Oil Gravity — API (Corr.)
FR-SITP 876 PC-SITP 1410	FR-SICP 968	→				

34. Disposition of Gas (Sold, used for fuel, vented, etc.)
to be sold

Test Witnessed By: Joe Elledge

35. List of Attachments

FEB 13 1978
OIL CON. COM.
DIST. 3

36. I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief.

SIGNED J. R. Routson TITLE Petroleum Engineer DATE 2/7/78

NEW MEXICO OIL CONSERVATION COMMISSION
WELL DELIVERABILITY TEST REPORT FOR 19 78

Form C122-A
Revised 1-1-65

POOL NAME	POOL SLOPE	FORMATION	COUNTY
Wildcat	n= .85	Pictured Cliff	San Juan

COMPANY			WELL NAME AND NUMBER		
Palmer Oil and Gas Company			State #2		
UNIT LETTER	SECTION	TOWNSHIP	RANGE	PURCHASING PIPELINE	
N	2	31N	7W	Northwest Pipeline	
CASING O.D. - INCHES	CASING I.D. - INCHES	SET AT DEPTH - FEET	TUBING O.D. - INCHES	TUBING I.D. - INCHES	TOP - TUBING PERF. - FEET
5.500	5.012	3390	2.375	1.995	3346
GAS PAY ZONE		WELL PRODUCING THRU		GAS GRAVITY	GRAVITY X LENGTH
FROM 3354 TO 3378		CASING	TUBING X	.686	2295
DATE OF FLOW TEST			DATE SHUT-IN PRESSURE MEASURED		
FROM 7-3-78 TO 7-11-78			7-18-78		

PRESSURE DATA - ALL PRESSURES IN PSIA

(a) Flowing Casing Pressure (DWt)	(b) Flowing Tubing Pressure (DWt)	(c) Flowing Meter Pressure (DWt)	(d) Flow Chart Static Reading	(e) Meter Error (Item c - Item d)	(f) Friction Loss (a - c) or (b - c)	(g) Average Meter Pressure (Integr.)
Dual	588	518	518	0	70	509
(h) Corrected Meter Pressure (g + e)	**(i) Avg. Wellhead Press. P_t = (h + f)**	**(j) Shut-in Casing Pressure (DWt)**	**(k) Shut-in Tubing Pressure (DWt)**	**(l) P_c = higher value of (j) or (k)**	**(m) Del. Pressure P_d = 80 %P_c**	**(n) Separator or Dehydrator Pr. (DWt) for critical flow only**
509	579	Dual	1114	1114	891	

FLOW RATE CORRECTION (METER ERROR)

Integrated Volume - MCF/D	Quotient of $\frac{\text{Item c}}{\text{Item d}}$	$\sqrt{\frac{\text{Item c}}{\text{Item d}}}$	Corrected Volume
500	1.000	1.000	Q = 500 MCF/D

WORKING PRESSURE CALCULATION

$(1-e^{-s})$	$(P_c\ Q_m)^2\ (1000)$	$R^2 = (1-e^{-s})\ (P_c\ Q_m)^2\ (1000)$	P_t^2	$P_w^2 = P_t^2 + R^2$	$P_w = \sqrt{P_w^2}$
0.154	22,099	3,403	335,241	338,644	582

DELIVERABILITY CALCULATION

$$D = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = 500 \left[\left(\frac{447,115}{902,352}\right)^n = (.4955)^n = .5505\right] = 225 \text{ MCF/D}$$

REMARKS: Initial and Annual test for 1978

SUMMARY

Item b	509	Psia
P_c	1114	Psia
Q	500	MCF/D
P_w	582	Psia
P_d	891	Psia
D	225	MCF/D

Company Palmer Oil and GAs Company
By BY JOE F. ELLEDGE
Title Agent
Witnessed By
Company

Form 9-331
(Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE (See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

5. LEASE DESIGNATION AND SERIAL NO.: NM-28749

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

7. UNIT AGREEMENT NAME:

2. NAME OF OPERATOR: Palmer Oil & Gas Company

8. FARM OR LEASE NAME: Federal

3. ADDRESS OF OPERATOR: P. O. Box 2564, Billings, Montana 59103

9. WELL NO.: No. 3

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface: 1850' FNL, 1640' FEL
At top prod. interval reported below: same
At total depth: same

10. FIELD AND POOL, OR WILDCAT: Undesignated PC and S. Los Pinos Fruitland Ext.

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: SW¼NE¼ Sec. 10-31N-7W

14. PERMIT NO. | DATE ISSUED

12. COUNTY OR PARISH: San Juan | 13. STATE: New Mexico

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
3/27/78	4/4/78	5/13/78	6539 GL, 3550 KB	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
3630'	3585'	two	→	0-TD	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
3325-3522 - Pictured Cliffs
3106-3264 - Fruitland

25. WAS DIRECTIONAL SURVEY MADE: no

26. TYPE ELECTRIC AND OTHER LOGS RUN: no open hole logs were run

27. WAS WELL CORED: no

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	24#	252' KB	12-1/4"	225 sx	
5-1/2"	14#	3630'	7-7/8"	350 sx	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2-3/8"	3300'	
1"	3209'	

31. PERFORATION RECORD (Interval, size and number)
PC - 3325, 3326, 3328, 3332, 3344, 3351, 3483, 3486, 3516, 3522 (1 shot each)
Fr - 3106-20, 3130-36, 3150-90, 3198-3214, 3228-36, 3252-56, 3260-64 (1 sh/ft)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
3325-3522	500 gal 15% HCl, Foam fraced w/120,000 10/20 sd, 1,336,500 scf N_2.
3106-3264	no treatment

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
shut in	flowing	shut-in

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
5/13/78	3 hrs	3/4"			FR 78 PC 225		

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
PC 138 FR. 38	FCP 599			PC 1806 FR 624		

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): to be sold

TEST WITNESSED BY: Joe Elledge

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Robert D. Ballantyne TITLE Production Sup't DATE 5/30/78

*(See Instructions and Spaces for Additional Data on Reverse Side)

Form C-122
Revised 9-1-58

NEW MEXICO OIL CONSERVATION COMMISSION
MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Type Test: [X] Initial [ ] Annual [ ] Special — Test Date: 5-6-1978

Company: Palmer Oil & Gas Company — Connection: Northwest Pipeline — Unit:

Pool: Wildcat — Formation: Pictured Cliffs — Farm or Lease Name: Federal

Completion Date: 4-29-1978 — Total Depth: 3630 — Plug Back TD: 3585 — Elevation: 6539 G.L. — Well No.: 3

Csg. Size: 5.500 — Wt.: 14# — d: 5.012 — Set At: 3630 — Perforations: From 3325 To 3522 — Unit: G — Sec.: 10 — Twp.: 31N — Rge.: 7W

Tbg. Size: 2.375 — Wt.: 4.7 — d: 1.995 — Set At: 3300 — Perforations: From Open To Ended — County: San Juan

Type Well – Single – Bradenhead – G.C. or G.O. Multiple: Gas - Gas Dual — Packer Set At: 3300 — State: New Mexico

Producing Thru	Reservoir Temp. °F	Mean Annual Temp. °F	Baro. Press. – P_a	Prover	Meter Run	Taps
Tbg.			12 psia			

H	Gg	% CO_2	% N_2	% H_2S
	.650(est.)			

FLOW DATA

NO.	Prover Line Size	X	Orifice Size	Press. p.s.i.g.	Diff. hw	Temp. °F
SI	7 day					
1.	2 inch		.750	138		
2.						
3.						
4.						
5.						

TUBING DATA

Press. p.s.i.g.	Temp. °F
1461	
138	60°

CASING DATA

Press. p.s.i.g.	Temp. °F

Duration of Flow: 3 hrs.

RATE OF FLOW CALCULATIONS

NO.	Coefficient (24 Hour)	$\sqrt{h_w P_m}$	Pressure P_m	Flow Temp. Factor Ft.	Gravity Factor Fg	Super Compress. Factor, Fpv	Rate of Flow Q, Mcfd
1	12.3650		150	1.000	.9608	1.014	1806
2.							
3.							
4.							
5.							

NO.	P_t	Temp. °R	T_r	Z
1.				
2.				
3.				
4.				
5.				

Gas Liquid Hydrocarbon Ratio _____ Mcf/bbl.

A.P.I. Gravity of Liquid Hydrocarbons _____ Deg.

Specific Gravity Separator Gas _____ XXXXXXXXXX

Specific Gravity Flowing Fluid XXXXX

Critical Pressure _____ P.S.I.A.

Critical Temperature _____ R

P_t 1423 — P_c 2,169,729

NO	P_t^2	P_w	P_w^2	$P_c^2 - P_w^2$
1		253	64018	2,105,711
2	Use calculated P_w^2			
3				
4				
5				

(1) $\frac{P_c^2}{P_c^2 - P_w^2} = 1.0304$ — (2) $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1.02577$

AOF = Q $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1852$

Absolute Open Flow 1852 Mcfd @ 15.025 — Angle of Slope θ _____ — Slope, n .85

Remarks: Initial P.L. test taken in conjunction with potential test.

Approved By Commission:	Conducted By:	Calculated By:	Checked By:
	Jc F. Elledge	Joe F. Elledge	Don Roberts

3

United States Department of the Interior

GEOLOGICAL SURVEY

FARMINGTON DISTRICT
DURANGO DISTRICT

Supplement to USGS, NTL-6

Above Data Required on Well Sign

GENERAL REQUIREMENTS FOR OIL AND GAS OPERATIONS ON FEDERAL AND INDIAN LEASES

These requirements apply generally to all oil and gas operations on Federal and Indian leases. They apply specifically to the above-described well. Special requirements that apply and are effective for this well, if any, are check-marked in Section 15 of these General Requirements.

1. GENERAL

A. Full compliance with applicable laws and regulations, with the approved Permit to Drill, and with the approved Surface Use and Operations Plan is required. Lessees and/or operators are fully accountable for the actions of their contractors and subcontractors.

B. Each well shall have a well sign in legible condition from spud date to final abandonment. The sign should show the operator's name, lease name or unit name, well number, location of the well, and the lease serial number.

C. A complete copy of the approved Application for Permit to Drill and the accompanying Surface Use and Operations Plan, along with any conditions of approval, shall be available to authorized personnel at the drillsite whenever active construction or drilling operations are under way.

D. A drilling operations progress report is to be submitted daily from spud date until the well is completed and the Well Completion Report (Form 9-330) is filed. The report should be on paper not less than 5 X 8 inches in size, and each page should identify the well by operator's name, well name and number, and by well location.

E. Immediate notice is required of all blowouts, fires, spills, and accidents involving life-threatening injuries or loss of life. (See NTL-3A.)

F. No construction activities, such as roads, well sites, tank battery sites, pits, or other work involving surface disturbance of previously non-disturbed land will be commenced until a Surface Use and Operations Plan is submitted and approval obtained.

G. If, during operations, any archeological or historical sites, or any object of antiquity subject to the Antiquities Act of June 8, 1906, are discovered, all operations which would affect such sites are to be suspended and the discovery reported promptly to the appropriate office of the Geological Survey.

H. Prior approval of the District Engineer is required for variance from the approved drilling program and before commencing plugging operations, plugback work, casing repair work, corrective cementing operations, or suspending drilling operations indefinitely. Emergency approval may be obtained orally, but such approval does not waive the written report requirements.

I. Blowout prevention equipment is to be installed, tested, and in working order before drilling below the surface casing, and shall be maintained ready for use until drilling operations are completed.

J. All shows of fresh water and minerals will be reported and protected.

K. Well area and lease premises will be maintained in a workmanlike manner with due regard to safety, conservation, and appearance. All waste associated with the drilling operations will be contained and will be buried in place (in a separate trash pit) or removed and deposited in an approved sanitary landfill. All garbage (metal containers will be crushed) and debris left on site will be buried at least two feet deep. All trash and debris will be buried or removed from the site within one month after removal of the drilling rig and/or completion rig, and the wellsite will be kept clean and in an aesthetically satisfactory condition for the life of the well.

L. Unless drilling operations are commenced within one year, approval of an Application for Permit to Drill will expire. A written request for extension may be granted if timely submitted.

2. CONSTRUCTION ACTIVITIES (Refer to Surface Operating Standards for Oil and Gas Exploration and Development--Second Edition)

A. Prior to commencing construction of road, pad, or other associated developments, operator will provide the dirt contractor with a copy of the Surface Use Plan, the conditions of approval, and a copy of Sections 2 and 3 of these General Requirements.

B. No gravel or other related minerals from new or existing pits on Federal land will be used in construction of roads, well sites, etc., without prior approval from the surface management agency.

C. Vegetative materials removed during construction must be disposed of in such manner that it does not detract from the aesthetics of the area and does not accelerate erosion. Vegetation removed during clearing operations should be placed in drainages, washes, gullies, etc., and "walked down" by crawler-type tractor. If there are no drainages in the immediate area, the vegetation should be "walked down" in place. All trash resulting from construction activities will not be piled or left in rows, but will be left so it does not detract from the natural appearance of the area. Any available topsoil encountered during construction should be stockpiled for use in restoring the pit area after the pits are covered. A drainage ditch must be constructed above the cut slope of the pad.

D. Unless otherwise approved, all access roads should be limited to 20 feet in width, excluding turnouts.

(1) Water bars will be constructed on the access road to the well location and conform to surface management agency specifications. The maximum slope distance between water bars will be:

% Slope	Slope Distance
Less than 1%	400 feet
1% - 5%	300 feet
5% - 15%	200 feet
15% - 25%	100 feet
Greater than 25%	50 feet

When the access road is graded, water bars will be left in the road or replaced immediately upon completion of grading.

E. Each existing fence to be crossed by the permittee will be braced and tied off before cutting so as to prevent slacking of the wire. The opening will be protected as necessary during construction to prevent the escape of livestock and upon completion of construction, the fence will be repaired back to the original standard of the existing fence. A cattleguard will be installed

In any fence where a road is to be regularly traveled. A twelve-foot gate will be installed adjacent to the cattleguard when necessary.

NOTE: Sections 2-C and 2-D above apply primarily to Federal surface. If the land is privately owned, these requirements may be varied to comply with the operator landowner agreement.

3. DRILLING PITS

A. Mud pits will be constructed so as not to leak, break, or allow discharge of liquids. Pits are not to be located in natural drainage. Any plastic material used to line pits must be removed to below ground level before pits are covered.

B. All unguarded pits containing liquids will be fenced.

C. Liquids in pits will be allowed to evaporate, or be properly disposed of otherwise, before pits are recontoured. Under no circumstances will pits be cut and drained.

4. CASING AND CEMENTING REQUIREMENTS

A. Surface casing is to be set at sufficient depth to protect fresh water zones and provide well control; and cement circulated to the surface.

B. Intermediate and production casing strings are to be set and cemented as necessary to effectively isolate and seal off all water, oil, gas, or coal-bearing strata encountered in the well down to the casing point.

C. Prior to drilling the plug after cementing, all casing strings shall be pressure tested. Test pressure shall not be less than 600 psi for surface casing, and a minimum of 1,500 psi or 0.2 psi/ft., whichever is greater, for other casing strings. If the pressure declines more than 10 percent in 30 minutes, or if there is other indication of a leak, the casing shall be recemented, repaired, or an additional casing string run, and the casing shall be tested again in the same manner.

D. After cementing but before commencing any tests, the casing string shall stand cemented until the cement has reached a compressive strength of at least 500 psi at the shoe, except that in no case shall tests be initiated until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log.

5. BLOWOUT PREVENTION

A. Blowout preventers and related well control equipment shall be installed, tested, and used in such manner necessary to prevent blowouts. All wells must be equipped with at least one blowout preventer while drilling below surface casing.

B. While drill pipe is in use, ram-type blowout preventers shall be actuated to test proper functioning once each trip, but in no event less than once each day. The annular-type blowout preventer shall be actuated on the drill pipe at least once each week.

C. Blowout preventers are to have proper rams for the operations being performed. Casing rams are required when running casing.

D. Blowout preventers are to have handwheels installed.

E. A choke line and a kill line are to be properly installed. The kill line is not to be used as a fill-up line.

F. The accumulator system shall have a pressure capacity to provide for repeated operation of hydraulic preventers.

G. Drill string safety valve(s) to fit all pipe in the drill string are to be maintained on the rig floor while drilling operations are in progress.

H. Blowout prevention drills are to be conducted as necessary to assure that equipment is operational and that each crew is properly trained to carry out emergency duties. All BOP tests and drills are to be recorded in the driller's log.

I. The maximum pressure to be allowed on blowout preventers during well control operations is to be posted for each casing string.

J. The characteristics, use, and testing of drilling mud and the conduct of related drilling procedures shall be such as are necessary for well control. Quantities of mud materials sufficient to insure well control shall be maintained, readily accessible for use at all times.

K. From the time drilling operations are initiated and until drilling operations are completed, a member of the drilling crew or the toolpusher shall maintain rig floor surveillance at all times, unless the well is secured with blowout preventers or cement plugs.

6. REPORTS

A. The following reports shall be filed with the District Engineer within 15 days after the work is completed:

(1) Five copies of Sundry Report, Form 9-331, giving complete information concerning:

(a) Setting of each string of casing. Show size, grade and weight of casing set, size hole, depth set, amount and type of cement used, whether cement circulated, top of cement behind casing if determined, depth of cementing tools if used, casing test method and results, and date work was done. Show spud date on first report submitted.

(b) Intervals tested, perforated, acidized, or fractured, and results obtained. Show date work was done.

(2) Five copies of Well Completion Report, Form 9-330. Show formation tops, drill stem test information, completion data, and production tests. Show all oil and gas zones and important water sands under Item 37. Data on water sands should include rate of water inflow and elevation to which water rose in hole.

(3) Two copies of all electrical and radioactivity logs run.

7. DRILLER'S LOG

A. The following shall be entered in the daily driller's log:

(1) Blowout preventer pressure tests, including test pressures and results.

(2) Blowout preventer tests for proper functioning.

(3) Blowout prevention drills conducted.

(4) Casing run, including size, grade, weight and depth set.

(5) How pipe was cemented, including amount of cement, type, whether cement circulated, location of cementing tools, etc.

(6) Waiting on cement time for each casing string.

(7) Casing pressure tests after cementing, including test pressure and results.

8. DRILLSTEM TESTS

A. Estimated amounts of oil and gas recovered and/or produced during drillstem tests are to be shown in the driller's log and reported in accordance with NTL-4.

9. GAS FLARING

A. Approval is granted to flare gas while drilling and completion testing.

B. When gas is used for drilling, the blooey line will be located where no damage to vegetation will occur. If this is not possible, an earthen baffle will be constructed to keep the heat and residue within the operating area.

C. Failure to request permission to vent gas after 60 days following the date the well is completed will result in compensation due the United States being the full value of the gas so wasted. (See NTL-4.)

10. WATER DISPOSAL

A. An application for approval of the disposal method for water production from all new wells must be filed with the District Engineer pursuant to Section VII of NTL-2B. Failure to timely file such application will be considered an incident of non-compliance and will be grounds for issuing a shut-in order until the application is submitted.

11. SAFETY

A. All rig heating stoves are to be of the explosion-proof type.

B. Drilling rig engines should have water-cooled exhausts.

C. Rig safety lines are to be installed.

D. Hard hats must be utilized.

12. SUBSEQUENT OR CHANGE OF PLANS

A. Any additional construction, re-construction, or alterations of facilities, including roads, gathering lines, batteries, etc., which will result in the disturbance of new ground, will require the filing of a suitable plan and prior approval by the Survey after clearance with the surface management agency.

13. REMOVAL OF DRILLING RIG

A. Unless a well has been properly cased and cemented, or properly plugged, the drilling rig must not be moved from the drillsite without prior approval from the Survey.

14. ABANDONMENT

A. If the well is dry and is to be plugged, approval of the proposed plugging program may be obtained orally; however, oral approval must be confirmed in writing by immediately filing a Notice of Intention to Abandon on Form 9-331 in quintuplicate with the District Engineer. The report should show the total depth reached, the reason for plugging, and the proposed intervals, by depths, where cement plugs are to be placed, type of plugging mud, etc.

B. Upon completion of approved plugging, erect a regulation well marker which should not be less than 4 inches in diameter and extend at least 4 feet above general ground level. Heap up the dirt around the base of the marker about 12 inches to take care of any settling of the cellar. The top of the marker must be closed or capped. The following minimum information shall be permanently placed on the marker with a plate, cap, or welded bead:

(1) Operator
(2) Well number and name
(3) Section, Township and Range
(4) Footage location

If approval is obtained to omit the dry hole marker, casings should be cut off four feet below ground level.

C. Within 15 days after plugging the well, a Subsequent Report of Abandonment is to be filed on Form 9-331 in quintuplicate, showing the manner in which the well was plugged, including depths where casing was cut and pulled, intervals (by depths) where cement plugs were placed, and the date plugging was completed. When all surface restoration work is completed, advise the District Office so that a field inspection of the wellsite can be made.

D. If, upon abandonment of wells on Federal surface, the retention of the well pad and/or access road is not considered necessary for the management and multiple use of the natural resources, they will be ripped a minimum of 12" in depth. After ripping, water bars will be installed as stated in 2-D-(1). All ripped surfaces are to be protected from vehicular travel by construction of a dead-end ditch and earthen barricade at the entrance to these ripped areas. (Reseeding of the affected areas may be required.)

E. Surface restoration after abandonment of wells on non-Federal surface normally will be in accordance with the operator-landowner agreement; however, minimum Federal restoration requirements on private surface-Federal minerals will be required.

15. SPECIAL STIPULATIONS

The following special requirements apply and are effective when checked:

☐ A. _____ surface casing should be set at _____ feet and cement circulated to the surface.

☐ B. Ram-type blowout preventers and related control equipment shall be pressure tested with water to the rated working pressure of the stack assembly (except that the annular-type preventer may be tested to 70 percent of rated working pressure) (a) when installed; (b) before drilling possible abnormally-pressured zones; and (c) following repairs that require disconnecting a pressure seal in the assembly.

☐ C. Minimum required fill of cement behind the _____ casing is to _____.

☑ D. All above-ground permanent structures and equipment will be painted a non-glare color that simulates the natural color of the site, as follows:

- ☐ Brown, Federal Standard 595a-30318
- ☑ Green, Federal Standard 595a-34127
- ☐ Gray, Federal Standard 595a-36357
- ☐ Sand, Federal Standard 5952-30277

☐ E. A kelly cock will be installed and maintained in operable condition.

☐ F. The District Office is to be notified in sufficient time for a representative to witness cementing of the _____ casing.

☐ G. A Communitization Agreement covering the acreage dedicated to the well must be filed for approval with the U. S. Geological Survey, P. O. Box 26124, Albuquerque, New Mexico 87125. The effective date of the agreement must be prior to any sales.

☐ H. Compacted areas will be plowed or ripped before reseeding. Reseeding of the disturbed lands is required upon completion of drilling and completion activities and abandonment of the well. All seeding will be done between July 1 and September 15. Seeding will be done with a disc-type drill with two boxes for various seed sizes. The drill rows will be eight to ten inches apart. The seed will be planted not less than one-half inch deep or more than one inch deep. The seeder will be followed with a drag, packer, or roller to insure uniform coverage of the seed, and adequate compaction. Drilling of the seed will be done on the contour where possible, not up and down the slope. Where slopes are too steep for contour drilling, a "cyclone" hand-seeder or similar broadcast seeder will be used. Seed will then be covered to the depth described above by whatever means is practical.

If, in the opinion of the surface management agency, the seeding is unsuccessful, the lessee/operator may be required to make subsequent seedings until revegetation is successful.

Species to be planted in pounds pure-live-seed per acre:

☑ Seed Mix No. 1
Crested Wheatgrass (Agropyron desertorum)----------2½
Smooth Brome (Bromus inermis)----------2½
Fourwing Saltbush (Dewinged) (Atriplex canescens)---------- ½
Nomad Alfalfa (Hedicago sitiva)----------1

☐ Seed Mix No. 2
Crested Wheatgrass (Agropyron desertorum)----------3½
Fourwing Saltbush (Dewinged) (Atriplex canescens)----------1
Sand Dropseed (Sporobolus cryptandrus)----------3/4
Alkali Sacaton (Sporobolus airoides)----------3/4

☐ Seed Mix No. 3
Fourwing Saltbush (Dewinged) (Atriplex canescens)----------1
Sand Dropseed (Sporobolus cryptandrus)----------1½
Alkali Sacaton (Sporobolus airoides)----------1½
Shad Scale (Atriplex confertifolia)----------3/4

☐ Seed Mix No. 4--NIPP
Indian Ricegrass----------1
Sand Dropseed----------1
Galletta----------2

☐ Seed Mix No. 5--NIPP
Alkali Sacaton----------1
Sand Dropseed----------1
Galletta----------2

☐ Seed Mix No. 6--BIA

		Minimum % PLS accept.
Alkali Sacaton	1	76%
Sand Dropseed	1	76%
Galletta	2	55%

PLS (Pure Live Seed) = Germination X Purity

After drilling is completed, the pad will be seeded with the recommended seed mix. Seed will be drilled to a depth of not less than ½ inch and not more than 3/4 inch, followed by a drag or packer. Compacted areas will be plowed (disced) to a depth of 4-6 inches before seeding. Areas too steep to be drilled will be broadcast seeded with a "cyclone" hand-held seeder or similar device, using 150% of the recommended drilled rate of seed per acre. The cut slope will be dressed up and seeded according to the above stipulation.

☐ I. No well and/or production equipment within the irrigable fields of the Navajo Indian Irrigation Project will exceed two feet above the natural ground surface elevation, and will be adequately barricaded for safety.

☐ J. Any production piping systems shall be installed with at least four feet of cover.

☐ K. In addition to the well-control equipment stipulated in Section 5, either an annular blowout preventer or a rotating head must be used while drilling below surface casing to. _____.

☑ L. Other:

See special stips

DIRECTORY OF FEDERAL PERSONNEL

OIL AND GAS OPERATIONS IN FARMINGTON AND DURANGO DISTRICTS

Surface Use and Rehabilitation

Bureau of Land Management
P. O. Box 568, or
900 La Plata Highway
Farmington, New Mexico 87401

Office hours: 7:45 a.m. to 4:30 p.m.

Office phones: (505) 325-3581, 325-3582, and 325-2922

Names of people involved with Oil and Gas Operations:

Bob Calkins, Area Manager
Bob Moore, Lands & Minerals Supervisor
Russ Pigors, Inspector
Bob Harler, Inspector
Steve Friedman, Inspector

Drilling and Producing Operations

U. S. Geological Survey--Oil and Gas Operations
P. O. Box 959, or
3535 East 30th Street
Farmington, New Mexico 87401

Office hours: 8:00 a.m. to 4:30 p.m.

Office phones: (505) 325-4572 or 325-4573

Home Phones

Jim Sims, District Supervisor.....
Errol Becher, Petroleum Engineer.....325-3886
Hildred Kuchera, Petroleum Engineer.....325-3448
Bill Spence, Petroleum Engineer.....327-2193
Ray Swanson, Petroleum Engineering Technician.....325-8189
Ken Baker, Petroleum Engineering Technician.....327-2170
Fred Edwards, Petroleum Engineering Technician.....325-7885
Andrew Stump, Environmental Scientist.....327-0507
George Carlson, Environmental Scientist.....325-0757

U. S. Geological Survey--Oil and Gas Operations
Federal Building
701 Camino del Rio
Durango, Colorado 81301

Office hours: 8:00 a.m. to 4:30 p.m.

Office phone: (303) 247-5144

Home Phones

Carl Barrick, Petroleum Engineer.....259-0628
Terry Galloway, Petroleum Engineering Technician.....247-3646
Randall Walker, Petroleum Engineering Technician.....247-0487
John Keller, Environmental Scientist.....247-5308
Donald Englishman, Environmental Scientist.....563-4314

Each well drilled on any consolidated tract shall be located in the approximate geographical center of the combined units with a tolerance of 150 feet for topographical conditions, but in any event shall not be located closer than 330 feet to the outer boundaries of the proposed proration unit or consolidated tract.

RULE 105. PIT FOR CLAY, SHALE, AND DRILL CUTTING

In order to assure a supply of proper material for mud-laden fluid to confine oil, gas, or water to their native strata during the drilling of any well, operators shall provide before drilling is commenced an adequate pit for the accumulation of drill cuttings.

RULE 106. SEALING OFF STRATA

(a) During the drilling of any oil or natural gas well, all oil, gas, and water strata above the producing horizon shall be sealed or separated in order to prevent their contents from passing into other strata.

(b) All fresh waters and waters of present or probable value for domestic, commercial, or stock purposes shall be confined to their respective strata and shall be adequately protected by methods approved by the Division. Special precautions by methods satisfactory to the Division shall be taken in drilling and abandoning wells to guard against any loss of artesian water from the strata in which it occurs, and the contamination of artesian water by objectionable water, oil, or gas.

(c) All water shall be shut off and excluded from the various oil and gas bearing strata which are penetrated. Water shut-offs shall ordinarily be made by cementing casing.

RULE 107. CASING AND TUBING REQUIREMENTS

(a) Any well drilled for oil or natural gas shall be equipped with such surface and intermediate casing strings and cement as may be necessary to effectively seal off and isolate all water-, oil-, and gas-bearing strata and other strata encountered in the well down to the casing point. In addition thereto, any well completed for the production of oil or natural gas shall be equipped with a string of properly cemented production casing at sufficient depth to ensure protection of all oil- and gas-bearing strata encountered in the well, including the one(s) to be produced.

Sufficient cement shall be used on surface casing to fill the annular space behind the casing to the top of the hole, provided however, that authorized field personnel of the Division may, at their discretion, allow exceptions to the foregoing requirement when known conditions in a given area render compliance impracticable.

All cementing shall be by pump and plug method unless some other method is expressly authorized by the Division.

All cementing shall be with conventional-type hard-setting cements to which such additives (lighteners, densifiers, extenders, accelerators, retarders, etc.) have been added to suit conditions in the well.

Authorized field personnel of the Division may, when conditions warrant, allow exceptions to the above paragraph and permit the use of oil-base casing packing material in lieu of hard-setting cements on intermediate and production casing strings; provided however, that when such materials are used on the intermediate casing string, conventional-type hard-setting cements shall be placed throughout all oil- and gas-bearing zones and throughout at least the lowermost 300 feet of the intermediate casing string. When such materials are used on the production casing string, coventional-type hard-setting cements shall be placed throughout all oil- and gas-bearing zones and shall extend upward a minimum of 500 feet above the uppermost perforation or, in the case of an open-hole completion, 500 feet above the production casing shoe.

All casing strings shall be tested and proved satisfactory as provided in paragraph (c) below.

(b) After cementing, but before commencing tests required in paragraph (c) below, all casing strings shall stand cemented in accordance with Option 1 or 2 below. Regardless of which option is taken, the casing shall remain stationary and under pressure for at least eight hours after the cement has been placed. Casing shall be "underpressure" if some acceptable means of holding pressure is used or if one or more float valves are employed to hold the cement in place.

OPTION 1

Allow all casing strings to stand cemented a minimum of eighteen (18) hours prior to commencing tests. Operators using this option shall report on Form C-103 the actual time the cement was in place before initiating tests.

OPTION 2

(May be used in the counties of San Juan, Rio Arriba, McKinley, Sandoval, Lea, Eddy, Chaves, and Roosevelt only.) Allow all casing strings to stand cemented until the cement has reached a compressive strength of at least 500 pounds per square inch in the "zone of interest" before commencing tests, provided however, that no tests shall be commenced until the cement has been in place for at least eight (8) hours.

The "zone of interest" for surface and intermediate casing strings shall be the bottom 20 percent of the casing string, but shall be no more than 1000 feet nor less than 300 feet of the bottom part of the casing unless the casing is set at less than 300 feet. The "zone of interest" for production casing strings shall include the interval or intervals where immediate completion is contemplated.

To determine that a minimum compressive strength of 500 pounds per square inch has been attained, operators shall use the typical performance data for the particular cement mix used in the well, at the minimum temperature indicated for the zone of interest by Figure 107-A, Temperature Gradient Curves. Typical performance data used shall be that data furnished by the cement manufacturer or by a competent materials testing agency, as determined in accordance with the latest edition of API Code RP 10 B "Recommended Practice for Testing Oil-Well Cements."

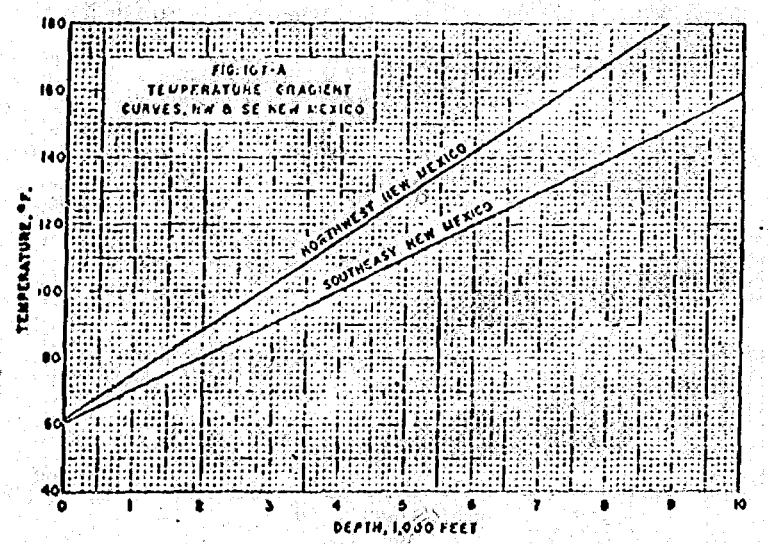


Figure 107-A

Operators using the compressive strength criterion (Option 2) shall report the following information on Form C-103:

(1) Volume of cement slurry (cu. ft.) and brand name of cement and additives, percent additives used, and sequence of placement if more than one type cement slurry is used.

(2) Approximate temperature of cement slurry when mixed.

(3) Estimated minimum formation temperature in zone of interest.

(4) Estimate of cement strength at time of casing test.

(5) Actual time cement in place prior to starting test.

(c) All casing strings except conductor pipe shall be tested after cementing and before commencing any other operations on the well. Form C-103 shall be filed for each casing string reporting the grade and weight of pipe used. In the case of combination strings utilizing pipe of varied grades or weights, the footage of each grade and weight used shall be reported. The results of the casing test, including actual pressure held on pipe and the pressure drop observed shall also be reported on the same Form C-103.

(1) Casing strings in wells drilled with rotary tools shall be pressure tested. Minimum casing test pressure shall be approximately one-third of the manufacturer's rated internal yield pressure except that the test pressure shall not be less than 600 pounds per square inch and need not be greater than 1500 pounds per square inch. In cases where combination strings are involved, the above test pressures shall apply to the lowest pressure rated casing used. Test pressures shall be applied for a period of 30 minutes. If a drop of more than 10 percent of the test pressure should occur, the casing shall be considered defective and corrective measures shall be applied.

(7) Casing strings in wells drilled with cable tools may be tested as outlined in sub-paragraph (c) (1) above, or by bailing the well dry and observing the hole to see if it remains satisfactorily dry for a period of at least one (1) hour before commencing any further operations on the well.

(d) Requirements for tubing of wells are as follows:

(1) All flowing oil wells equipped with casing larger in size than 2 7/8-inch OD shall be tubed.

(2) All gas wells equipped with casing larger in size than 2 7/8-inch OD shall be tubed.

(3) Tubing shall be set as near the bottom as practical and tubing Perforations shall not be more than 250 feet above the top of the pay.

(4) The Division Director may, upon proper application, grant administrative exceptions to the provisions of sub-paragraphs (2) and (3) above, without notice and hearing, provided waste will not be caused thereby.

(e) The Division's District Supervisors or their representatives shall have authority to approve tubingless completions without the necessity of administrative approval or notice and hearing when the following conditions exist:

(1) The well is to be completed with a total depth of 5,000 feet or less,

(2) The well is not a wildcat (it is not more than one mile from an existing well producing from the same common source of supply to which it is projected).

(3) No known corrosive or pressure problems exist which might make the tubingless method of completion undesirable,

(4) The well will not be a dual completion,

(5) The tubing used as a substitute for casing will be either 2 3/8-inch OD or 2 7/8-inch OD.

RULE 108. DEFECTIVE CASING OR CEMENTING

In any well that appears to have a defective casing program or faultily cemented or corroded casing which will permit or may create underground waste, the operator shall proceed with diligence to use the appropriate method and means to eliminate such hazard of underground waste. If such hazard of waste cannot be eliminated, the well shall be properly plugged and abandoned.

RULE 109. BLOWOUT PREVENTION (See Rule 114 (b) also)

(a) Blowout preventers shall be installed and maintained in good working order on all drilling rigs operating in areas of known high pressures at or above the projected depth of the well and in all areas where pressures which will be encountered are unknown, and on all workover rigs working on wells in which high pressures are known to exist.

(b) Blowout preventers shall be installed and maintained in good working order on all drilling rigs and workover rigs operating within the corporate limits of any city, town, or village, or within 1320 feet of a habitation, school, or church, wherever located.

(c) All operators, when filing Form C-101, Application for Permit to Drill, Deepen, or Plug Back, or Form C-103, Sundry Notices, for any operation requiring blowout prevention equipment in accordance with Sections (a) and (b) above, shall submit a proposed blowout prevention program for the well. The program as submitted may be modified by the District Supervisor if, in his judgment, such modification is necessary.

RULE 110. PULLING OUTSIDE STRINGS OF CASING

In pulling outside strings of casing from any oil or gas well, the space outside the casing left in the hole shall be kept and left full of mud-laden fluid or cement of adequate specific gravity to seal off all fresh and salt water strata and any strata bearing oil or gas not producing.

RULE 111. DEVIATION TESTS AND DIRECTIONAL DRILLING

(a) Any well which is drilled or deepened with rotary tools shall be tested at reasonably frequent intervals to determine the deviation from the vertical. Such tests shall be made at least once each 500 feet or at the first bit change succeeding 500 feet. A tabulation of all deviation tests run, sworn to and notarized, shall be filed with Form C-104, Request for Allowable and Authorization to Transport Oil and Natural Gas. When the deviation averages more than five degrees in any 500-foot interval, the Division Director may require that a directional survey be run to establish the location of the producing interval(s).

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

CASE NO. 6852
Order No. R-6388

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION ON ITS OWN MOTION TO CONSIDER SPECIAL RULES AND PROCEDURES FOR THE DESIGNATION OF "TIGHT FORMATIONS" UNDER THE NATURAL GAS POLICY ACT OF 1978.

ORDER OF THE DIVISION

BY THE DIVISION:

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

NOW, on this 30th day of June, 1980, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the 95th Congress of the United States passed the Natural Gas Policy Act of 1978 (NGPA), P.L. 95-621, 92 Stat. L. 3350.

(3) That said Act was enacted on November 9, 1978, and went into effect on December 1, 1978.

(4) That pursuant to said Act, the Federal Energy Regulatory Commission (FERC), on February 20, 1980, issued interim regulations under Section 107 of the NGPA providing that the appropriate agency in each state may recommend formations within that state which meet FERC specifications and which may be eligible for designation by the FERC as "tight formation."

(5) That natural gas produced from said "tight formations" should receive a reasonable incentive price.

(6) That the Oil Conservation Division and the Office of the United States Geological Survey in Albuquerque, New Mexico, are the agencies in the State of New Mexico which may recommend formations within the State of New Mexico for tight formation designations.

(7) That the Oil Conservation Division and the Office of the United States Geological Survey in Albuquerque, New Mexico, have agreed that the Oil Conservation Division shall receive and rule on all applications for tight formation designations in the State of New Mexico irrespective of the nature of land ownership.

(8) That the Oil Conservation Division should adopt special rules of procedure for accepting applications for the tight formation designations.

(9) That said special rules should require the filing of geographical, geological, and engineering information sufficient to support findings for an order recommending a tight formation designation.

(10) That said special rules should be in the form and content prescribed in Exhibit A, attached hereto and made a part hereof.

IT IS THEREFORE ORDERED:

(1) That the "Special Rules and Procedures for Tight Formation Designations Under Section 107 of the Natural Gas Policy Act of 1978," attached hereto as Exhibit A, are hereby adopted effective immediately.

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

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

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY
Director

SEAL
fd/

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

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.

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.

Case No. 6852
Order No. R-6388
Exhibit A

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. One additional complete set 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 have produced oil or gas, or both, from the formation within the geographical area of the application; 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 that are being used or are expected to be used in the foreseeable future for domestic or agricultural water supplies; and

e. 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

If the average depth to the top of the formation (in feet): exceeds:	but does not exceed:	The maximum allowable production rate (in Mcf/day) may not exceed:
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 more than five barrels of crude oil per day prior to application of stimulation techniques or processes.

d. If an application meets the guidelines contained in subparagraphs 2 b and 2 c above, but does not meet the guideline 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 guideline 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.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
14 January 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood and Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7006

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. STAMETS: Call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. STAMETS: At the request of the applicant this case will be continued until the first Examiner Hearing in April.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. ____, heard by me on _____ 19____.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
10 December 1980

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. STAMETS: We'll call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd., for a designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. STAMETS: At the request of the applicant, this case will be continued until the January 14th, 1981, Examiner Hearing.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. ____, heard by me on _____ 19__.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Each well drilled on any communitized tract shall be located in the approximate geographical center of the combined units with a tolerance of 150 feet for topographical conditions, but in any event shall not be located closer than 330 feet to the outer boundaries of the proposed proration unit or communitized tract.

RULE 105. PIT FOR CLAY, SHALE, AND DRILL CUTTING

In order to assure a supply of proper material for mud-laden fluid to confine oil, gas, or water to their native strata during the drilling of any well, operators shall provide before drilling is commenced an adequate pit for the accumulation of drill cuttings.

RULE 106. SEALING OFF STRATA

(a) During the drilling of any oil or natural gas well, all oil, gas, and water strata above the producing horizon shall be sealed or separated in order to prevent their contents from passing into other strata.

(b) All fresh waters and waters of present or probable value for domestic, commercial, or stock purposes shall be confined to their respective strata and shall be adequately protected by methods approved by the Division. Special precautions by methods satisfactory to the Division shall be taken in drilling and abandoning wells to guard against any loss of artesian water from the strata in which it occurs, and the contamination of artesian water by objectionable water, oil, or gas.

(c) All water shall be shut off and excluded from the various oil and gas bearing strata which are penetrated. Water shut-offs shall ordinarily be made by cementing casing.

RULE 107. CASING AND TUBING REQUIREMENTS

(a) Any well drilled for oil or natural gas shall be equipped with such surface and intermediate casing strings and cement as may be necessary to effectively seal off and isolate all water-, oil-, and gas-bearing strata and other strata encountered in the well down to the casing point. In addition thereto, any well completed for the production of oil or natural gas shall be equipped with a string of properly cemented production casing at sufficient depth to ensure protection of all oil- and gas-bearing strata encountered in the well, including the one(s) to be produced.

Sufficient cement shall be used on surface casing to fill the annular space behind the casing to the top of the hole, provided however, that authorized field personnel of the Division may, at their discretion, allow exceptions to the foregoing requirement when known conditions in a given area render compliance impracticable.

All cementing shall be by pump and plug method unless some other method is expressly authorized by the Division.

All cementing shall be with conventional-type hard-setting cements to which such additives (lighteners, densifiers, extenders, accelerators, retarders, etc.) have been added to suit conditions in the well.

Authorized field personnel of the Division may, when conditions warrant, allow exceptions to the above paragraph and permit the use of oil-base casing packing material in lieu of hard-setting cements on intermediate and production casing strings; provided however, that when such materials are used on the intermediate casing string, conventional-type hard-setting cements shall be placed throughout all oil- and gas-bearing zones and throughout at least the lowermost 300 feet of the intermediate casing string. When such materials are used on the production casing string, coventional-type hard-setting cements shall be placed throughout all oil- and gas-bearing zones and shall extend upward a minimum of 500 feet above the uppermost perforation or, in the case of an open-hole completion, 500 feet above the production casing shoe.

All casing strings shall be tested and proved satisfactory as provided in paragraph (c) below.

(b) After cementing, but before commencing tests required in paragraph (c) below, all casing strings shall stand cemented in accordance with Option 1 or 2 below. Regardless of which option is taken, the casing shall remain stationary and under pressure for at least eight hours after the cement has been placed. Casing shall be "underpressure" if some acceptable means of holding pressure is used or if one or more float valves are employed to hold the cement in place.

OPTION 1

Allow all casing strings to stand cemented a minimum of eighteen (18) hours prior to commencing tests. Operators using this option shall report on Form C-103 the actual time the cement was in place before initiating tests.

OPTION 2

(May be used in the counties of San Juan, Rio Arriba, McKinley, Sandoval, Lea, Eddy, Chaves, and Roosevelt only.) Allow all casing strings to stand cemented until the cement has reached a compressive strength of at least 500 pounds per square inch in the "zone of interest" before conducting tests, provided however, that no tests shall be commenced until the cement has been in place for at least eight (8) hours.

The "zone of interest" for surface and intermediate casing strings shall be the bottom 20 percent of the casing string, but shall be no more than 1000 feet nor less than 300 feet of the bottom part of the casing unless the casing is set at less than 300 feet. The "zone of interest" for production casing strings shall include the interval or intervals where immediate completion is contemplated.

To determine that a minimum compressive strength of 500 pounds per square inch has been attained, operators shall use the typical performance data for the particular cement mix used in the well, at the minimum temperature indicated for the zone of interest by Figure 107-A, Temperature Gradient Curves. Typical performance data used shall be that data furnished by the cement manufacturer or by a competent materials testing agency, as determined in accordance with the latest edition of API Code RP 10 B "Recommended Practice for Testing Oil-Well Cements."

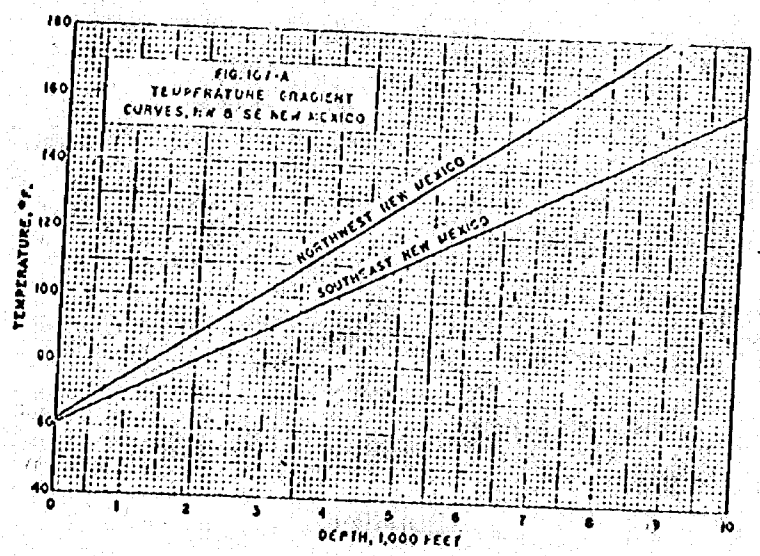


Figure 107-A

Operators using the compressive strength criterion (Option 2) shall report the following information on Form C-103:

(1) Volume of cement slurry (cu. ft.) and brand name of cement and additives, percent additives used, and sequence of placement if more than one type cement slurry is used.

(2) Approximate temperature of cement slurry when mixed.

(3) Estimated minimum formation temperature in zone of interest.

(4) Estimate of cement strength at time of casing test.

(5) Actual time cement in place prior to starting test.

(c) All casing strings except conductor pipe shall be tested after cementing and before commencing any other operations on the well. Form C-103 shall be filed for each casing string reporting the grade and weight of pipe used. In the case of combination strings utilizing pipe of varied grades or weights, the footage of each grade and weight used shall be reported. The results of the casing test, including actual pressure held on pipe and the pressure drop observed shall also be reported on the same Form C-103.

(1) Casing strings in wells drilled with rotary tools shall be pressure tested. Minimum casing test pressure shall be approximately one-third of the manufacturer's rated internal yield pressure except that the test pressure shall not be less than 600 pounds per square inch and need not be greater than 1500 pounds per square inch. In cases where combination strings are involved, the above test pressures shall apply to the lowest pressure rated casing used. Test pressures shall be applied for a period of 30 minutes. If a drop of more than 10 percent of the test pressure should occur, the casing shall be considered defective and corrective measures shall be applied.

(2) Casing strings in wells drilled with cable tools may be tested as outlined in sub-paragraph (c) (1) above, or by bailing the well dry in which case the hole must stand full and remain totally dry for a period of at least one (1) hour before commencing any further operations on the well.

(d) Requirements for tubing of wells are as follows:

(1) All flowing oil wells equipped with casing larger in size than 2 7/8-inch OD shall be tubed.

(2) All gas wells equipped with casing larger in size than 2 7/8-inch OD shall be tubed.

(3) Tubing shall be set as near the bottom as practical and tubing Perforations shall not be more than 250 feet above the top of the pay.

(4) The Division Director may, upon proper application, grant administrative exceptions to the provisions of sub-paragraphs (2) and (3) above, without notice and hearing, provided waste will not be caused thereby.

(e) The Division's District Supervisors or their representatives shall have authority to approve tubingless completions without the necessity of administrative approval or notice and hearing when the following conditions exist:

(1) The well is to be completed with a total depth of 5,000 feet or less,

(2) The well is not a wildcat (it is not more than one mile from an existing well producing from the same common source of supply to which it is projected).

(3) No known corrosive or pressure problems exist which might make the tubingless method of completion undesirable,

(4) The well will not be a dual completion,

(5) The tubing used as a substitute for casing will be either 2 3/8-inch OD or 2 7/8-inch OD.

RULE 108. DEFECTIVE CASING OR CEMENTING

In any well that appears to have a defective casing program or faultily cemented or corroded casing which will permit or may create underground waste, the operator shall proceed with diligence to use the appropriate method and means to eliminate such hazard of underground waste. If such hazard of waste cannot be eliminated, the well shall be properly plugged and abandoned.

RULE 109. BLOWOUT PREVENTION (See Rule 114 (b) also)

(a) Blowout preventers shall be installed and maintained in good working order on all drilling rigs operating in areas of known high pressures at or above the projected depth of the well and in all areas where pressures which will be encountered are unknown, and on all workover rigs working on wells in which high pressures are known to exist.

(b) Blowout preventers shall be installed and maintained in good working order on all drilling rigs and workover rigs operating within the corporate limits of any city, town, or village, or within 1320 feet of a habitation, school, or church, wherever located.

(c) All operators, when filing Form C-101, Application for Permit to Drill, Deepen, or Plug Back, or Form C-103, Sundry Notices, for any operation requiring blowout prevention equipment in accordance with Sections (a) and (b) above, shall submit a proposed blowout prevention program for the well. The program is submitted may be modified by the District Supervisor if, in his judgment, such modification is necessary.

RULE 110. PULLING OUTSIDE STRINGS OF CASING

In pulling outside strings of casing from any oil or gas well, the space outside the casing left in the hole shall be kept and left full of mud-laden fluid or cement of adequate specific gravity to seal off all fresh and salt water strata and any strata bearing oil or gas not producing.

RULE 111. DEVIATION TESTS AND DIRECTIONAL DRILLING

(a) Any well which is drilled or deepened with rotary tools shall be tested at reasonably frequent intervals to determine the deviation from the vertical. Such tests shall be made at least once each 500 feet or at the first bit change succeeding 500 feet. A tabulation of all deviation tests run, sworn to and notarized, shall be filed with Form C-104, Request for Allowable and Authorization to Transport Oil and Natural Gas. When the deviation averages more than five degrees in any 500-foot interval, the Division Director may require that a directional survey be run to establish the location of the producing interval(s).

PICTURED CLIFFS FORMATION

MEANING AND PURPOSE OF EXHIBITS

Exhibit 1. Required map of producing Pictured Cliffs wells which also shows the exact area this application covers.

Exhibit 2. General Geologic Section shows the relative position of the Pictured Cliffs Formation to other Formations in the area.

Exhibit 3. Federal Regulations - these are the pertinent parts of the regulations protecting fresh water from pollution.

Exhibit 4. State Regulations - these are the applicable regulations showing how fresh water must be protected by use of steel casing, cement etc.

Exhibit 5. Fracture Stimulation Recommendation - a procedure to fracture the Pictured Cliffs reservoir rocks in order to increase (stimulate) production. The method used, cost of the procedure and calculated production increase is shown.

Exhibit 6. Completion Report NEBU well No. 202 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 7. Completion Report NEBU well No. 204 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 8. Re-completion Report NEBU well No. 201 shows the final completion interval (last perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 9. Re-completion Report on the NEBU well No. 203 shows that the lower perforations had to be abandoned because of too much water production, only the interval shallower than 3405 feet is now producing.

Exhibit 10. Re-completion Report on the NEBU well No. 205 shows that the interval below 3430 feet was shut off by cement retainer and a new interval (3350-3362) was perforated and fractured for production.

Exhibit 11. Completion Report Yager No. 3 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 12. Completion Report State No. 3 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 13. Deliverability test State No. 3 shows flowing tubing pressure, shut in tubing pressure, Meter pressure etc. These pressures are used in calculating "production to the atmosphere."

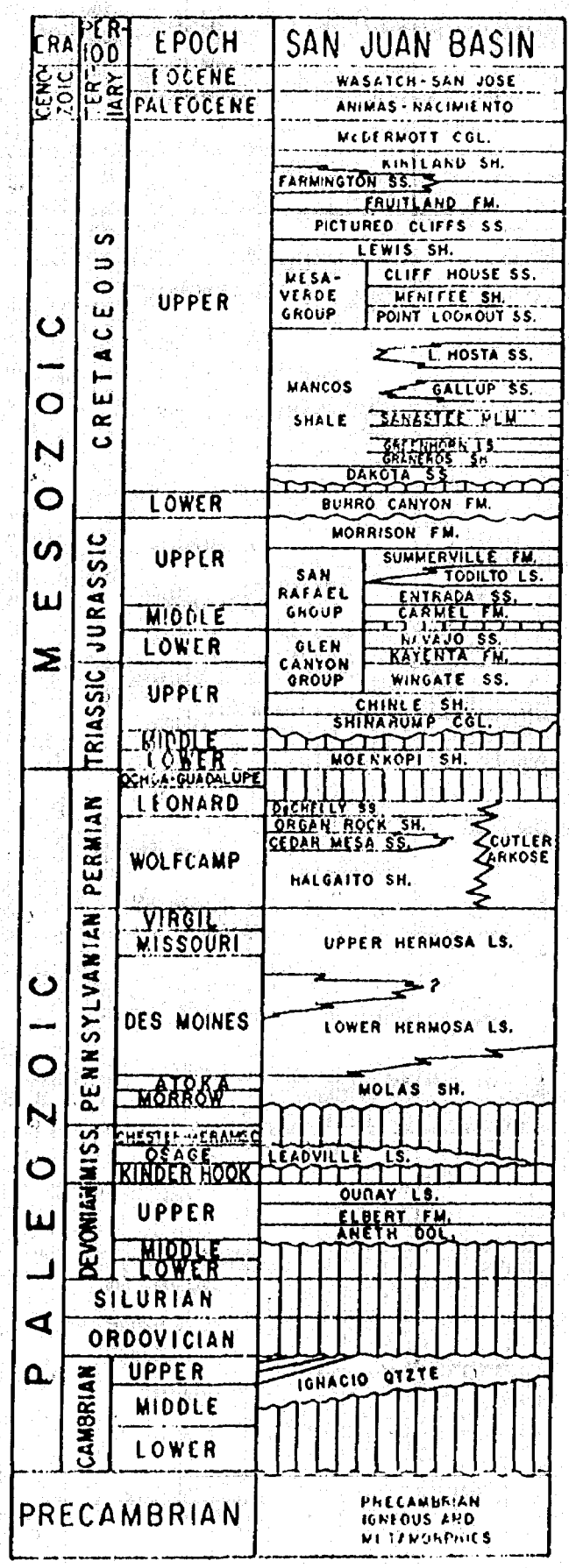
Exhibit 14. Completion Report State No. 2 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 15. Deliverability test on State No. 2 shows flowing tubing pressure, Meter pressure, shut in tubing pressure, etc. These pressures are used in calculating "production to the atmosphere."

Exhibit 16. Completion Report Federal No. 3 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 17. Deliverability Test Federal No. 3 shows flowing tubing pressure, shut in tubing pressure, meter pressure etc. These pressures are used to calculate "production to the atmosphere."

GENERAL GEOLOGIC SECTION



BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 2
CASE NO. 7086
Submitted by
Hearing Date 11-12-80

United States Department of the Interior

GEOLOGICAL SURVEY
FARMINGTON DISTRICT
DURANGO DISTRICT

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
APPLICANTS EXHIBIT NO. 3
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80

Supplement to USGS

Above Data Required on Well Sign

GENERAL REQUIREMENTS FOR OIL AND GAS OPERATIONS ON FEDERAL AND INDIAN LEASES

These requirements apply generally to all oil and gas operations on Federal and Indian leases. They apply specifically to the above-described well. Special requirements that apply and are effective for this well, if any, are check-marked in Section 15 of these General Requirements.

I. GENERAL

A. Full compliance with applicable laws and regulations, with the approved Permit to Drill, and with the approved Surface Use and Operations Plan is required. Lessees and/or operators are fully accountable for the actions of their contractors and subcontractors.

B. Each well shall have a well sign in legible condition from spud date to final abandonment. The sign should show the operator's name, lease name or unit name, well number, location of the well, and the lease serial number.

C. A complete copy of the approved Application for Permit to Drill and the accompanying Surface Use and Operations Plan, along with any conditions of approval, shall be available to authorized personnel at the drillsite whenever active construction or drilling operations are under way.

D. A drilling operations progress report is to be submitted daily from spud date until the well is completed and the Well Completion Report (Form 9-330) is filed. The report should be on paper not less than 5 X 8 inches in size, and each page should identify the well by operator's name, well name and number, and by well location.

E. Immediate notice is required of al blowouts, fires, spills, and accidents involving life-threatening injuriet or loss of life. (See NTL-3A.)

F. No construction activities, such as roads, well sites, tank battery sites, pits, or other work involving surface disturbance of previously non-disturbed land will be commenced until a Surface Use and Operations Plan is submitted and approval obtained.

G. If, during operations, any archeological or historical sites, or any object of antiquity subject to the Antiquities Act of June 8, 1906, are discovered, all operations which would affect such sites are to be suspended and the discovery reported promptly to the appropriate office of the Geological Survey.

H. Prior approval of the District Engineer is required for variance from the approved drilling program and before commencing plugging operations, plugback work, casing repair work, corrective cementing operations, or suspending drilling operations indefinitely. Emergency approval may be obtained orally, but such approval does not waive the written report requirements.

I. Blowout prevention equipment is to be installed, tested, and in working order before drilling below the surface casing, and shall be maintained ready for use until drilling operations are completed.

J. All shows of fresh water and minerals will be reported and protected.

K. Well area and lease premises will be maintained in a workmanlike manner with due regard to safety, conservation, and appearance. All waste associated with the drilling operations will be contained and will be buried in place (in a separate trash pit) or removed and deposited in an approved sanitary landfill. All garbage (metal containers will be crushed) and debris left on site will be buried at least two feet deep. All trash and debris will be buried or removed from the site within one month after removal of the drilling rig and/or completion rig, and the wellsite will be kept clean and in an aesthetically satisfactory condition for the life of the well.

L. Unless drilling operations are commenced within one year, approval of an Application for Permit to Drill will expire. A written request for extension may be granted if timely submitted.

2. CONSTRUCTION ACTIVITIES (Refer to Surface Operating Standards for Oil and Gas Exploration and Development--Second Edition)

A. Prior to commencing construction of road, pad, or other associated developments, operator will provide the dirt contractor with a copy of the Surface Use Plan, the conditions of approval, and a copy of Sections 2 and 3 of these General Requirements.

B. No gravel or other related minerals from new or existing pits on Federal land will be used in construction of roads, well sites, etc., without prior approval from the surface management agency.

C. Vegetative materials removed during construction must be disposed of in such manner that it does not detract from the aesthetics of the area and does not accelerate erosion. Vegetation removed during clearing operations should be placed in drainages, washes, gullies, etc., and "walked down" by crawler-type tractor. If there are no drainages in the immediate area, the vegetation should be "walked down" in place. All trash resulting from construction activities will not be piled or left in rows, but will be left so it does not detract from the natural appearance of the area. Any available topsoil encountered during construction should be stockpiled for use in restoring the pit area after the pits are covered. A drainage ditch must be constructed above the cut slope of the pad.

D. Unless otherwise approved, all access roads should be limited to 20 feet in width, excluding turnouts.

(1) Water bars will be constructed on the access road to the well location and conform to surface management agency specifications. The maximum slope distance between water bars will be:

% Slope	Slope Distance
Less than 1%.	.400 feet
1% - 5%	.300 feet
5% - 15%.	.200 feet
15% - 25%	.100 feet
Greater than 25%.	50 feet

When the access road is graded, water bars will be left in the road or replaced immediately upon completion of grading.

E. Each existing fence to be crossed by the permittee will be braced and tied off before cutting so as to prevent slacking of the wire. The opening will be protected as necessary during construction to prevent the escape of livestock and upon completion of construction, the fence will be repaired back to the original standard of the existing fence. A cattleguard will be installed

In any fence where a road is to be regularly traveled. A twelve-foot gate will be installed adjacent to the cattleguard when necessary.

NOTE: Sections 2-C and 2-D above apply primarily to Federal surface. If the land is privately owned, these requirements may be varied to comply with the operator-landowner agreement.

3. DRILLING PITS

A. Mud pits will be constructed so as not to leak, break, or allow discharge of liquids. Pits are not to be located in natural drainage. Any plastic material used to line pits must be removed to below-ground level before pits are covered.

B. All unguarded pits containing liquids will be fenced.

C. Liquids in pits will be allowed to evaporate, or be properly disposed of otherwise, before pits are recontoured. Under no circumstances will pits be cut and drained.

4. CASING AND CEMENTING REQUIREMENTS

A. Surface casing is to be set at sufficient depth to protect fresh water zones and provide well control; and cement circulated to the surface.

B. Intermediate and production casing strings are to be set and cemented as necessary to effectively isolate and seal off all water, oil, gas, or coal-bearing strata encountered in the well down to the casing point.

C. Prior to drilling the plug after cementing, all casing strings shall be pressure tested. Test pressure shall not be less than 600 psi for surface casing, and a minimum of 1,500 psi or 0.2 psi/ft., whichever is greater, for other casing strings. If the pressure declines more than 10 percent in 30 minutes, or if there is other indication of a leak, the casing shall be recemented, repaired, or an additional casing string run, and the casing shall be tested again in the same manner.

D. After cementing but before commencing any tests, the casing string shall stand cemented until the cement has reached a compressive strength of at least 500 psi at the shoe, except that in no case shall tests be initiated until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log.

5. BLOWOUT PREVENTION

A. Blowout preventers and related well control equipment shall be installed, tested, and used in such manner necessary to prevent blowouts. All wells must be equipped with at least one blowout preventer while drilling below surface casing.

B. While drill pipe is in use, ram-type blowout preventers shall be actuated to test proper functioning once each trip, but in no event less than once each day. The annular-type blowout preventer shall be actuated on the drill pipe at least once each week.

C. Blowout preventers are to have proper rams for the operations being performed. Casing rams are required when running casing.

D. Blowout preventers are to have handwheels installed.

E. A choke line and a kill line are to be properly installed. The kill line is not to be used as a fill-up line.

F. The accumulator system shall have a pressure capacity to provide for repeated operation of hydraulic preventers.

G. Drill string safety valve(s) to fit all pipe in the drill string are to be maintained on the rig floor while drilling operations are in progress.

H. Blowout prevention drills are to be conducted as necessary to assure that equipment is operational and that each crew is properly trained to carry out emergency duties. All BOP tests and drills are to be recorded in the driller's log.

I. The maximum pressure to be allowed on blowout preventers during well control operations is to be posted for each casing string.

J. The characteristics, use, and testing of drilling mud and the conduct of related drilling procedures shall be such as are necessary for well control. Quantities of mud materials sufficient to insure well control shall be maintained, readily accessible for use at all times.

K. From the time drilling operations are initiated and until drilling operations are completed, a member of the drilling crew or the toolpusher shall maintain rig floor surveillance at all times, unless the well is secured with blowout preventers or cement plugs.

6. REPORTS

A. The following reports shall be filed with the District Engineer within 15 days after the work is completed:

(1) Five copies of Sundry Report, Form 9-331, giving complete information concerning:

(a) Setting of each string of casing. Show size, grade and weight of casing set, size hole, depth set, amount and type of cement used, whether cement circulated, top of cement behind casing if determined, depth of cementing tools if used, casing test method and results, and date work was done. Show spud date on first report submitted.

(b) Intervals tested, perforated, acidized, or fractured, and results obtained. Show date work was done.

(2) Five copies of Well Completion Report, Form 9-330. Show formation tops, drill stem test information, completion data, and production tests. Show all oil and gas zones and important water sands under Item 37. Data on water sands should include rate of water inflow and elevation to which water rose in hole.

(3) Two copies of all electrical and radioactivity logs run.

7. DRILLER'S LOG

A. The following shall be entered in the daily driller's log:

(1) Blowout preventer pressure tests, including test pressures and results.

(2) Blowout preventer tests for proper functioning.

(3) Blowout prevention drills conducted.

(4) Casing run, including size, grade, weight and depth set.

(5) How pipe was cemented, including amount of cement, type, whether cement circulated, location of cementing tools, etc.

(6) Waiting on cement time for each casing string.

(7) Casing pressure tests after cementing, including test pressure and results.

8. DRILLSTEM TESTS

A. Estimated amounts of oil and gas recovered and/or produced during drillstem tests are to be shown in the driller's log and reported in accordance with NTL-4.

9. GAS FLARING

A. Approval is granted to flare gas while drilling and completion testing.

B. When gas is used for drilling, the blooey line will be located where no damage to vegetation will occur. If this is not possible, an earthen baffle will be constructed to keep the heat and residue within the operating area.

C. Failure to request permission to vent gas after 60 days following the date the well is completed will result in compensation due the United States being the full value of the gas so wasted. (See NTL-4.)

10. WATER DISPOSAL

A. An application for approval of the disposal method for water production from all new wells must be filed with the District Engineer pursuant to Section VII of NTL-2B. Failure to timely file such application will be considered an incident of non-compliance and will be grounds for issuing a shut-in order until the application is submitted.

11. SAFETY

A. All rig heating stoves are to be of the explosion-proof type.

B. Drilling rig engines should have water-cooled exhausts.

C. Rig safety lines are to be installed.

D. Hard hats must be utilized.

12. SUBSEQUENT OR CHANGE OF PLANS

A. Any additional construction, re-construction, or alterations of facilities, including roads, gathering lines, batteries, etc., which will result in the disturbance of new ground, will require the filing of a suitable plan and prior approval by the Survey after clearance with the surface management agency.

13. REMOVAL OF DRILLING RIG

A. Unless a well has been properly cased and cemented, or properly plugged, the drilling rig must not be moved from the drillsite without prior approval from the Survey.

14. ABANDONMENT

A. If the well is dry and is to be plugged, approval of the proposed plugging program may be obtained orally; however, oral approval must be confirmed in writing by immediately filing a Notice of Intention to Abandon on Form 9-331 in quintuplicate with the District Engineer. The report should show the total depth reached, the reason for plugging, and the proposed intervals, by depths, where cement plugs are to be placed, type of plugging mud, etc.

B. Upon completion of approved plugging, erect a regulation well marker which should not be less than 4 inches in diameter and extend at least 4 feet above general ground level. Heap up the dirt around the base of the marker about 12 inches to take care of any settling of the cellar. The top of the marker must be closed or capped. The following minimum information shall be permanently placed on the marker with a plate, cap, or welded bead:

(1) Operator
(2) Well number and name
(3) Section, Township and Range
(4) Footage location

If approval is obtained to omit the dry hole marker, casings should be cut off four feet below ground level.

C. Within 15 days after plugging the well, a Subsequent Report of Abandonment is to be filed on Form 9-331 in quintuplicate, showing the manner in which the well was plugged, including depths where casing was cut and pulled, intervals (by depths) where cement plugs were placed, and the date plugging was completed. When all surface restoration work is completed, advise the District Office so that a field inspection of the wellsite can be made.

D. If, upon abandonment of wells on Federal surface, the retention of the well pad and/or access road is not considered necessary for the management and multiple use of the natural resources, they will be ripped a minimum of 12" in depth. After ripping, water bars will be installed as stated in 2-D-(1). All ripped surfaces are to be protected from vehicular travel by construction of a dead-end ditch and earthen barricade at the entrance to these ripped areas. (Reseeding of the affected areas may be required.)

E. Surface restoration after abandonment of wells on non-Federal surface normally will be in accordance with the operator-landowner agreement; however, minimum Federal restoration requirements on private surface-Federal minerals will be required.

15. SPECIAL STIPULATIONS

The following special requirements apply and are effective when checked:

☐ A. _____ surface casing should be set at _____ feet and cement circulated to the surface.

☐ B. Ram-type blowout preventers and related control equipment shall be pressure tested with water to the rated working pressure of the stack assembly (except that the annular-type preventer may be tested to 70 percent of rated working pressure) (a) when installed; (b) before drilling possible abnormally-pressured zones; and (c) following repairs that require disconnecting a pressure seal in the assembly.

☐ C. Minimum required fill of cement behind the _____ casing is to _____.

☑ D. All above-ground permanent structures and equipment will be painted a non-glare color that simulates the natural color of the site, as follows:

- ☐ Brown, Federal Standard 595a-30318
- ☑ Green, Federal Standard 595a-34127
- ☐ Gray, Federal Standard 595a-36357
- ☐ Sand, Federal Standard 5952-30277

☐ E. A kelly cock will be installed and maintained in operable condition.

☐ F. The District Office is to be notified in sufficient time for a representative to witness cementing of the _____ casing.

☐ G. A Communitization Agreement covering the acreage dedicated to the well must be filed for approval with the U. S. Geological Survey, P. O. Box 26124, Albuquerque, New Mexico 87125. The effective date of the agreement must be prior to any sales.

☐ H. Compacted areas will be plowed or ripped before reseeding. Reseeding of the disturbed lands is required upon completion of drilling and completion activities and abandonment of the well. All seeding will be done between July 1 and September 15. Seeding will be done with a disc-type drill with two boxes for various seed sizes. The drill rows will be eight to ten inches apart. The seed will be planted not less than one-half inch deep or more than one inch deep. The seeder will be followed with a drag, packer, or roller to insure uniform coverage of the seed, and adequate compaction. Drilling of the seed will be done on the contour where possible, not up and down the slope. Where slopes are too steep for contour drilling, a "cyclone" hand-seeder or similar broadcast seeder will be used. Seed will then be covered to the depth described above by whatever means is practical.

If, in the opinion of the surface management agency, the seeding is unsuccessful, the lessee/operator may be required to make subsequent seedings until revegetation is successful.

Species to be planted in pounds pure-live-seed per acre:

☑ Seed Mix No. 1
Crested Wheatgrass (Agropyron desertorum)----------2½
Smooth Brome (Bromus inermis)----------2½
Fourwing Saltbush (Dewinged) (Atriplex canescens)----------½
Nomad Alfalfa (Medicago sitiva)----------1

☐ Seed Mix No. 2
Crested Wheatgrass (Agropyron desertorum)----------3½
Fourwing Saltbush (Dewinged) (Atriplex canescens)----------1
Sand Dropseed (Sporobolus cryptandrus)----------3/4
Alkali Sacaton (Sporobolus airoides)----------3/4

☐ Seed Mix No. 3
Fourwing Saltbush (Dewinged) (Atriplex canescens)----------1
Sand Dropseed (Sporobolus cryptandrus)----------1½
Alkali Sacaton (Sporobolus airoides)----------1½
Shad Scale (Atriplex confertifolia)----------3/4

☐ Seed Mix No. 4--NIPP
Indian Ricegrass----------1
Sand Dropseed----------1
Galletta----------2

☐ Seed Mix No. 5--NIPP
Alkali Sacaton----------1
Sand Dropseed----------1
Galletta----------2

☐ Seed Mix No. 6--BIA

		Minimum % PLS accept.
Alkali Sacaton	1	76%
Sand Dropseed	1	76%
Galletta	2	55%

PLS (Pure Live Seed) = Germination X Purity

After drilling is completed, the pad will be seeded with the recommended seed mix. Seed will be drilled to a depth of not less than ½ inch and not more than 3/4 inch, followed by a drag or packer. Compacted areas will be plowed (disced) to a depth of 4-6 inches before seeding. Areas too steep to be drilled will be broadcast seeded with a "cyclone" hand-held seeder or similar device, using 150% of the recommended drilled rate of seed per acre. The cut slope will be dressed up and seeded according to the above stipulation.

☐ I. No well and/or production equipment within the irrigable fields of the Navajo Indian Irrigation Project will exceed two feet above the natural ground surface elevation, and will be adequately barricaded for safety.

☐ J. Any production piping systems shall be installed with at least four feet of cover.

☐ K. In addition to the well-control equipment stipulated in Section 5, either an annular blowout preventer or a rotating head must be used while drilling below surface casing to. _____.

☑ L. Other:

See special stips

DIRECTORY OF FEDERAL PERSONNEL
OIL AND GAS OPERATIONS IN FARMINGTON AND DURANGO DISTRICTS

Surface Use and Rehabilitation

Bureau of Land Management
P. O. Box 568, or
900 La Plata Highway
Farmington, New Mexico 87401

Office hours: 7:45 a.m. to 4:30 p.m.

Office phones: (505) 325-3581, 325-3582, and 325-2922

Names of people involved with Oil and Gas Operations:

Bob Calkins, Area Manager
Bob Moore, Lands & Minerals Supervisor
Russ Pigors, Inspector
Bob Harler, Inspector
Steve Friedman, Inspector

Drilling and Producing Operations

U. S. Geological Survey--Oil and Gas Operations
P. O. Box 959, or
3535 East 30th Street
Farmington, New Mexico 87401

Office hours: 8:00 a.m. to 4:30 p.m.

Office phones: (505) 325-4572 or 325-4573

Home Phones

Jim Sims, District Supervisor.....
Errol Becher, Petroleum Engineer.....325-3836
Mildred Kuchera, Petroleum Engineer.....325-3448
Bill Spence, Petroleum Engineer.....327-2193
Ray Swanson, Petroleum Engineering Technician.....325-8189
Ken Baker, Petroleum Engineering Technician.....327-2170
Fred Edwards, Petroleum Engineering Technician.....325-7885
Andrew Stump, Environmental Scientist.....327-0507
George Carlson, Environmental Scientist.....325-0757

U. S. Geological Survey--Oil and Gas Operations
Federal Building
701 Camino del Rio
Durango, Colorado 81301

Office hours: 8:00 a.m. to 4:30 p.m.

Office phone: (303) 247-5144

Home Phones

Carl Barrick, Petroleum Engineer.....259-0628
Terry Galloway, Petroleum Engineering Technician.....247-3646
Randall Walker, Petroleum Engineering Technician.....247-0487
John Keller, Environmental Scientist.....247-5308
Donald Englishman, Environmental Scientist.....563-4314

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
14 January 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood and Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. STAMETS: Call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. STAMETS: At the request of the applicant this case will be continued until the first Examiner Hearing in April.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7086, heard by me on 5-14, 1981.

Richard L. Stamets, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone: (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
10 December 1980

EXAMINER HEARING

IN THE MATTER OF:

Application of Blackwood & Nichols Company, Ltd., for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

CASE 7086

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Ernest L. Padilla, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. STAMETS: We'll call next Case 7086.

MR. PADILLA: Application of Blackwood and Nichols Company, Ltd., for a designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico.

MR. STAMETS: At the request of the applicant, this case will be continued until the January 14th, 1981, Examiner Hearing.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7086, heard by me on 12-10 1980.

Richard L. Stamets, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

Western Petroleum Services

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
APPLICANT'S EXHIBIT NO. 5
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80

FRACTURE STIMULATION RECOMMENDATION

FOR

BLACKWOOD & NICHOLS CO., LTD

NEBU NO. 203

PICTURED CLIFFS AND FRUITLAND FORMATIONS

BLANCO PICTURED CLIFFS FIELD

SAN JUAN COUNTY, NEW MEXICO

Sec.11, T31N, R7W

Prepared for:
Mr. Loos
Blackwood & Nichols Co., LTD
Farmington, New Mexico

Prepared by:
Randy LaFollette
The Western Company
Denver, Colorado

August 12, 1980

Service Point:
Farmington, New Mexico
505-327-6222

DISCUSSION:

The customer requested fracture stimulation designs for the Pictured Cliffs and Fruitland zones in the #203 well. Mini Max III-30 gel is recommended with a 2% condensate phase for fluid loss control. Mini Max III is a titanate cross-linked hydroxy-propyl guar gum gel featuring very low leak-off, perfect proppant support and neutral pH.

Figure I shows the anticipated rate-pressure relationship for treatment via 4½" casing. At the recommended rate of 30 BPM, a surface pressure of 2,600 psi is expected. Treatment with 100,000 gallons of Mini Max III-30/2% HC and 190,000# 10/20 mesh sand is recommended to yield a propped length of 972 feet. Average sand concentration in the fracture is .73#/ft^2 (see Exhibit II). Figure II shows the McGuire and Sikora productivity increase chart. With the reservoir and fracture parameters given, a theoretical 10 fold production increase is calculated.

The expected rate-pressure graph for the Fruitland is presented in Figure III. At the recommended 17 BPM rate, a surface treating pressure of 2,700 psi is expected. Treatment with 40,000 gallons of Mini Max III-30/2% HC and 76,000# 10/20 mesh sand is recommended to yield a propped length of 1,200 feet. Average sand concentration in the fracture is .75#/ft^2 (see Exhibit II). Figure IV shows the McGuire-Sikora graph. After scaling, an 11 fold productivity increase is calculated.

WELL DATA:

Formation:	Pictured Cliffs
Average Depth To Zone:	3,500 ft.
Zone Height:	133 ft.
Casing Size:	4½"
Perforated Interval:	3456, 3478, 3492, 3518, 3534, 3554, 2 jspf, .34" diameter
Bottom Hole Temperature:	120° F
Fracture Gradient:	.65 psi/ft
Bottom Hole Fracture Pressure:	2,275 psi
Bottom Hole Pressure:	1,375 psi
Overburden:	900 psi
Hydrostatic Head:	1,515 psi with fresh water
ISDP (fresh water):	760 psi
Porosity:	10%
Permeability:	.06 md
Well Spacing:	160 acres

TREATMENT PROCEDURE:

It is recommended that the Pictured Cliffs zone be fracture stimulated via 4½" casing with 100,000 gallons of Mini Max III-30/2% HC gel containing 190,000# 10/20 mesh sand. Average anticipated injection rate and surface treating pressure are 30 BPM and 2,600 psi, respectively. Stage fluid and sand as follows:

1. Pump 20,000 gallons of Mini Max III-30/2% HC as a pad to initiate the fracture and establish sufficient fracture width to accept sand. (Add 1#/1000 B-5.)
2. Pump 20,000 gallons of Mini Max III-30/2% HC with 1 ppg 10/20 mesh sand. (Add 1#/1000 B-5.)
3. Pump 20,000 gallons of Mini Max III-30/2% HC with 2 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
4. Pump 20,000 gallons of Mini Max III-30/2% HC with 3 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
5. Pump 20,000 gallons of Mini Max III-30/2% HC with 3½ ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
6. Cut sand, start flush with 500 gallons of Mini Max III-30 gel.
7. Continue to flush to top perforation with 1,815 gallons of fresh water.
8. Shut in for at least 6 hours to allow gel to break and fracture to heal and recover treating fluid load.

NOTE: All gel to contain 2% condensate, 1 gal/1000 Aquaflow, 1 gal/1000 Adocide.

TREATMENT PROCEDURE:

Treating Conductor	4½" casing
Injection Rate	30 BPM
Expected Surface Treating Pressure	2,600 psi
Total Pumpable Volume of Mini Max III-40 Gel Phase	100,000 gallons
Total Pumpable Volume of Condensate	2,000 gallons
Total Pumpable Volume of Fresh Water Flush & Reserve	5,000 gallons
Total 10/20 Mesh Sand Required	190,000#

Auxiliary Materials:

161# B-5 gel breaker

105 gallons Adocide bactericide

105 gallons Aquaflow surfactant

COST ESTIMATE:

100,500 gallons of Mini Max III-30/2% HC @ .24/gal	$24,120.00
161# B-5 @ 2.15/lb	346.15
105 gallons Adocide @ 29.40/gal	3,087.00
105 gallons Aquaflow @ 25.85/gal	2,714.25
Chemical Delivery Charge @ .68/T mi x 3.5 T x 75 mi	178.50
190,000# 10/20 Sand @ 5.25/cwt	9,975.00
Sand Pumping Charge @ .70/cwt	1,330.00
Proppant Delivery Charge @ .68/T mi x 95 T x 75 mi	4,845.00
30 BPM Master Mixer @ 760.00	760.00
1,912 HHP @ 3.15/HHP	6,022.80
Mileage Charge @ 1.90/unit mi x 6 units x 75 mi	855.00
Sandmaster @ 875.00	875.00
Ratiometer @ 134.00	134.00
TOTAL	$55,242.70

Subject to terms and conditions in the published price schedule of The Western Company of North America.

WELL DATA:

Formation:	Fruitland
Average Depth To Zone:	3,380 ft.
Zone Height:	42 ft.
Casing Size:	4½" - 10.5#
Perforated Interval:	3368, 3374, 3384, 3392, 2 jspf, .34" diameter
Bottom Hole Temperature:	120° F
Fracture Gradient:	.9 psi/ft
Bottom Hole Fracture Pressure:	3,050 psi
Bottom Hole Pressure:	1,375 psi
Overburden:	1,675 psi
Hydrostatic Head:	1,450 psi with fresh water
ISDP (fresh water):	1,600 psi
Porosity:	10%
Permeability:	.06 md
Well Spacing:	160 acres

TREATMENT PROCEDURE:

It is recommended that the Fruitland zone be fracture stimulated via 4½" casing with 40,000 gallons of Mini Max III-30/2% HC gel and 76,000# 10/20 mesh sand. Average anticipated injection rate and surface treating pressure are 17 BPM and 2,700 psi, respectively. Stage fluid and proppant as follows:

1. Pump 8,000 gallons of Mini Max III-30/2% HC as a pad to initiate the fracture and establish sufficient fracture width to accept sand. (Add 1#/1000 B-5.)
2. Pump 8,000 gallons of Mini Max III-30/2% HC with 1 ppg 10/20 mesh sand. (Add 1#/1000 B-5.)
3. Pump 8,000 gallons of Mini Max III-30/2% HC with 2 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
4. Pump 8,000 gallons of Mini Max III-30/2% HC with 3 ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
5. Pump 8,000 gallons of Mini Max III-30/2% HC with 3½ ppg 10/20 mesh sand. (Add 2#/1000 B-5.)
6. Cut sand, start flush with 500 gallons of Mini Max III-30 gel.
7. Continue to flush to top perforation with 1,750 gallons of fresh water.
8. Shut in for at least 6 hours to allow gel to break and fracture to heal and recover treating fluid load.

NOTE: All gel to contain 2% condensate, 1 gal/1000 Aquaflow, 1 gal/1000 Adocide.

TREATMENT REQUIREMENTS:

Treating Conductor	4½" casing
Injection Rate	17 BPM
Expected Surface Treating Pressure	2,700 psi
Total Pumpable Volume of Mini Max III-30 Gel Phase	40,000 gallons
Total Pumpable Volume of Condensate	800 gallons
Total Pumpable Volume of Fresh Water Flush & Reserve	5,000 gallons
Total 10/20 Mesh Sand Required	76,000#

Auxiliary Materials:

42 gallons Aquaflow surfactant

42 gallons Adocide bactericide

65# B-5 gel breaker

COST ESTIMATE:

40,000 gallons of Mini Max III-30/2% HC @ .24/gal	$ 9,600.00
65# B-5 @ 2.15/lb	139.75
42 gallons Adocide @ 29.40/gal	1,234.80
42 gallons Aquaflow @ 25.85/gal	1,085.70
Chemical Delivery Charge @ .68/T mi x 1.5 T x 75 mi	76.50
76,000# 10/20 Sand @ 5.25/cwt	3,990.00
Sand Pumping Charge @ .70/cwt	532.00
Proppant Delivery Charge @ .68/T mi x 38 T x 75 mi	1,938.00
17 BPM Master Mixer @ 730.00	730.00
1,125 HHP @ 3.15/HHP	3,543.75
Mileage Charge @ 1.90/unit mi x 6 units x 75 mi	855.00
Ratiometer @ 134.00	134.00
TOTAL	$23,859.50

Subject to terms and conditions in the published price schedule of The Western Company of North America.

FIGURE 3

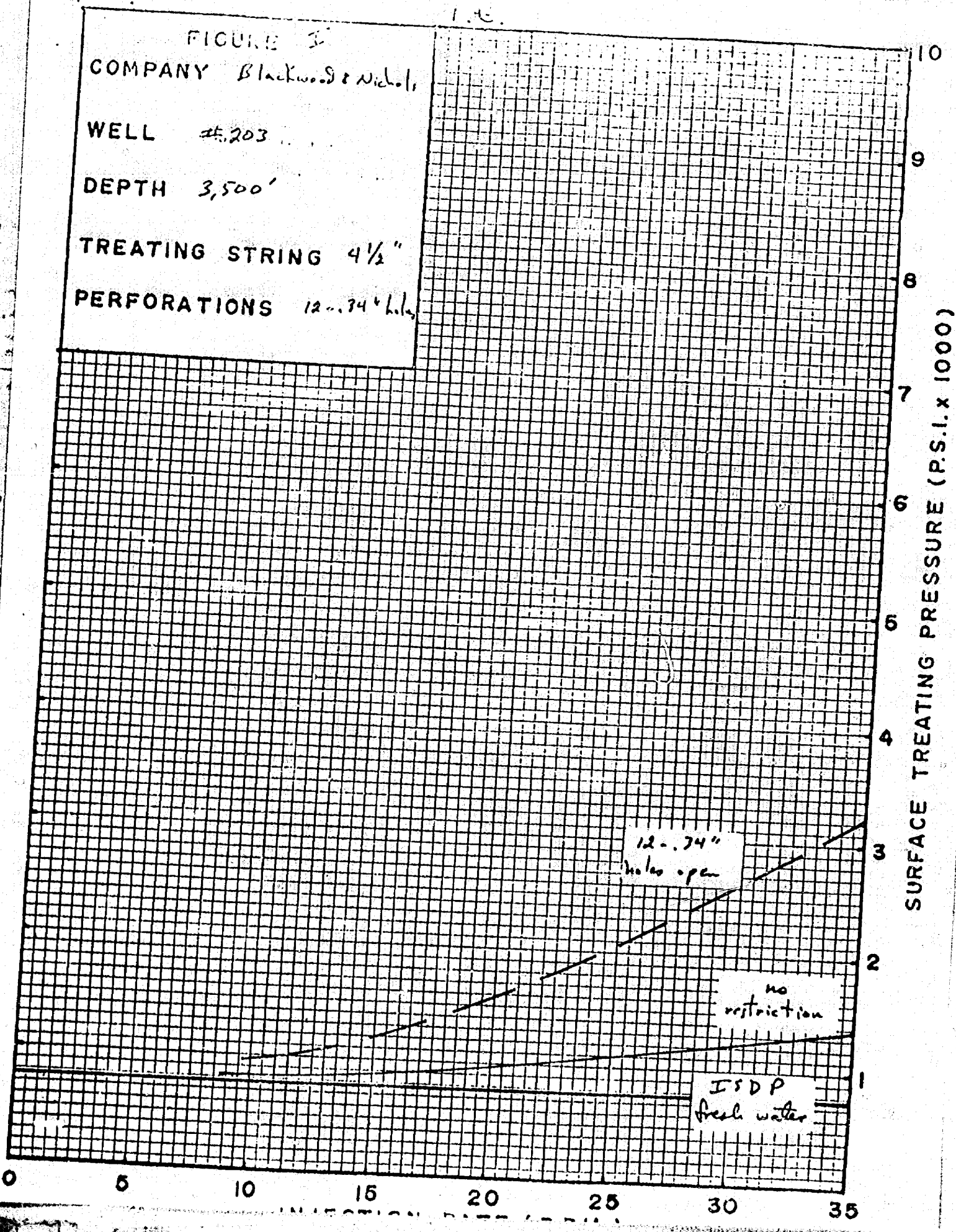
COMPANY Blackwood & Nichols

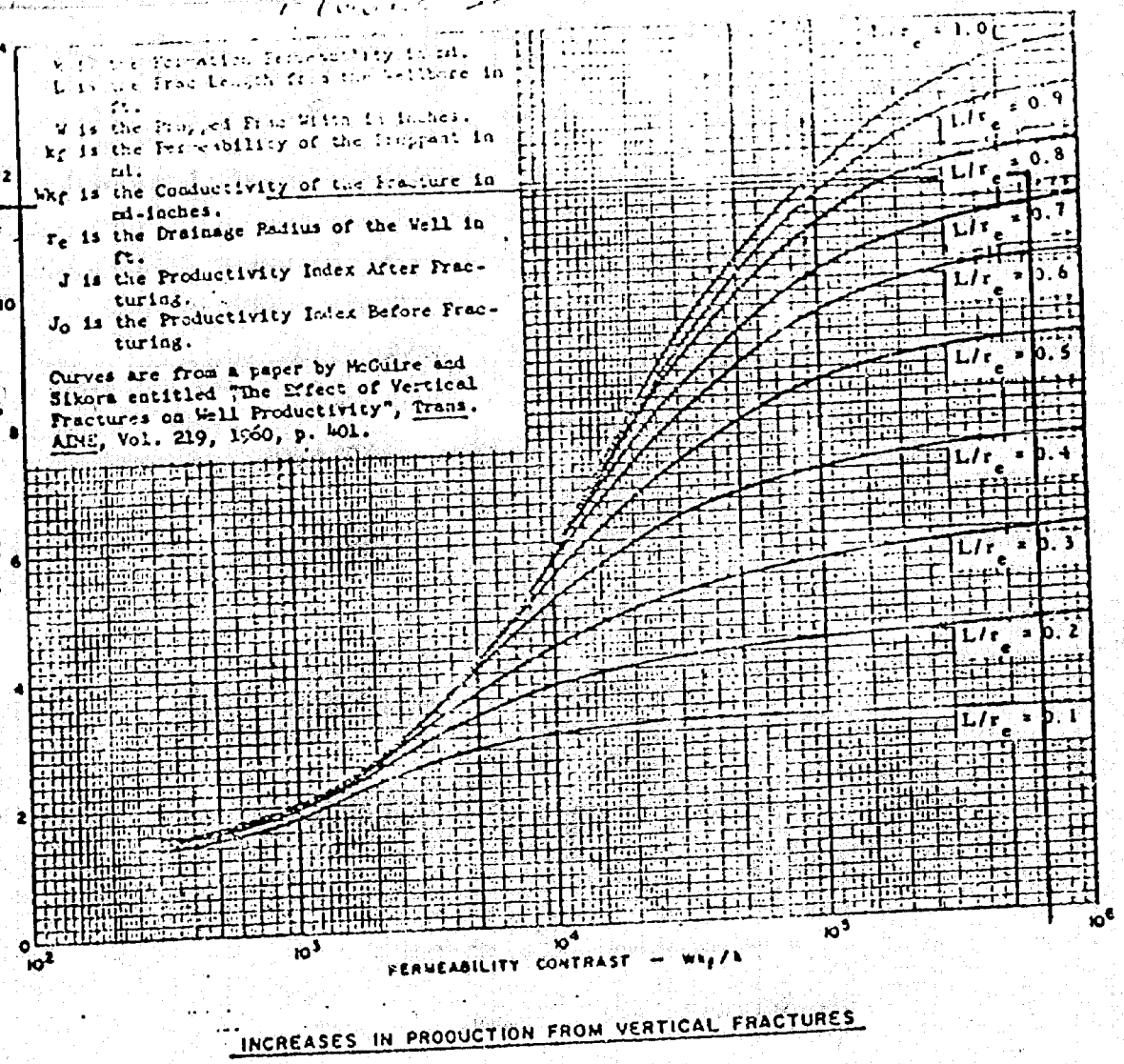
WELL #203

DEPTH 3,500'

TREATING STRING 4½"

PERFORATIONS 12 - .34 holes





INCREASES IN PRODUCTION FROM VERTICAL FRACTURES

$J/J_o = 10$ after scaling

Note: This graph is based on a well spacing (A) of 40 acres and a wellbore radius (r_w) of 3 inches. It can be converted to other well spacing and wellbore radii by use of the following scaling factors:

Well Spacing	Drainage Radii	Scaling Factors for Abscissa (Wk_f/k)	Scaling Factors for Ordinate (J/J_o)
For spacing shown and 3-inch wellbore radius.			
10 Acres	330 ft	2.00	1.11
20 Acres	467 ft	1.42	1.05
40 Acres	660 ft	1.00	1.00
80 Acres	933 ft	0.71	0.95
160 Acres	1320 ft	0.50	0.91
320 Acres	1867 ft	0.35	0.87
640 Acres	2640 ft	0.25	0.84

For other spacing (A) and wellbore radii (r_w).

A	$104\sqrt{A}$	$\sqrt{40/A}$	$\frac{3.095}{\log(.472)(r_e/r_w)}$

FIGURE VI

COMPANY Blackwood & Nichols

WELL #203

DEPTH 3,380'

TREATING STRING 4 1/2"

PERFORATIONS 8-.34" holes

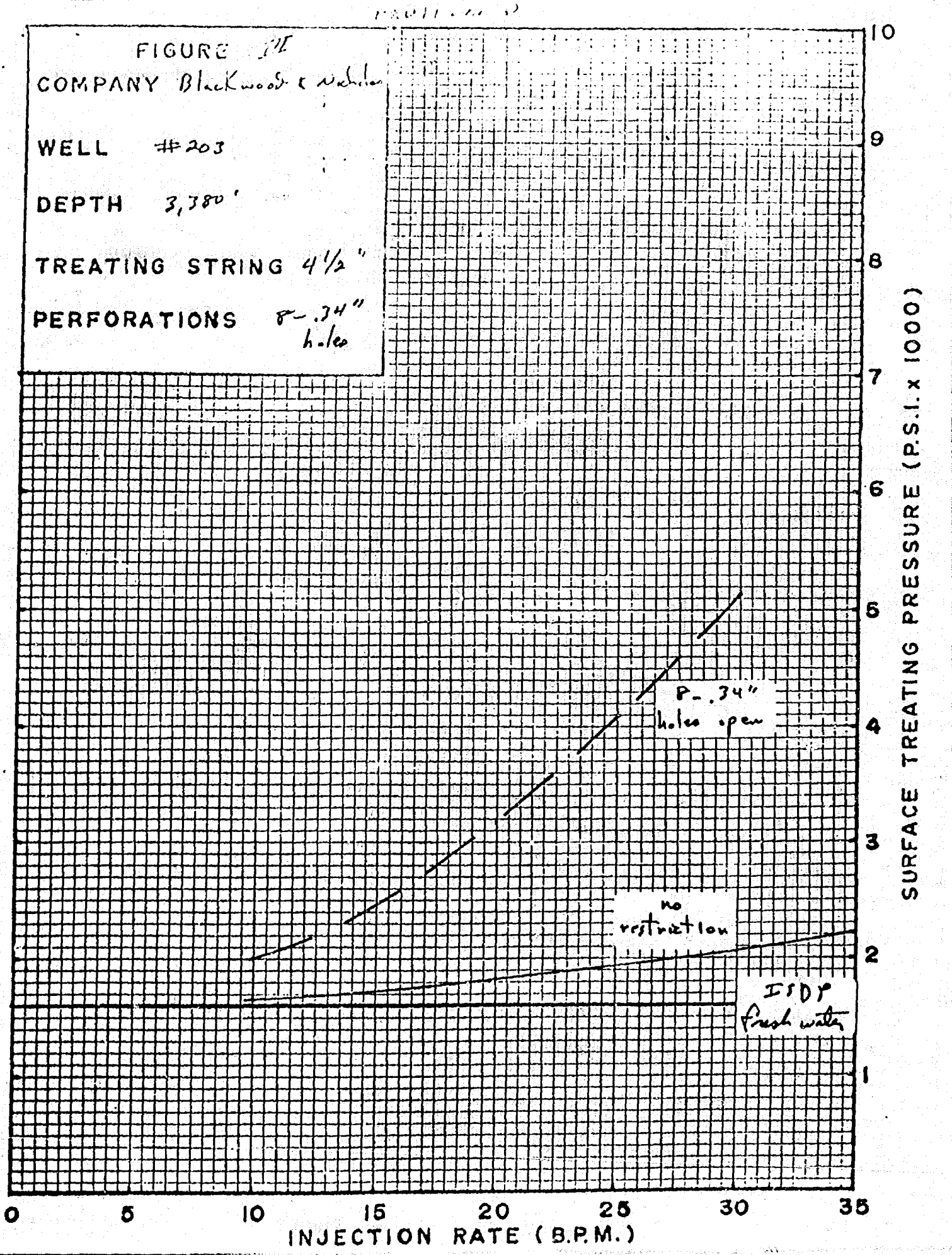
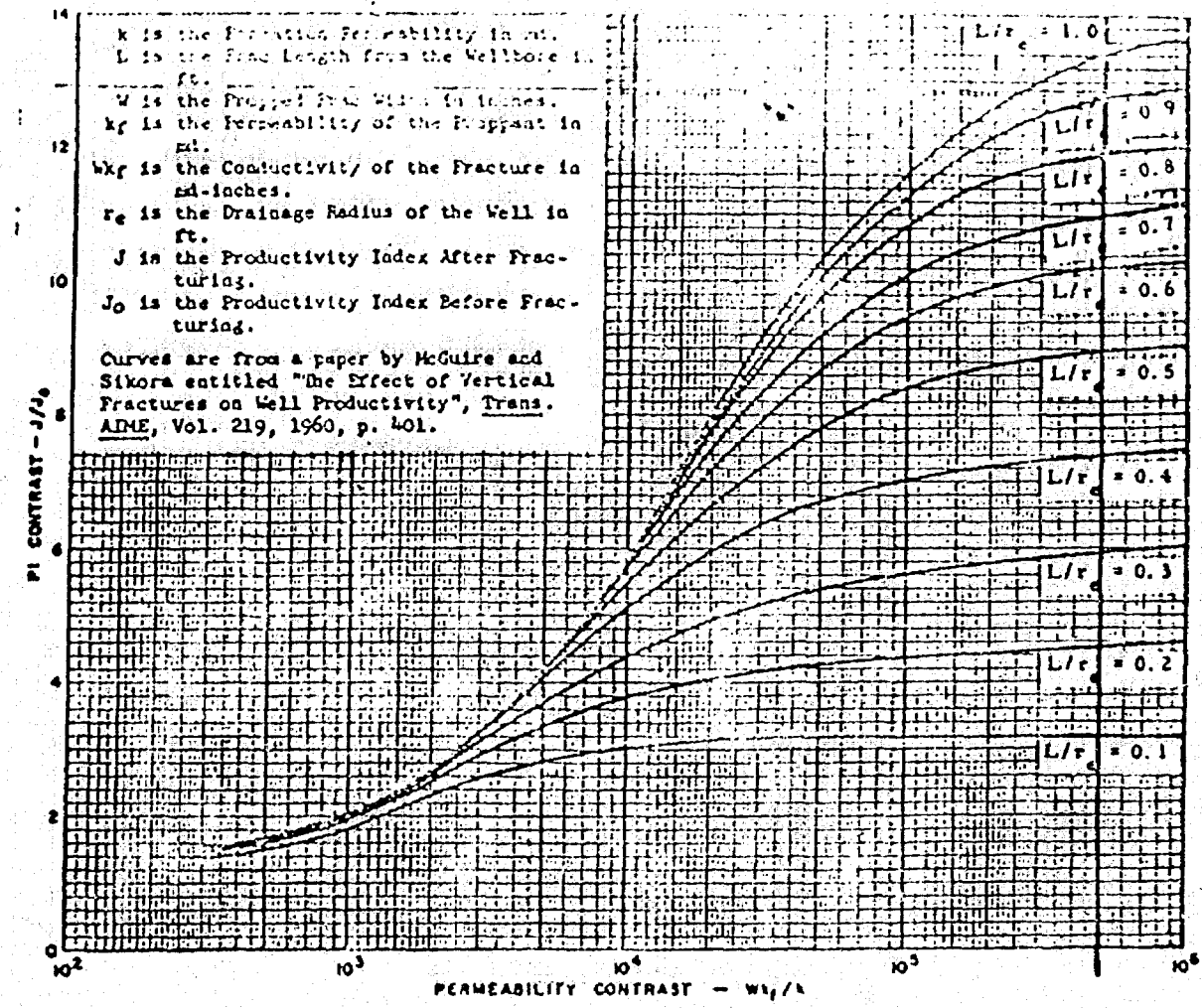


Figure 31.



INCREASES IN PRODUCTION FROM VERTICAL FRACTURES

J/Jo = 11 after scaling

Note: This graph is based on a well spacing (A) of 40 acres and a wellbore radius (r_w) of 3 inches. It can be converted to other well spacing and wellbore radii by use of the following scaling factors:

Well Spacing	Drainage Radii	Scaling Factors for Abscissa (Wk_f/k)	Scaling Factors for Ordinate (J/J_o)
For spacing shown and 3-inch wellbore radius.			
10 Acres	330 ft	2.00	1.11
20 Acres	467 ft	1.42	1.05
40 Acres	660 ft	1.00	1.00
80 Acres	933 ft	0.71	0.95
160 Acres	1320 ft	0.50	0.91
320 Acres	1867 ft	0.35	0.87
640 Acres	2640 ft	0.25	0.84

For other spacing (A) and wellbore radii (r_w).

A	$104\sqrt{A}$	$\sqrt{40/A}$	$\frac{3.095}{\log(.472)(r_e/r_w)}$

EXHIBIT 1

THE WESTERN COMPANY

PROPPANT PROFILE STUDY

PERFECT SUPPORT FLUIDS

FLUID STUDIED - MINI MAX III 30/2%HC
TOTAL VOLUME - 108816 GAL
FLUID PENETRATION - 1121 FT

PERM. TO STIMULATION FLUID - .060
PERM. TO RESERVOIR FLUID - .060
LEAK-OFF FLUID VISCOSITY - 1.00
RESERVOIR FLUID VISCOSITY - .01
RESERVOIR FLUID COMP. - 4.00E-04
STIMULATION FLUID C-III - 0.00080
FRACTURE HEIGHT - 133
COMBINED C - 0.00060

FRAC. PRESSURE - 2275
RESERVOIR PRESSURE - 1375
N PRIME - .690
K PRIME - 0.013000
YOUNGS MODULUS - 5.00E+06
WIDTH - .396
INJECTION RATE - 30.0

FLUID VOLUME (GAL)	SURFACE PROPPANT CONC (LB/GAL)	LOCATION IN FRACTURE (FT)	FRACTURE PROPPANT CONC (LB/FT^2)	CUMLATIVE PROPPANT (LB)
				0
20000	.00	972 TO 1121	.000	20000
20000	1.00	795 TO 972	.425	60000
20000	2.00	582 TO 795	.705	120000
20000	3.00	320 TO 582	.862	190000
20000	3.50	0 TO 320	.821	

USED 4.63 UNITS

EXHIBIT II

THE WESTERN COMPANY

PROPPANT PROFILE STUDY

PERFECT SUPPORT FLUIDS

FLUID STUDIED - MINI MAX III 30/2% HC
TOTAL VOLUME - 43446 GAL
FLUID PENETRATION - 1377 FT

PERM. TO STIMULATION FLUID - .060
PERM. TO RESERVOIR FLUID - .060
LEAK-OFF FLUID VISCOSITY - 1.00
RESERVOIR FLUID VISCOSITY - .01
RESERVOIR FLUID COMP. - 4.40E-04
STIMULATION FLUID C-III - 0.00080
FRACTURE HEIGHT - 42
COMBINED C - 0.00083

FRAC. PRESSURE - 3050
RESERVOIR PRESSURE - 1375
N PRIME - .455
K PRIME - 0.024000
YOUNGS MODULUS - 5.00E+06
WIDTH - .383
INJECTION RATE - 17.0

FLUID VOLUME (GAL)	SURFACE PROPPANT CONC (LB/GAL)	LOCATION IN FRACTURE (FT)	FRACTURE PROPPANT CONC (LB/FT^2)	CUMLATIVE PROPPANT (LB)
				0
8000	.00	1203 TO 1377	.000	8000
8000	1.00	994 TO 1203	.455	24000
8000	2.00	736 TO 994	.739	48000
8000	3.00	411 TO 736	.880	76000
8000	3.50	0 TO 411	.810	

4.76 UNITS

Form 9-331
Dec. 1973

Form Approved.
Budget Bureau No. 42-R1424

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☐ gas well ☒ other

2. NAME OF OPERATOR
Blackwood & Nichols Co., Ltd.

3. ADDRESS OF OPERATOR
P.O. Box 1237, Durango, Co. 81301

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 1070' F/NL - 1760' F/EL
AT TOP PROD. INTERVAL: Same
AT TOTAL DEPTH: Same

5. LEASE
NM 03358

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
Northeast Blanco Unit #1, Sec. 929

8. FARM OR LEASE NAME
Northeast Blanco Unit

9. WELL NO.
202

10. FIELD OR WILDCAT NAME
South Los Pinos PC

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
B-11-31N-7W

12. COUNTY OR PARISH
San Juan

13. STATE
New Mexico

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
6440' GL

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☒
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other)			

(NOTE: Report results of multiple completion or zone change on Form 9-330)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

8-15-79 Perforated two holes per foot per interval; 3272', 3282', 3292', 3306', 3318', 3402', 3412', 3420', 3428', 3440', 3446', 3452', 3474'; twenty-six holes. Mini-Max II fractured with 48,000 gals of gelled water, 80,000 lbs 10-20 sand, 500 gallons 10% acetic acid. Ten HCL ball sealers. Maximum treating pressure 3000 PSI; Average treating pressure 1300 PSI; Average injection rate 26 bbls/min.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct
SIGNED Richard Delasso LOOBTLE District Manager DATE 8-21-79
(This space for Federal or State office use)

APPROVED BY _____ TITLE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
APPLICANT'S EXHIBIT NO. 6
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80

BLACKWOOD & NICHOLS CO.
P. O. BOX 1237
DURANGO, COLORADO 81301
(303) 247-0728

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
APPLICANT'S EXHIBIT NO. 7
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80

Drilling Report - Pictured Cliffs

Northeast Blanco Unit Well No. 204 LOCATION: 830' F/SL - 990' F/WL
Sec. 1-T31N-R7W
San Juan County, New Mexico
Elevation: 6546' GL

8-8-79 Moved Four Corners Drilling Company's rig on location and rigging up.

8-9-79 350', sand. Nippled up, tested 9 5/8" casing to 800 PSI for thirty minutes; held O.K. Spudded 12¼" hole at 10:30 A.M., 8-8-79. Ran 5 jts 9 5/8" 36.00# H-40 casing; 204' set at 217'. Cemented with 150 sacks class B cement with 1/4# flocele per sack and 2% $CaCl_2$. Plug down 4:00 P.M., 8-8-79; cement circulated. 1/4° at 217'.

8-10-79 1930' sand. 3/4° @ 721', 1° @ 1242', 2° @ 1682'.

8-11-79 2572', sand. 1½° at 2307'.

8-12-79 3128', sand. Mud wt. 10.6#, vis. 43.

8-13-79 3600', shale. Mud wt. 10.6#, vis. 40. 1° at 3128', 1° at 3600'. Laying down 3½" drill pipe.

8-14-79 3680' TD, shale. Mud wt. 10.6# Vis. 48. Ran 113 jts 4½" 10.50# K-55 casing; 3675' set at 3686'. Float collar at 3635'; cemented with 265 sacks Howco Lite cement with 1/4# flocele per sack, followed with 222 sacks 50-50 Pozmix with 2% gel and 1/4# flocele per sack. Plug down 2:15 PM, 8-13-79. Rig released.

8-18-79 3680' TD; 3640' PBTD. Moved Drake Well Services rig on location and rigged up. Picked up 2 3/8" tubing with 3 7/8" bit. Cleaned out to 3640'. Tested 4½" casing to 3400 PSI for thirty minutes, held OK. Spotted 500 gals 10% acetic acid. Ran Gamma Ray Correlation and Cement Bond logs. Perforated two holes per foot per interval; 3404', 3412', 3420', 3428', 3442', 3498', 3518', 3530', 3538', 3548' 3574' 3598' - twenty-four holes. Preparing to fracture.

8-19-79 3680' TD; 3640' PBTD. Mini-Max II fractured with 48,048 gallons gelled water. 75,000 lbs 10-20 sand. Maximum treating pressure 2000 PSI; Average treating pressure 1600 PSI; Average Injection rate 28 bbls/min. Dropped ten HCl ball sealers. Final shut-in pressure 650 PSI. Well now cleaning up.

8-20-79 3640' PBTD. Going in hole with tubing, cleaning out.

8-21-79 3640' PBTD. Cleaning out, preparing to land 2 3/8" tubing.

8-22-79 3640' PBTD. Cleaned out to 3640'. Ran 119 jts 2 3/8" 4.7# J-55 EUE tubing; 3569' landed at 3580'. Seating nipple at 3550'. Released rig 2:00 PM, 8-21-79.

NO. OF COPIES RECEIVED		
DISTRIBUTION		
SANTA FE		
FILE		
U.S.G.S.		
LAND OFFICE		
OPERATOR		

NEW MEXICO OIL CONSERVATION COMMISSION

Form C-103
Supersedes Old C-102 and C-103
Effective 1-1-65

5a. Indicate Type of Lease: State ☐ Fee ☒

5. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT —" (FORM C-101) FOR SUCH PROPOSALS.)

1. OIL WELL ☐ GAS WELL ☒ OTHER-

7. Unit Agreement Name: Northeast Blanco Unit Agrmt. #1, Sec. 929

2. Name of Operator: Blackwood & Nichols Co., Ltd.

8. Farm or Lease Name: Northeast Blanco Unit

3. Address of Operator: P. O. Box 1237, Durango, Co. 81301

9. Well No.: 201

4. Location of Well: UNIT LETTER M, 990 FEET FROM THE South LINE AND 1030 FEET FROM THE West LINE, SECTION 9 TOWNSHIP 31N RANGE 7W NMPM.

10. Field and Pool, or Wildcat: So. Los Pinos Fruitland

15. Elevation (Show whether DF, RT, GR, etc.): 6652' GL

12. County: San Juan

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐		COMMENCE DRILLING OPNS. ☐	PLUG AND ABANDONMENT ☐
PULL OR ALTER CASING ☐	CHANGE PLANS ☐	CASING TEST AND CEMENT JOB ☐	
OTHER ☐		OTHER Water encroachment ☒	

17. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 1103.

7-21-80 3697' PBTD. Pulled 2 3/8" tubing. Ran Gamma Ray and Neutron Logs. Set drillable bridge plug at 3549'. Tested perforation at 3560' - 3588', no decrease in water. Set cement retainer at 3536'. Shut off water and gas. Set drillable cement retainer at 3373'. Squeeze cemented perforations 3441' - 3449', with 50 sacks neat cement, squeezed off at 2500 PSI.

7-22-80 3697' PBTD. Drilled retainer at 3373' and cement to 3459'.

7-23-80 3697' PBTD. Perforated 4 1/2" csg. 3482' - 3494' with 11 holes. Versagel fractured with 30,350 gals. water and 30,000 lbs. 10-20 sand. Maximum pressure 2450 PSI, average treating pressure 2300 PSI, average injection rate 17.5 bbls/min.

7-25-80 3697' PBTD. Reran 111 jts. 2 3/8" 4.7# J-55 EUE tubing, set at 3428'.

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
BLACKWOOD EXHIBIT NO. 8
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80
7-28-80

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED R. DeLasso Loos for DeLasso Loos TITLE District Manager DATE 7-28-80

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

Form 9-331
Dec. 1973

Form Approved.
Budget Bureau No. 42-R1424

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☐ gas well ☒ other

2. NAME OF OPERATOR
Blackwood & Nichols Co., Ltd.

3. ADDRESS OF OPERATOR
P.O. Box 1237, Durango, Colo. 81301

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 990' F/NL - 1490' F/EL
AT TOP PROD. INTERVAL: Same
AT TOTAL DEPTH: Same

5. LEASE
NM 03358

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
NEBU Agmt. No. 1, Sec. 929

8. FARM OR LEASE NAME
Northeast Blanco Unit

9. WELL NO.
203

10. FIELD OR WILDCAT NAME
South Los Pinos-Fruitland - PC

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
C-11-31N-7W

12. COUNTY OR PARISH
San Juan

13. STATE
New Mexico

14. API NO.
30-045-23485

15. ELEVATIONS (SHOW DF, KDB, AND WD)
6546' GL

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Subsequent of water encroachment	X		

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

7-13-80 3630' PBTD. Pulled 2 3/8" tubing, Ran Gamma Ray and Neutron Logs. Set Retrievamatic Packer at 3496'. Well made water thru tubing.

7-15-80 3630' PBTD. Reset packer at 3459'. Well making water thru tubing and between tubing and 4 1/2" csg. Reset packer at 3393'. Well making water thru tubing. Dry gas between tubing and 4 1/2" csg. Set cement retainer at 3409'.

7-16-80 3630' PBTD. Set Retrievamatic at 3405', pressured up to 2000 PSI, held OK.

7-17-80 3630' PBTD. Reran 108 jts. 2 3/8" 4.7# J-55 EUE tubing; 3356' landed at 3366'.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED LaDeLasso Loos TITLE District Manager DATE 7-28-80

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____ DATE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
APPLICANT'S EXHIBIT NO. 9
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80

Form 9-331
Dec 1973

Form Approved.
Budget Bureau No. 42-R1424

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☐ gas well ☒ other

2. NAME OF OPERATOR
Blackwood & Nichols Co., Ltd.

3. ADDRESS OF OPERATOR
P. O. Box 1237, Durango, Co. 81301

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 1180' F/SL - 925' F/EL
AT TOP PROD. INTERVAL: Same
AT TOTAL DEPTH: Same

5. LEASE
NM 03358

6. IF INDIAN, ALLOTTEE OR TRIBE NAME

7. UNIT AGREEMENT NAME
NEBU Agrmt. No. 1, Sec. 929

8. FARM OR LEASE NAME
Northeast Blanco Unit

9. WELL NO.
205

10. FIELD OR WILDCAT NAME
South Los Pinos Fruitland - PC

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
P-10-31N-7W

12. COUNTY OR PARISH: San Juan
13. STATE: New Mexico

14. API NO.
30-045-23601

15. ELEVATIONS (SHOW DF, KDB, AND WD)
6560' GL

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Subsequent report for water encroachment	X		

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

7-18-80 3620' PBTD. Pulled 2 3/8" tubing, ran Gamma Ray and Neutron Logs. Set cement retainer at 3430'. Tested 4 1/2" csg. to 3000 PSI for 10 minutes, held OK. Perforated 3350' - 3362' with 11 holes. Versagel fractured with 300 gals. 15% HCL acid and 28,640 gals. water, 30,000 lbs. 10-20 sand, Maximum pressure 2700 PSI, average teating pressure 2200 PSI, average injection rate 15 bbls/min.

7-20-80 3620' PBTD. Reran 107 jts. 2 3/8" 4.7# J-55 EUE tubing; set at 3339'.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Rebasso Loos TITLE District Manager DATE 7-28-80

(This space for Federal or State office use)

APPROVED BY _____ TITLE _____
CONDITIONS OF APPROVAL, IF ANY:

*See Instructions on Reverse Side

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
APPLICANTS EXHIBIT NO. 10
CASE NO. 7086
Submitted by BLACKWOOD
Hearing Date 11-12-80

NO. OF COPIES RECEIVED	5	
DISTRIBUTION		
SANTA FE	1	
FILE	1	
U.S.G.S.	2	
LAND OFFICE		
OPERATOR	1	1

Form C-105
Revised 1-1-65

NEW MEXICO OIL CONSERVATION COMMISSION
WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5a. Indicate Type of Lease: State ☐ Fee ☒

5. State Oil & Gas Lease No.

7. Unit Agreement Name

8. Farm or Lease Name: Yager

9. Well No.: 3

10. Field and Pool, or Wildcat: Undesignated PC & So. Los Pinos Fruitland Extension

12. County: San Juan

TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ OTHER

TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEPEN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ OTHER

Name of Operator: Palmer Oil & Gas Company

Address of Operator: P. O. Box 2564, Billings, Montana, 59103

Location of Well: UNIT LETTER N LOCATED 800 FEET FROM THE South LINE AND 1850 FEET FROM THE West LINE OF SEC. 3 TWP. 31N RGE. 7W NMPM

Date Spudded	16. Date T.D. Reached	17. Date Compl. (Ready to Prod.)	18. Elevations (DF, RKB, RT, GR, etc.)	19. Elev. Cashinghead
8/2/77	8/11/77	10/28/77	6597 KB	

Total Depth	21. Plug Back T.D.	22. If Multiple Compl., How Many	23. Intervals Drilled By	Rotary Tools	Cable Tools
3669	3647	two	→	0-TD	

Producing Interval(s), of this completion — Top, Bottom, Name
ctured Cliffs - 3361-3391
ultland: 3155-65, 3182-3209, 3219-27, 3233-39, 3245-51, 3258-63, 3267-71, 3275-95

25. Was Directional Survey Made: No

Type Electric and Other Logs Run
chlumberger - No open hole logs run - ran CBL-GR & TDT thru casing

27. Was Well Cored: No

CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
9 5/8"	36#	237'	13 3/4"	250 sacks	
7 "	20#	3652'	8 3/4"	700 sacks	

LINER RECORD

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN
None				

30. TUBING RECORD

SIZE	DEPTH SET	PACKER SET
2 3/8"	3413	3318' Model "D"
1½"	3232	none

Perforation Record (Interval, size and number)
3361-3391, 3155-65, 3182-3209, 3219-27, 3233-39, 3245-51, 3258-63, 3275-95, 3267-71 (1 shot/foot)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL	AMOUNT AND KIND MATERIAL USED
3361-3391	1000 gals. 15% MR-1
3361-3391	52,700 gals gelled wtr; 45,000# 10

PRODUCTION

Date First Production	Production Method (Flowing, gas lift, pumping — Size and type pump)	Well Status (Prod. or Shut-in)
SI	Flowing	SI

Date of Test	Hours Tested	Choke Size	Prod'n. For Test Period →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Gas — Oil Ratio

Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Oil Gravity — API (Corr.)
- SITP 1293 - SITP 1421	PC - SICP 1473					

Disposition of Gas (Sold, used for fuel, vented, etc.)
Will be sold

Test Witnessed By

List of Attachments

DEC 27 1977
OIL CON. COM.
DIST. 3

I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief

SIGNED Robert D Ballantine TITLE Drilling Supt. DATE 12/2/77

DISTRIBUTION	
SANTA FE	1
FILE	1
U.S.G.S.	2
LAND OFFICE	1
OPERATOR	1

NEW MEXICO OIL CONSERVATION COMMISSION

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5a. Indicate Type of Lease: State [X] Fee [ ]

5. State Oil & Gas Lease No.: LG-3876

7. Unit Agreement Name:

8. Farm or Lease Name: State

9. Well No.: 3

10. Field and Pool, or Wildcat: undesignated PC & S Los Pinos Fruitland Ext

12. County: San Juan

1a. TYPE OF WELL: OIL WELL [ ] GAS WELL [X] DRY [ ] OTHER

b. TYPE OF COMPLETION: NEW WELL [X] WORK OVER [ ] DEEPEN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] OTHER

2. Name of Operator: Palmer Oil & Gas Company

3. Address of Operator: P. O. Box 2564, Billings, Montana 59103

4. Location of Well: UNIT LETTER I LOCATED 1620 FEET FROM THE South LINE AND 800 FEET FROM THE East LINE OF SEC. 2 TWP. 31N RGE. 7W NMPM

15. Date Spudded	16. Date T.D. Reached	17. Date Compl. (Ready to Prod.)	18. Elevations (DF, RKB, RT, GR, etc.)	19. Elev. Cashinghead
12/6/77	12/13/77	1/22/78	6542' GR, 6553' KB	

20. Total Depth	21. Plug Back T.D.	22. If Multiple Compl., How Many	23. Intervals Drilled By	Rotary Tools	Cable Tools
3425'	3408'		→	0-T.D.	

24. Producing Interval(s), of this completion — Top, Bottom, Name: 3282 - 3406 Pictured Cliffs

25. Was Directional Survey Made: No

26. Type Electric and Other Logs Run: None

27. Was Well Cored: No

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	24#	256'	12¼"	225 sacks	
5½"	14#	3420'	7-7/8"	400 sacks	

29. LINER RECORD

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN

30. TUBING RECORD

SIZE	DEPTH SET	PACKER SET
2-3/8"	3379'	none

31. Perforation Record (Interval, size and number): 3382-3406 25holes

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL	AMOUNT AND KIND MATERIAL USED
3382-3406	45,500 gal Minimax containing 45,000# 10/20 sand; 750 gals 15% HCl

33. PRODUCTION

Date First Production	Production Method (Flowing, gas lift, pumping — Size and type pump)	Well Status (Prod. or Shut-in)
Shut in	Flowing	Shut in

Date of Test	Hours Tested	Choke Size	Prod'n. For Test Period →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Gas — Oil Ratio
1/22/78	3 hours	3/4"					

Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Oil Gravity — API (Corr.)
SITP 1420	SICP 1420					

34. Disposition of Gas (Sold, used for fuel, vented, etc.): To be sold

Test Witnessed By: Joe Elledge

35. List of Attachments

36. I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief.

SIGNED Robert D Ballantyne Jr. TITLE Drilling Superintendent DATE 1/24/78

RECEIVED FEB 16 1978 OIL CON. COM. DIST. 3

NEW MEXICO OIL CONSERVATION COMMISSION

WELL DELIVERABILITY TEST REPORT FOR 1978

Form C122-A
Revised 1-1-66

POOL NAME	POOL SLOPE	FORMATION	COUNTY
Wildcat	n= .85	Pictured Cliff	San Juan

COMPANY			WELL NAME AND NUMBER		
Palmer Oil and Gas Company			State #3		
UNIT LETTER	SECTION	TOWNSHIP	RANGE	PURCHASING PIPELINE	
I	2	31N	7W	Northwest Pipeline	
CASING O.D. – INCHES	CASING I.D. – INCHES	SET AT DEPTH – FEET	TUBING O.D. – INCHES	TUBING I.D. – INCHES	TOP – TUBING PERF. – FEET
5.500	5.012	3420	2.375	1.995	3329
GAS PAY ZONE		WELL PRODUCING THRU		GAS GRAVITY	GRAVITY x LENGTH
FROM 3382 TO 3406		CASING	TUBING X	.685	2315
DATE OF FLOW TEST			DATE SHUT-IN PRESSURE MEASURED		
FROM 7-3-78 TO 7-11-78			7-18-78		

PRESSURE DATA – ALL PRESSURES IN PSIA

(a) Flowing Casing Pressure (DWt)	(b) Flowing Tubing Pressure (DWt)	(c) Flowing Meter Pressure (DWt)	(d) Flow Chart Static Reading	(e) Meter Error (Item c – Item d)	(f) Friction Loss (a – c) or (b – c)	(g) Average Meter Pressure (Integr.)
480	303	301	303	-2	2	310
(h) Corrected Meter Pressure (g + e)	**(i) Avg. Wellhead Press. P_t = (h + f)**	**(j) Shut-in Casing Pressure (DWt)**	**(k) Shut-in Tubing Pressure (DWt)**	**(l) P_c = higher value of (j) or (k)**	**(m) Del. Pressure P_d = 80 %P_c**	**(n) Separator or Dehydrator Pr. (DWt) for critical flow only**
308	310	1138	1138	1138	910	

FLOW RATE CORRECTION (METER ERROR)

Integrated Volume – MCF/D	Quotient of Item c / Item d	$\sqrt{\text{Item c} / \text{Item d}}$	Corrected Volume
170	.9934	.9967	Q = 169 MCF/D

WORKING PRESSURE CALCULATION

$(1-e^{-s})$	$(P_c\ Q_m)^2\ (1000)$	$R^2 = (1-e^{-s})(P_c\ Q_m)^2(1000)$	P_t^2	$P_w^2 = P_t^2 + R^2$	$P_w = \sqrt{P_w^2}$
0.155	2,525	391	96,100	96,491	311

DELIVERABILITY CALCULATION

$$D = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = 169 \left[\left(\frac{466,944}{1,198,553}\right)^n = (.3896)^n = .44876\right] = 76 \text{ MCF/D}$$

REMARKS: Initial and Annual test for 1978

SUMMARY

Item h	308	Psia
P_c	1138	Psia
Q	169	MCF/D
P_w	311	Psia
P_d	910	Psia
D	76	MCF/D

Company Palmer Oil and Gas Company
By ORIGINAL SIGNED BY JOE F. ELLEDGE
Title Agent
Witnessed By
Company

NO. OF COPIES RECEIVED	6	
DISTRIBUTION		
SANTA FE	1	
FILE	1	
U.S.G.S.	2	
LAND OFFICE	1	
OPERATOR	1	

Form C-105
Revised 1-1-65

NEW MEXICO OIL CONSERVATION COMMISSION
WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5a. Indicate Type of Lease: State [X] Fee [ ]

5. State Oil & Gas Lease No.: LG-3876

7. Unit Agreement Name:

8. Farm or Lease Name: State

9. Well No.: 2

10. Field and Pool, or Wildcat: wc Undesignated PC and So. Los Pinos Fruitland Ext

12. County: San Juan

1a. TYPE OF WELL — OIL WELL [ ] GAS WELL [X] DRY [ ] OTHER

b. TYPE OF COMPLETION — NEW WELL [X] WORK OVER [ ] DEEPEN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] OTHER

2. Name of Operator: Palmer Oil & Gas Company

3. Address of Operator: P. O. Box 2564, Billings, Montana 59103

4. Location of Well: UNIT LETTER N LOCATED 1190 FEET FROM THE South LINE AND 1675 FEET FROM THE West LINE OF SEC. 2 TWP. 31N RGE. 7W NMPM

15. Date Spudded	16. Date T.D. Reached	17. Date Compl. (Ready to Prod.)	18. Elevations (DF, RKB, RT, GR, etc.)	19. Elev. Cashinghead
11/1/77	11/10/77	1/13/78	6555 GL, 6566 KB	

20. Total Depth	21. Plug Back T.D.	22. If Multiple Compl., How Many	23. Intervals Drilled By	Rotary Tools	Cable Tools
3390	3386'	two	→	0-TD	

25. Was Directional Survey Made: no

24. Producing Interval(s), of this completion — Top, Bottom, Name
3354-3378 - Pictured Cliffs
3267-3279 & 3174-3222 - Fruitland

27. Was Well Cored: no

26. Type Electric and Other Logs Run
No open hole logs were run

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT LB./FT.	DEPTH SET	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	24#	260'	12-1/4"	250 SX	
5-1/2"	14#	3390'	7-7/8"	350 SX	

29. LINER RECORD

SIZE	TOP	BOTTOM	SACKS CEMENT	SCREEN

30. TUBING RECORD

SIZE	DEPTH SET	PACKER SET
2-3/8"	3346	3346

31. Perforation Record (Interval, size and number)
3354-3378 - 25 holes
3267-3279 - 13 holes
3174-3222 - 49 holes

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL	AMOUNT AND KIND MATERIAL USED
3354-3375	300 gal. 15% HCL; 44,730 gal Minimax containing 45,000# 10/20 sand, 400 scf/bbl nitro

PRODUCTION

33. Date First Production: shut-in
Production Method (Flowing, gas lift, pumping — Size and type pump): Flowing
Well Status (Prod. or Shut-in): shut-in

Date of Test	Hours Tested	Choke Size	Prod'n. For Test Period →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Gas — Oil Ratio
1-13/78	3 hrs	3/4"					

Flow Tubing Press.	Casing Pressure	Calculated 24-Hour Rate →	Oil — Bbl.	Gas — MCF	Water — Bbl.	Oil Gravity — API (Corr.)
FR-SITP 876 PC-SITP 1410	FR-SICP 968					

34. Disposition of Gas (Sold, used for fuel, vented, etc.): to be sold

Test Witnessed By: Joe Elledge

35. List of Attachments

36. I hereby certify that the information shown on both sides of this form is true and complete to the best of my knowledge and belief.

SIGNED J. C. Routson TITLE Petroleum Engineer DATE 2/7/78

RECEIVED
FEB 13 1978
OIL CON. COM.
DIST. 3

NEW MEXICO OIL CONSERVATION COMMISSION
WELL DELIVERABILITY TEST REPORT FOR 19 78

Form C122-A
Revised 1-1-66

POOL NAME	POOL SLOPE	FORMATION	COUNTY
Wildcat	n= .85	Pictured Cliff	San Juan

COMPANY			WELL NAME AND NUMBER		
Palmer Oil and Gas Company			State #2		
UNIT LETTER	SECTION	TOWNSHIP	RANGE	PURCHASING PIPELINE	
N	2	31N	7W	Northwest Pipeline	
CASING O.D. - INCHES	CASING I.D. - INCHES	SET AT DEPTH - FEET	TUBING O.D. - INCHES	TUBING I.D. - INCHES	TOP - TUBING PERF. - FEET
5.500	5.012	3390	2.375	1.995	3346
GAS PAY ZONE		WELL PRODUCING THRU		GAS GRAVITY	GRAVITY X LENGTH
FROM 3354 TO 3378		CASING	TUBING X	.686	2295
DATE OF FLOW TEST			DATE SHUT-IN PRESSURE MEASURED		
FROM 7-3-78 TO 7-11-78			7-18-78		

PRESSURE DATA - ALL PRESSURES IN PSIA

(a) Flowing Casing Pressure (DWt)	(b) Flowing Tubing Pressure (DWt)	(c) Flowing Meter Pressure (DWt)	(d) Flow Chart Static Reading	(e) Meter Error (Item c - Item d)	(f) Friction Loss (a - c) or (b - c)	(g) Average Meter Pressure (Integr.)
Dual	588	518	518	0	70	509
(h) Corrected Meter Pressure (g + e)	(i) Avg. Wellhead Press. P_t = (h + f)	(j) Shut-in Casing Pressure (DWt)	(k) Shut-in Tubing Pressure (DWt)	(l) P_c = higher value of (j) or (k)	(m) Del. Pressure P_d = 80 %P_c	(n) Separator or Dehydrator Pr. (DWt) for critical flow only
509	579	Dual	1114	1114	891	

FLOW RATE CORRECTION (METER ERROR)

Integrated Volume - MCF/D	Quotient of Item c / Item d	$\sqrt{\text{Item c / Item d}}$	Corrected Volume
500	1.000	1.000	Q = 500 MCF/D

WORKING PRESSURE CALCULATION

$(1-e^{-s})$	$(F_c\ Q_m)^2(1000)$	$R^2 = (1-e^{-s})(F_c\ Q_m)^2(1000)$	P_t^2	$P_w^2 = P_t^2 + R^2$	$P_w = \sqrt{P_w^2}$
0.154	22,099	3,403	335,241	338,644	582

DELIVERABILITY CALCULATION

$$D = Q\left[\frac{P_c^2 - P_d^2}{P_c^2 - P_w^2}\right]^n = 500 \left[\left(\frac{447,115}{902,352}\right)^{(.4955)} = .5505\right] = 275 \text{ MCF/D}$$

REMARKS: Initial and Annual test for 1978

SUMMARY

P_t	509	Psia
P_c	1114	Psia
Q	500	MCF/D
P_w	582	Psia
P_d	891	Psia
D	275	MCF/D

Company Palmer Oil and Gas Company
By BY JOE F. ELLEDGE
Title Agent
Witnessed By
Company

Form 9-331
(Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE (See other instructions on reverse side)

Form approved
Budget Bureau No. 42-R355.5.

5. LEASE DESIGNATION AND SERIAL NO.: NM-28749

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

7. UNIT AGREEMENT NAME:

8. FARM OR LEASE NAME: Federal

9. WELL NO.: No. 3

10. FIELD AND POOL, OR WILDCAT: Undesignated PC and S. Los Pinos Fruitland Ext.

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: SW¼NE¼ Sec. 10-31N-7W

12. COUNTY OR PARISH: San Juan

13. STATE: New Mexico

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ DRY ☐ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: Palmer Oil & Gas Company

3. ADDRESS OF OPERATOR: P. O. Box 2564, Billings, Montana 59103

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface 1850' FNL, 1640' FEL
At top prod. interval reported below same
At total depth same

14. PERMIT NO. | DATE ISSUED

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
3/27/78	4/4/78	5/13/78	6539 GL, 3550 KB	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
3630'	3585'	two	→	0-TD	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
3325-3522 - Pictured Cliffs
3106-3264 - Fruitland

25. WAS DIRECTIONAL SURVEY MADE: no

26. TYPE ELECTRIC AND OTHER LOGS RUN: no open hole logs were run

27. WAS WELL CORED: no

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
8-5/8"	24#	252' KB	12-1/4"	225 sx	
5-1/2"	14#	3630'	7-7/8"	350 sx	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2-3/8"	3300'	
1"	3209'	

31. PERFORATION RECORD (Interval, size and number)
PC - 3325, 3326, 3328, 3332, 3344, 3351, 3483, 3486, 3516, 3522 (1 shot each)
Fr - 3106-20, 3130-36, 3150-90, 3198-3214, 3228-36, 3252-56, 3260-64 (1 sh/ft)

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
3325-3522	500 gal 15% HCl. Foam fraced w/120,000 10/20 sd. 1,336,500 scf N_2.
3106-3264	no treatment

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
shut in	flowing	shut-in

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
5/13/78	3 hrs	3/4"			FR 78 PC 225		

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
PC 138 FR 38	FCP 599			1806 624		

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): to be sold

TEST WITNESSED BY: Joe Elledge

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Robert D. Ballantyne TITLE Production Sup't DATE 5/30/78
Robert D. Ballantyne

*(See Instructions and Spaces for Additional Data on Reverse Side)

W MEXICO OIL CONSERVATION COMMISSION

MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Form C-122
Revised 9-1-65

Type Test: [X] Initial [ ] Annual [ ] Special				Test Date: 5-6-1978	
Company: Palmer Oil & Gas Company		Connection: Northwest Pipeline			
Pool: Wildcat		Formation: Pictured Cliff		Unit	
Completion Date: 4-29-1978	Total Depth: 3630	Plug Back TD: 3585	Elevation: 6539 G.L.	Farm or Lease Name: Federal	
Csg. Size: 5.500 / Wt.: 14# / d: 5.012 / Set At: 3630		Perforations: From 3325 To 3522		Well No.: 3	
Tbg. Size: 2.375 / Wt.: 4.7 / d: 1.995 / Set At: 3300		Perforations: From Open To Ended		Unit: G / Sec.: 10 / Twp.: 31N / Rge.: 7W	
Type Well – Single – Bradenhead – G.G. or G.O. Multiple: Gas - Gas Dual		Packer Set At: 3300		County: San Juan	
Producing Thru: Tbg.	Reservoir Temp. °F:	Mean Annual Temp. °F:	Baro. Press. – P_a: 12 psia	State: New Mexico	
L:	H:	Gg: .650(est.)	% CO_2:	% N_2:	% H_2S:
Prover:	Meter Run:	Taps:			

NO.	FLOW DATA: Prover Line Size	X	Orifice Size	Press. p.s.i.g.	Diff. hw	Temp. °F	TUBING DATA: Press. p.s.i.g.	Temp. °F	CASING DATA: Press. p.s.i.g.	Temp. °F	Duration of Flow
SI	7 day						1461				
1.	2 inch		.750	138			138	60°			3 hrs.
2.											
3.											
4.											
5.											

RATE OF FLOW CALCULATIONS

NO.	Coefficient (24 Hour)	$\sqrt{h_w P_{ai}}$	Pressure P_m	Flow Temp. Factor Ft.	Gravity Factor Fg	Super Compress. Factor, Fpv	Rate of Flow Q, Mcfd
1	12.3650		150	1.000	.9608	1.014	1806
2.							
3.							
4.							
5.							

NO.	P_t	Temp. °R	T_t	Z
1.				
2.				
3.				
4.				
5.				

Gas Liquid Hydrocarbon Ratio _____ Mcf/bbl.
A.P.I. Gravity of Liquid Hydrocarbons _____ Deg.
Specific Gravity Separator Gas _____ XXXXXXXXXX
Specific Gravity Flowing Fluid XXXXX _____
Critical Pressure _____ P.S.I.A. _____ P.S.I.A.
Critical Temperature _____ R _____ R

P_c 1473 P_c^2 2,169,729

NO	P_t^2	P_w	P_w^2	$P_c^2 - P_w^2$
1		253	64018	2,105,711
2	Use calculated P_w^2			
3				
4				
5				

(1) $\frac{P_c^2}{P_c^2 - P_w^2} = 1.0304$ (2) $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1.02577$

AOF = Q $\left[\frac{P_c^2}{P_c^2 - P_w^2}\right]^n = 1852$

Absolute Open Flow 1852 Mcfd @ 15.025 Angle of Slope θ _____ Slope, n .85

Remarks: Initial P.L. test taken in conjunction with potential test.

Approved By Commission:	Conducted By:	Calculated By:	Checked By:
	Jo[illegible] F. Elledge	Joe F. El[illegible]lge	Don Roberts

PICTURED CLIFFS FORMATION

MEANING AND PURPOSE OF EXHIBITS

Exhibit 1. Required map of producing Pictured Cliffs wells which also shows the exact area this application covers.

Exhibit 2. General Geologic Section shows the relative position of the Pictured Cliffs Formation to other Formations in the area.

Exhibit 3. Federal Regulations - these are the pertinent parts of the regulations protecting fresh water from pollution.

Exhibit 4. State Regulations - these are the applicable regulations showing how fresh water must be protected by use of steel casing, cement etc.

Exhibit 5. Fracture Stimulation Recommendation - a procedure to fracture the Pictured Cliffs reservoir rocks in order to increase (stimulate) production. The method used, cost of the procedure and calculated production increase is shown.

Exhibit 6. Completion Report NEBU well No. 202 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 7. Completion Report NEBU well No. 204 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 8. Re-completion Report NEBU well No. 201 shows the final completion interval (last perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 9. Re-completion Report on the NEBU well No. 203 shows that the lower perforations had to be abandoned because of too much water production, only the interval shallower than 3405 feet is now producing.

Exhibit 10. Re-completion Report on the NEBU well No. 205 shows that the interval below 3430 feet was shut off by cement retainer and a new interval (3350-3362) was perforated and fractured for production.

Exhibit 11. Completion Report Yager No. 3 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 12. Completion Report State No. 3 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 13. Deliverability test State No. 3 shows flowing tubing pressure, shut in tubing pressure, Meter pressure etc. These pressures are used in calculating "production to the atmosphere."

Exhibit 14. Completion Report State No. 2 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 15. Deliverability test on State No. 2 shows flowing tubing pressure, Meter pressure, shut in tubing pressure, etc. These pressures are used in calculating "production to the atmosphere."

Exhibit 16. Completion Report Federal No. 3 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 17. Deliverability Test Federal No. 3 shows flowing tubing pressure, shut in tubing pressure, meter pressure etc. These pressures are used to calculate "production to the atmosphere."

PICTURED CLIFFS FORMATION

MEANING AND PURPOSE OF EXHIBITS

Exhibit 1. Required map of producing Pictured Cliffs wells which also shows the exact area this application covers.

Exhibit 2. General Geologic Section shows the relative position of the Pictured Cliffs Formation to other Formations in the area.

Exhibit 3. Federal Regulations - these are the pertinent parts of the regulations protecting fresh water from pollution.

Exhibit 4. State Regulations - these are the applicable regulations showing how fresh water must be protected by use of steel casing, cement etc.

Exhibit 5. Fracture Stimulation Recommendation - a procedure to fracture the Pictured Cliffs reservoir rocks in order to increase (stimulate) production. The method used, cost of the procedure and calculated production increase is shown.

Exhibit 6. Completion Report NEBU well No. 202 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 7. Completion Report NEBU well No. 204 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 8. Re-completion Report NEBU well No. 201 shows the final completion interval (last perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 9. Re-completion Report on the NEBU well No. 203 shows that the lower perforations had to be abandoned because of too much water production, only the interval shallower than 3405 feet is now producing.

Exhibit 10. Re-completion Report on the NEBU well No. 205 shows that the interval below 3430 feet was shut off by cement retainer and a new interval (3350-3362) was perforated and fractured for production.

Exhibit 11. Completion Report Yager No. 3 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 12. Completion Report State No. 3 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 13. Deliverability test State No. 3 shows flowing tubing pressure, shut in tubing pressure, Meter pressure etc. These pressures are used in calculating "production to the atmosphere."

Exhibit 14. Completion Report State No. 2 shows producing interval (perforations) and Fracture stimulation procedure used on this well.

Exhibit 15. Deliverability test on State No. 2 shows flowing tubing pressure, Meter pressure, shut in tubing pressure, etc. These pressures are used in calculating "production to the atmosphere."

Exhibit 16. Completion Report Federal No. 3 shows producing interval (perforations) and Fracture procedure used to stimulate production from this well.

Exhibit 17. Deliverability Test Federal No. 3 shows flowing tubing pressure, shut in tubing pressure, meter pressure etc. These pressures are used to calculate "production to the atmosphere."

CAMPBELL AND BLACK, P.A.
LAWYERS

JACK M. CAMPBELL
BRUCE D. BLACK
MICHAEL B. CAMPBELL
WILLIAM F. CARR

POST OFFICE BOX 2208
JEFFERSON PLACE
SANTA FE, NEW MEXICO 87501
TELEPHONE (505) 988-4421

October 23, 1980

Case 7086

Mr. Joe D. Ramey
Director
Oil Conservation Division
New Mexico Department of
Energy & Minerals
Post Office Box 2088
Santa Fe, New Mexico 87501

Re: Application of Blackwood & Nichols Co., Ltd. for Designation of Tight Formation under Section 107 of the NGPA -- Pictured Cliffs Formation

Dear Mr. Ramey:

Enclosed in triplicate is the application of Blackwood & Nichols Company in the above-referenced matter with all exhibits required by the Commission's Special Rules and Procedures for Tight Formation Designation attached.

Blackwood & Nichols Co., Ltd. requests that this matter be docketed for hearing on November 12, 1980.

Very truly yours,

William F. Carr

WFC:lr

Enclosures

cc: Mr. Charles Blackwood

CASE 7083: Application of Bass Enterprises Production Co. for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp, Cisco, Canyon and Strawn formations underlying the S/2 NE/4 of Section 13, Township 16 South, Range 36 East, Northeast Lovington Field, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7005: (Continued from October 29, 1980, Examiner Hearing)

Application of Sol West III for an NGPA determination, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks a new onshore reservoir determination in the Morrow formation for his Turkey Track-Morrow Sand Well No. 1 in Unit I of Section 26, Township 18 South, Range 28 East.

CASE 7038: (Continued from October 29, 1980, Examiner Hearing)

Application of Natura Energy Corporation for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres formation underlying the NE/4 NE/4 of Section 6, Township 19 South, Range 39 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7073: (Readvertised)

Application of Enserch Exploration, Inc. for pool creation, temporary special pool rules, and assignment of a discovery allowable, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks the creation of a new Fusselman oil pool for its J. G. O'Brien Well No. 1 located 1980 feet from the North line and 660 feet from the West line of Section 31, Township 7 South, Range 29 East, with special rules therefor, including provisions for 80-acre spacing, a limiting gas-oil ratio of 3000 to one and special well location requirements providing for the drilling of wells within 150 feet of the center of a quarter-quarter section. Applicant further seeks approval of a 74.24-acre proration and spacing unit and a discovery allowable for said J. G. O'Brien Well No. 1.

CASE 7084: Application of Harvey E. Yates Company for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the Duncan Unit Area, comprising 7679 acres, more or less, of State, Federal, and fee lands in Townships 13 and 14 South, Range 35 East.

CASE 7085: Application of Harvey E. Yates Company for designation of a tight formation, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Atoka formation underlying portions of Townships 12, 13, and 14 South, Ranges 35 and 36 East, containing 37,760 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7086: Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Pictured Cliffs formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7087: Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Fruitland formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

Docket No. 36-80

Dockets Nos. 37-80 and 38-80 are tentatively set for November 25 and December 10, 1980. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - NOVEMBER 12, 1980

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

ALLOWABLE: (1) Consideration of the allowable production of gas for December, 1980, from fifteen prorated pools in Lea, Eddy, and Chaves Counties, New Mexico.

(2) Consideration of the allowable production of gas for December, 1980, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.

CASE 7076: Application of Vista Resources, Inc. for an unorthodox gas well location, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its John H. Dashko Federal Well No. 1 to be drilled 2510 feet from the South line and 790 feet from the East line of Section 11, Township 24 North, Range 7 West, Basin-Dakota Pool, the E/2 of said Section 11 to be dedicated to the well.

CASE 7077: Application of Threshold Development Company for a dual completion, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion of its Conoco "10" State Com Well No. 1 located in Unit I of Section 10, Township 19 South, Range 29 East, Turkey Track Field, to produce oil from the Wolfcamp formation and gas from the Atoka formation through parallel strings of tubing.

CASE 7046: (Continued from October 15, 1980, Examiner Hearing)

Application of Cotton Petroleum Corporation for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Chacra and Pictured Cliffs production in the wellbores of wells in the South Blanco-Pictured Cliffs Pool located in Sections 1, 2, 3, 4, 9, 10, 11, 13, 23, and 24, Township 24 North, Range 4 West.

CASE 7078: Application of Conoco Inc. for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion of its Warren Unit Well No. 82 located in Unit G of Section 35, Township 20 South, Range 38 East, to produce oil from the Blinebry Oil and Gas or Warren-Tubb Pools and the D-K Abo Pool.

CASE 7079: Application of HNG Oil Company for the amendment of Order No. R-5727, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-5727 to include the entire Pennsylvanian formation under the compulsory pooling order rather than only the Morrow formation as previously ordered.

CASE 7080: Application of Franks Petroleum, Inc. for an unorthodox gas well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a well to be drilled 660 feet from the North and East lines of Section 9, Township 21 South, Range 32 East, Hat Mesa-Morrow Gas Pool, the E/2 of said Section 9 to be dedicated to the well.

CASE 7081: Application of Belco Petroleum Corporation for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Pennsylvanian formation underlying the E/2 of Section 19, Township 23 South, Range 28 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7070: (Continued from October 29, 1980, Examiner Hearing)

Application of Tesoro Petroleum Corporation for a pilot caustic flood project, McKinley County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a five-acre pilot caustic flood project in the Hospah Field by the injection of caustic fluid into the Seven Lakes Sand of the Upper Hospah Field at an approximate depth of 300-500 feet through four injection wells in Unit K of Section 1, Township 17 North, Range 9 West.

CASE 7082: Application of Maralo, Inc. and Dalport Oil Corporation for a waterflood project, Lea County, New Mexico. Applicants, in the above-styled cause, seek authority to institute a joint waterflood project on Dalport's Winters Lease offsetting Maralo's Jalmat Yates Unit waterflood project by the injection of water into the Yates-Seven Rivers-Queen formations through a well to be jointly drilled at an unorthodox location 1260 feet from the South line and 1250 feet from the West line of Section 7, Township 25 South, Range 36 East, Jalmat Pool.

Docket No. 40-80

Dockets Nos. 42-80 and 43-80 are tentatively set for December 30, 1980 and January 14, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - DECEMBER 10, 1980

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

ALLOWABLE: (1) Consideration of the allowable production of gas for January, 1981, from fifteen prorated pools in Lea, Eddy, and Chaves Counties, New Mexico.

(2) Consideration of the allowable production of gas for January, 1981, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.

CASE 7095: In the matter of the hearing called by the Oil Conservation Division on its own motion to permit Bill G. Isler, United States Fidelity and Guranty Company, and all other interested parties to appear and show cause why the Speare State Well No. 2 in Unit B of Section 28, Township 11 South, Range 27 East, Chaves County, should not be plugged and abandoned in accordance with a Division-approved plugging program.

CASE 7096: Application of Read & Stevens, Inc. for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the North Baum Unit Area, comprising 637 acres, more or less, of State lands in Township 13 South, Ranges 32 and 33 East.

CASE 7097: Application of Mesa Petroleum Co. for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the Jackson Unit Area, comprising 2,560 acres, more or less, of State lands in Township 24 South, Range 33 East.

CASE 7098: Application of The Wiser Oil Company for a dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion of its McQuatters Well No. 4 located in Unit G of Section 11, Township 21 South, Range 36 East, to produce oil from the Oil Center-Glorieta and Hardy-Drinkard Pools through parallel strings of tubing.

CASE 7077: (Continued from November 25, 1980, Examiner Hearing)

Application of Threshold Development Company for a dual completion, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion of its Conoco "10" State Com Well No. 1 located in Unit I of Section 10, Township 19 South, Range 29 East, Turkey Track Field, to produce oil from the Wolfcamp formation and gas from the Atoka formation through parallel strings of tubing.

CASE 7089: (Continued from November 25, 1980, Examiner Hearing)

Application of Summit Energy, Inc. for a waterflood project, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to institute a waterflood project by the injection of water into the Blinebry formation through its Gulf Eunin Well No. 2 located in Unit C of Section 13, Township 21 South, Range 37 East.

CASE 7099: Application of Harvey E. Yates Company for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the Duncan Unit Area, comprising 7,679 acres, more or less, of State, Federal, and fee lands in Townships 13 and 14 South, Range 35 East.

CASE 7100: Application of Harvey E. Yates Company for downhole commingling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Atoka and Morrow production in the wellbore of its Travis 24 State Com Well No. 1 in Unit H of Section 24, Township 18 South, Range 28 East.

CASE 7101: Application of Consolidated Oil & Gas, Inc. for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Gallup and Basin-Dakota production in the wellbore of its Tribal "C" Well No. 4-E in Unit H of Section 6, Township 26 North, Range 3 West.

CASE 7102: Application of Consolidated Oil & Gas, Inc. for approval of infill drilling and an exception to Rule 9(E) of Order No. R-1670-T, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the drilling of its Jacquez Well No. 2 to be located in Unit K of Section 2, Township 31 North, Range 13 West, is necessary to effectively and efficiently drain that portion of the proration unit which cannot be so drained by the two existing wells on the unit. Applicant further seeks an exception to Rule 9(E) of Division Order No. R-1670-T to permit calculating the proration unit's allowable on the basis of three Mesaverde wells on the unit.

CASE 7103: Application of E. L. Latham, Jr. for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp thru Pennsylvanian formations underlying the N/2 of Section 7, Township 22 South, Range 26 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7104: Application of Conoco Inc. for the amendment of Orders Nos. R-4633 and WFX-462, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Division Orders Nos. R-4633 and WFX-462, which authorized the injection of water into applicant's Maljamar Mitchell Waterflood Project in Section 5, Township 17 South, Range 32 East. The amendments sought would include carbon dioxide in the injection authorization for said project.

CASE 7105: Application of C and E Operators, Inc. for compulsory pooling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Mesaverde formation underlying the N/2 of Section 9, Township 30 North, Range 11 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7106: Application of C and E Operators, Inc. for compulsory pooling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Mesaverde formation underlying the S/2 of Section 8, Township 30 North, Range 11 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7107: Application of C and E Operators, Inc. for compulsory pooling and a non-standard proration unit, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Mesaverde formation underlying a 158.54-acre non-standard gas proration unit comprising the SW/4 of Section 9, Township 30 North, Range 11 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7090: (Continued from November 25, 1980, Examiner Hearing)

Application of Dorchester Exploration, Inc. for directional drilling and an unorthodox gas well location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks authority to re-enter the old Union Hill Well No. 1, the surface location of which is 2310 feet from the North and West lines of Section 27, Township 12 South, Range 28 East, and to directionally drill in an indeterminate direction from a kick-off point at 7300 feet, bottoming said well at an approximate depth of 8100 feet in the Mississippian formation less than 330 feet away from the surface location. The W/2 of said Section 27 would be dedicated to the well.

CASE 6668: (Continued from November 25, 1980, Examiner Hearing)

In the matter of Case 6668 being reopened pursuant to the provisions of Order No. R-6139 which order promulgated temporary special rules and regulations for the South Culebra Bluff-Bone Spring Pool in Eddy County, New Mexico, including a provision for 80-acre spacing units. Operators in said pool may appear and show cause why the pool should not be developed on 40-acre spacing units.

CASE 7092: (Continued from November 25, 1980, Examiner Hearing)

Application of Delta Drilling Company for pool extension, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the extension of the South Culebra Bluff-Bone Spring Pool to include all of Sections 2, 11, 13, 14, 23, and 24, Township 23 South, Range 28 East.

CASE 7056: (Continued and Readvertised)

Application of Getty Oil Company for the extension of vertical limits of the Jalmat Pool, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the contraction of the vertical limits of the Langlie-Mattix Pool and the downward extension of the vertical limits of the Jalmat Pool to a depth of 3740 feet, subsurface, under the NW/4 SW/4 of Section 3, Township 24 South, Range 36 East.

CASE 7108: Application of HNG Oil Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the S/2 of Section 32, Township 21 South, Range 35 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7109: Application of Alpha Twenty-One Production Company for approval of infill drilling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the El Paso Tom Federal Well No. 1 located 330 feet from the North and West lines of Section 33, Township 25 South, Range 37 East, is necessary to effectively and efficiently drain that portion of an existing proration unit in the Langlie-Mattix Pool which cannot be so drained by the existing well(s).

CASE 7110: Application of Alpha Twenty-One Production Company for approval of infill drilling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the El Paso Tom Federal Well No. 3 located 1650 feet from the North and West lines of Section 33, Township 25 South, Range 37 East, is necessary to effectively and efficiently drain that portion of an existing proration unit in the Langlie-Mattix Pool which cannot be so drained by the existing well(s).

CASE 7111: Application of Alpha Twenty-One Production Company for approval of infill drilling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the El Paso Tom Federal Well No. 2 located 1650 feet from the North line and 330 feet from the West line of Section 33, Township 25 South, Range 37 East, is necessary to effectively and efficiently drain that portion of an existing proration unit in the Langlie-Mattix Pool which cannot be so drained by the existing well(s).

CASE 7112: Application of Alpha Twenty-One Production Company for approval of infill drilling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the Harrison Federal Well No. 3 located 1980 feet from the North line and 660 feet from the West line of Section 27, Township 25 South, Range 37 East, is necessary to effectively and efficiently drain that portion of an existing proration unit in the Jalmat Gas Pool which cannot be so drained by the existing well(s).

CASE 7086: (Continued from November 12, 1980, Examiner Hearing)

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Pictured Cliffs formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7087: (Continued from November 12, 1980, Examiner Hearing)

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Fruitland formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7046: (Continued and Readvertised)

Application of Cotton Petroleum Corporation for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Chacra and Pictured Cliffs production in the wellbores of wells in the South Blanco-Pictured Cliffs Pool located in Sections 1 thru 4, 9 thru 14, and 23 and 24, Township 24 North, Range 4 West.

****

DOCKET: COMMISSION HEARING - THURSDAY - DECEMBER 11, 1980

OIL CONSERVATION COMMISSION - 9 A.M. - ROOM 205
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

Docket No. 41-80

CASE 7025: (DE NOVO)

Application of Southland Royalty Company for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Pennsylvanian formation underlying the W/2 of Section 35, Township 18 South, Range 29 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

Upon application of Southland Royalty Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 7008: (DE NOVO)

Application of Coronado Exploration Corp. for eight compulsory poolings, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres formation underlying eight 40-acre proration units, being the NE/4 NE/4 of Section 4 and the NW/4 NE/4 of Section 5, both in Township 12 South, Range 28 East, and the NW/4 SE/4 of Section 6, the NE/4 NW/4 of Section 23, the NE/4 SE/4 of Section 28, the SE/4 SE/4 of Section 29, the NE/4 NW/4 of Section 33, all in Township 11 South, Range 28 East, each to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said wells and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the wells, and a charge for risk involved in drilling said wells.

Upon application of Tenneco Oil Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6965: (DE NOVO)

Application of Supron Energy Corporation for a non-standard gas proration unit, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval of a 160-acre non-standard Mesaverde and Dakota gas proration unit comprising the SE/4 of Section 8, Township 25 North, Range 3 West, to be dedicated to a well to be drilled at a standard location thereon.

Upon application of Curtis J. Little and Beartooth Oil and Gas Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6896: (DE NOVO)

Application of John E. Schalk for a non-standard gas proration unit and an unorthodox gas well location, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval of a 160-acre non-standard Blanco Mesaverde gas proration unit comprising the NE/4 of Section 8, Township 25 North, Range 3 West, to be dedicated to his Gulf Well No. 2 to be drilled at an unorthodox location 1925 feet from the North line and 790 feet from the East line of said Section 8.

Upon application of Curtis J. Little and Beartooth Oil and Gas Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6996: (Continued from November 25, 1980, Examiner Hearing)

Application of John E. Schalk for compulsory pooling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Blanco Mesaverde Pool underlying the NE/4 of Section 8, Township 25 North, Range 3 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

Docket No. 1-81

Dockets Nos. 4-81 and 5-81 are tentatively set for January 28 and February 11, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - JANUARY 14, 1981

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

ALLOWABLE: (1) Consideration of the allowable production of gas for February, 1981, from fifteen prorated pools in Lea, Eddy, and Chaves Counties, New Mexico.

(2) Consideration of the allowable production of gas for February, 1981, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.

CASE 7117: Application of Gulf Oil Corporation for a non-standard gas proration unit, unorthodox location, and simultaneous dedication, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the simultaneous dedication of a previously approved 320-acre non-standard proration unit comprising the E/2 of Section 25, Township 20 South, Range 36 East, Eumont Gas Pool, to its L. W. White (NCT-A)Wells No. 2 in Unit I and No. 7 at an unorthodox location 990 feet from the North line and 660 feet from the East line of said Section 25.

CASE 7118: Application of El Paso Exploration Company for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of South Blanco-Tocito and Basin-Dakota production in the wellbore of its Jicarilla 152 W Well No. 3 in Unit D of Section 7, Township 26 North, Range 5 West.

CASE 7119: Application of Shell Oil Company for a unit agreement, Bernalillo and Sandoval Counties, New Mexico. Applicant, in the above-styled cause, seeks approval for the West Mesa Unit Area, comprising 26,722 acres, more or less, of State, Federal, and fee lands in Townships 10, 11, and 12 North, Ranges 1 and 2 East.

CASE 7120: Application of Dugan Production Corporation for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of undesignated Gallup and Basin-Dakota production in the wellbore of its Merry May Well No. 1 in Unit I of Section 24, Township 24 North, Range 10 West.

CASE 7121: Application of Flag-Redfern Oil Co. for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Pinon-Fruitland and Fulcher Kutz-Pictured Cliffs production in the wellbores of its Aloha Wells Nos. 1 and 2 located in Units L and D, respectively, of Section 16, Township 28 North, Range 11 West.

CASE 7122: Application of Elk Oil Company for salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the Pennsylvanian formation in the interval from 10,445 feet to 10,516 feet in its C. S. State Well No. 2 in Unit K of Section 26, Township 14 South, Range 34 East, High Plains-Pennsylvanian Pool.

CASE 7123: Application of Yates Petroleum Corporation for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its Federal "AB" Well No. 7, a Morrow test to be drilled 1980 feet from the North line and 660 feet from the West line of Section 9, Township 18 South, Range 25 East, the N/2 of said Section 9 to be dedicated to the well.

CASE 7124: Application of Caribou Four Corners, Inc. for two non-standard proration units, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for two non-standard oil proration units in Section 13, Township 29 North, Range 15 West, Cha Cha-Gallup Oil Pool, as follows: a 56.09-acre unit consisting of those fee lands comprising the NE/4 NW/4 and northermost 16.09 acres of the SE/4 NW/4 of said Section 13, and a 66.33-acre unit consisting of those fee lands comprising the NW/4 NW/4 and northermost 23.33 acres of the SW/4 NW/4 of said Section 13. In the alternative applicant seeks an order directing the escrowing of funds attributable to those lands in the E/2 NW/4 and W/2 NW/4, respectively, of said Section 13 which are not included in the above-described non-standard proration units.

CASE 7125: Application of Western Oil Producers Inc. for the amendment of Order No. R-5399, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Division Order No. R-5399 to include production from all of the Pennsylvanian formations in its Amoco State Well No. 1 at an unorthodox location in Unit M of Section 28, Township 16 South, Range 33 East.

CASE 7126: Application of Franks Petroleum, Inc. for an unorthodox gas well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for an unorthodox location 1980 feet from the North line and 1315 feet from the West line, Section 3, Township 21 South, Range 32 East, Hat Mesa-Morrow Gas Pool, the N/2 of said Section 3 to be dedicated to the well.

CASE 7127: Application of Ellwade Corporation for amendment of Order No. R-6399, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-6399 which approved a 129.52-acre non-standard gas proration unit comprising the W/2 of Section 33, Township 26 South, Range 30 East, for the Wolfcamp formation in the Ross Draw Area. Applicant seeks to have said order also apply to all formations of Pennsylvanian age.

CASE 6670: (Reopened and Readvertised)

In the matter of Case 6670 being reopened and pursuant to the provisions of Order No. R-6183 which order promulgated temporary special rules and regulations for the Red Hills-Devonian Gas Pool in Lea County, New Mexico, including a provision for 640-acre spacing units. Operators in said pool may appear and show cause why the pool should not be developed on 320-acre spacing units.

CASE 7128: Application of HNG Oil Company for pool creation, special pool rules, assignment of a discovery allowable, and dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks creation of a new Wolfcamp oil pool for its San Simon 6 State Comm. Well No. 1 located 1980 feet from the North line and 660 feet from the East line of Section 6, Township 22 South, Range 35 East, with special rules therefor, including provisions for 160-acre spacing. Applicant further seeks a discovery allowable for said well and approval for its dual completion to produce oil from the Wolfcamp and gas from an undesignated Morrow pool thru parallel strings of tubing.

CASE 7129: Application of Koch Exploration Company for compulsory pooling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Dakota formation underlying the N/2 of Section 28, Township 28 North, Range 8 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7130: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the SE/4 of Section 12, Township 15 South, Range 27 East, to be dedicated to its Trobough "A" State Com. Well No. 1 in Unit J, and the other being the NE/4 of said Section 12 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the North and East lines of the section.

CASE 7131: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the SE/4 of Section 1, Township 15 South, Range 27 East, to be dedicated to its Trobough Com. Well No. 1 in Unit J, and the other being the NE/4 of said Section 1 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the North and East lines of the section.

CASE 7132: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the SE/4 of Section 13, Township 15 South, Range 27 East, to be dedicated to its Rose Well No. 1 located in Unit J, and the other being the SW/4 of said Section 13 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the South and West lines of the section.

CASE 7133: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the NW/4 of Section 12, Township 15 South, Range 27 East, to be dedicated to its Hurd Well No. 1 in Unit C, and the other being the SW/4 of said Section 12 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the South and West lines of the section.

CASE 7134: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the NW/4 of Section 13, Township 15 South, Range 27 East, to be dedicated to its Langley "Com" Well No. 1 in Unit C, and the other being the NE/4 of said Section 12 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the North and East lines of the section.

CASE 7100: (Continued from the December 10, 1980, Examiner Hearing)

Application of Harvey E. Yates Company for downhole commingling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Atoka and Morrow production in the wellbore of its Travis 24 State Com Well No. 1 in Unit H of Section 24, Township 18 South, Range 28 East.

CASE 7086: (Continued from the December 10, 1980, Examiner Hearing)

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Pictured Cliffs formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 6940: (Continued from the December 30, 1980, Examiner Hearing)

Application of Adobe Oil Company for compulsory pooling, Lea County, New Mexico. Applicant in the above-styled cause, seeks an order pooling all mineral interests down through the Wolfcamp formation underlying the NW/4 SE/4 for oil and the SE/4 for gas, Section 23, Township 20 South, Range 38 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7103: (Continued from the December 30, 1980, Examiner Hearing)

Application of E. L. Latham, Jr. for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp thru Pennsylvanian formations underlying the N/2 of Section 7, Township 22 South, Range 26 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7114: (Continued from the December 30, 1980, Examiner Hearing)

Application of Yates Petroleum Corporation for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its Rio Penasco "JX" Well No. 2, a Morrow test to be drilled 660 feet from the South and East lines of Section 35, Township 18 South, Range 25 East, the S/2 of said Section 35 to be dedicated to the well.

Docket No. 2-81

DOCKET: COMMISSION HEARING - MONDAY - JANUARY 19, 1981

OIL CONSERVATION COMMISSION - 9 A.M. - ROOM 205
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases are continued from the December 11, 1980, Commission Hearing:

CASE 7025: (DE NOVO)

Application of Southland Royalty Company for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Pennsylvanian formation underlying the W/2 of Section 35, Township 18 South, Range 29 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

Upon application of Southland Royalty Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 7008: (DE NOVO)

Application of Coronado Exploration Corp. for eight compulsory poolings, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres formation underlying eight 40-acre proration units, being the NE/4 NE/4 of Section 4 and the NW/4 NE/4 of Section 5, both in Township 12 South, Range 28 East, and the NW/4 SE/4 of Section 6, the NE/4 NW/4 of Section 23, the NE/4 SE/4 of Section 28, the SE/4 SE/4 of Section 29, the NE/4 NW/4 of Section 32, and the SE/4 NW/4 of Section 33, all in Township 11 South, Range 28 East, each to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said wells and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the wells, and a charge for risk involved in drilling said wells.

Upon application of Tenneco Oil Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6965: (DE NOVO)

Application of Supron Energy Corporation for a non-standard gas proration unit, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval of a 160-acre non-standard Mesaverde and Dakota gas proration unit comprising the SE/4 of Section 8, Township 25 North, Range 3 West, to be dedicated to a well to be drilled at a standard location thereon.

Upon application of Curtis J. Little and Beartooth Oil and Gas Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6896: (DE NOVO)

Application of John E. Schalk for a non-standard gas proration unit and an unorthodox gas well location, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval of a 160-acre non-standard Blanco Mesaverde gas proration unit comprising the NE/4 of Section 8, Township 25 North, Range 3 West, to be dedicated to his Gulf Well No. 2 to be drilled at an unorthodox location 1925 feet from the North line and 790 feet from the East line of said Section 8.

Upon application of Curtis J. Little and Beartooth Oil and Gas Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 6996: Application of John E. Schalk for compulsory pooling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Blanco Mesaverde Pool underlying the NE/4 of Section 8, Township 25 North, Range 3 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

****

Docket No. 3-81

DOCKET: COMMISSION HEARING - WEDNESDAY - JANUARY 21, 1981

OIL CONSERVATION COMMISSION - 9 A.M. - ROOM 205
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

CASE 7042: (Continued and Readvertised)

Application of Doyle Hartman for the extension of vertical limits of the Langlie Mattix Pool, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the contraction of the vertical limits of the Jalmat Pool and the upward extension of the vertical limits of the Langlie Mattix Pool to the following depths underlying the following 40-acre tracts in Section 19, Township 24 South, Range 37 East: NW/4 NE/4: 3446 feet; SE/4 NE/4: 3408 feet; SW/4 NE/4: 3419 feet; SE/4 SE/4: 3402 feet; and NE/4 SE/4: 3387 feet.

CASE 7043: (Continued and Readvertised)

Application of Cities Service Company for downhole commingling and simultaneous dedication, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Jalmat and Langlie Mattix production in the wellbores of the following Doyle Hartman wells in Section 19, Township 24 South, Range 37 East: his Adele Sowell Wells Nos. 1 and 2 located in Units I and P, respectively, and his Cities Thomas Wells Nos. 1, 3, and 4 in Units B, H, and G, respectively. Applicant further seeks approval of the simultaneous dedication of the E/2 of Section 19 for Jalmat production from the above Hartman wells and from its Thomas "A" Wells Nos. 1 and 2, located in Units O and G, respectively.

CASE 7041: (DE NOVO)

Application of John Yuronka for the extension of vertical limits of the Langlie Mattix Pool, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the contraction of the vertical limits of the Jalmat Pool and the upward extension of the vertical limits of the Langlie Mattix Pool to a depth of 3,408 feet, subsurface, under the NW/4 SW/4 of Section 17, Township 24 South, Range 37 East.

Upon application of Cities Service Company this case will be heard De Novo pursuant to the provisions of Rule 1220.

Docket No. 1-81

Dockets Nos. 4-81 and 5-81 are tentatively set for January 28 and February 11, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - JANUARY 14, 1981

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

ALLOWABLE: (1) Consideration of the allowable production of gas for February, 1981, from fifteen prorated pools in Lea, Eddy, and Chaves Counties, New Mexico.

(2) Consideration of the allowable production of gas for February, 1981, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.

CASE 7117: Application of Gulf Oil Corporation for a non-standard gas proration unit, unorthodox location, and simultaneous dedication, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the simultaneous dedication of a previously approved 320-acre non-standard proration unit comprising the E/2 of Section 25, Township 20 South, Range 36 East, Eumont Gas Pool, to its L. W. White (NCT-A)Wells No. 2 in Unit I and No. 7 at an unorthodox location 990 feet from the North line and 660 feet from the East line of said Section 25.

CASE 7118: Application of El Paso Exploration Company for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of South Blanco-Tocito and Basin-Dakota production in the wellbore of its Jicarilla 152 W Well No. 3 in Unit D of Section 7, Township 26 North, Range 5 West.

CASE 7119: Application of Shell Oil Company for a unit agreement, Bernalillo and Sandoval Counties, New Mexico. Applicant, in the above-styled cause, seeks approval for the West Mesa Unit Area, comprising 26,722 acres, more or less, of State, Federal, and fee lands in Townships 10, 11, and 12 North, Ranges 1 and 2 East.

CASE 7120: Application of Dugan Production Corporation for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of undesignated Gallup and Basin-Dakota production in the wellbore of its Merry May Well No. 1 in Unit I of Section 24, Township 24 North, Range 10 West.

CASE 7121: Application of Flag-Redfern Oil Co. for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Pinon-Fruitland and Fulcher Kutz-Pictured Cliffs production in the wellbores of its Aloha Wells Nos. 1 and 2 located in Units L and D, respectively, of Section 16, Township 28 North, Range 11 West.

CASE 7122: Application of Elk Oil Company for salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the Pennsylvanian formation in the interval from 10,445 feet to 10,516 feet in its C. S. State Well No. 2 in Unit K of Section 26, Township 14 South, Range 34 East, High Plains-Pennsylvanian Pool.

CASE 7123: Application of Yates Petroleum Corporation for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its Federal "AB" Well No. 7, a Morrow test to be drilled 1930 feet from the North line and 660 feet from the West line of Section 9, Township 18 South, Range 25 East, the N/2 of said Section 9 to be dedicated to the well.

CASE 7124: Application of Caribou Four Corners, Inc. for two non-standard proration units, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for two non-standard oil proration units in Section 13, Township 29 North, Range 15 West, Cha Cha-Gallup Oil Pool, as follows: a 56.09-acre unit consisting of those fee lands comprising the NE/4 NW/4 and northermost 16.09 acres of the SE/4 NW/4 of said Section 13, and a 66.33-acre unit consisting of those fee lands comprising the NW/4 NW/4 and northermost 23.33 acres of the SW/4 NW/4 of said Section 13. In the alternative applicant seeks an order directing the escrowing of funds attributable to those lands in the E/2 NW/4 and W/2 NW/4, respectively, of said Section 13 which are not included in the above-described non-standard proration units.

CASE 7125: Application of Western Oil Producers Inc. for the amendment of Order No. R-5399, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Division Order No. R-5399 to include production from all of the Pennsylvanian formations in its Amoco State Well No. 1 at an unorthodox location in Unit H of Section 28, Township 16 South, Range 33 East.

CASE 7126: Application of Franks Petroleum, Inc. for an unorthodox gas well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for an unorthodox location 1980 feet from the North line and 1315 feet from the West line, Section 3, Township 21 South, Range 32 East, Hat Mesa-Morrow Gas Pool, the N/2 of said Section 3 to be dedicated to the well.

CASE 7127: Application of Ellwade Corporation for amendment of Order No. R-6399, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Order No. R-6399 which approved a 129.52-acre non-standard gas proration unit comprising the W/2 of Section 33, Township 26 South, Range 30 East, for the Wolfcamp formation in the Ross Draw Area. Applicant seeks to have said order also apply to all formations of Pennsylvanian age.

CASE 6670: (Reopened and Readvertised)

In the matter of Case 6670 being reopened and pursuant to the provisions of Order No. R-6183 which order promulgated temporary special rules and regulations for the Red Hills-Devonian Gas Pool in Lea County, New Mexico, including a provision for 640-acre spacing units. Operators in said pool may appear and show cause why the pool should not be developed on 320-acre spacing units.

cont 2-11-81

CASE 7128: Application of HNG Oil Company for pool creation, special pool rules, assignment of a discovery allowable, and dual completion, Lea County, New Mexico. Applicant, in the above-styled cause, seeks creation of a new Wolfcamp oil pool for its San Simon 6 State Comm. Well No. 1 located 1980 feet from the North line and 660 feet from the East line of Section 6, Township 22 South, Range 35 East, with special rules therefor, including provisions for 160-acre spacing. Applicant further seeks a discovery allowable for said well and approval for its dual completion to produce oil from the Wolfcamp and gas from an undesignated Morrow pool thru parallel strings of tubing.

CASE 7129: Application of Koch Exploration Company for compulsory pooling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the formation underlying the N/2 of Section 28, Township 28 North, Range 8 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

cont 1-28-81

CASE 7130: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the SE/4 of Section 12, Township 15 South, Range 27 East, to be dedicated to its Trobough "A" State Com. Well No. 1 in Unit J, and the other being the NE/4 of said Section 12 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the North and East lines of the section.

CASE 7131: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the SE/4 of Section 1, Township 15 South, Range 27 East, to be dedicated to its Trobough Com. Well No. 1 in Unit J, and the other being the NE/4 of said Section 1 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the North and East lines of the section.

CASE 7132: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the SE/4 of Section 13, Township 15 South, Range 27 East, to be dedicated to its Rose Well No. 1 located in Unit J, and the other being the SW/4 of said Section 13 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the South and West lines of the section.

CASE 7133: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the NW/4 of Section 12, Township 15 South, Range 27 East, to be dedicated to its Hurd Well No. 1 in Unit C, and the other being the SW/4 of said Section 12 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the South and West lines of the section.

CASE 7134: Application of Read & Stevens, Inc. for an unorthodox gas well location and two non-standard gas proration units, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval of two 160-acre non-standard proration units in the Buffalo Valley-Pennsylvanian Gas Pool, the first being the NW/4 of Section 13, Township 15 South, Range 27 East, to be dedicated to its Langley "Com" Well No. 1 in Unit C, and the other being the NE/4 of said Section 12 to be dedicated to a well to be drilled at an unorthodox location 1315 feet from the North and East lines of the section.

Adv Error No #12 is 13 Read

CASE 7100: (Continued from the December 10, 1980, Examiner Hearing)

Application of Harvey E. Yates Company for downhole commingling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Atoka and Morrow production in the wellbore of its Travis 24 State Com Well No. 1 in Unit H of Section 24, Township 18 South, Range 28 East.

Cont 1-28-81

CASE 7086: (Continued from the December 10, 1980, Examiner Hearing)

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Pictured Cliffs formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

Cont 1-28-81 1st Hearing

CASE 6940: (Continued from the December 30, 1980, Examiner Hearing)

Application of Adobe Oil Company for compulsory pooling, Lea County, New Mexico. Applicant in the above-styled cause, seeks an order pooling all mineral interests down through the Wolfcamp formation underlying the NW/4 SE/4 for oil and the SE/4 for gas, Section 23, Township 20 South, Range 38 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

Cont'd. 1-28-81

CASE 7103: (Continued from the December 30, 1980, Examiner Hearing)

Application of E. L. Latham, Jr. for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp thru Pennsylvanian formations underlying the N/2 of Section 7, Township 22 South, Range 26 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

Dismiss

CASE 7114: (Continued from the December 30, 1980, Examiner Hearing)

Application of Yates Petroleum Corporation for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its Rio Penasco "JX" Well No. 2, a Morrow test to be drilled 660 feet from the South and East lines of Section 35, Township 18 South, Range 25 East, the S/2 of said Section 35 to be dedicated to the well.

Dismiss Amoco opposes

Dismiss or Cont & Read

Dockets Nos. 14-81 and 15-81 are tentatively set for April 22 and May 6, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - APRIL 8, 1981

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 7086: (Continued from the January 14, 1981, Examiner Hearing)

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Pictured Cliffs formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7210: Application of Gulf Oil Corporation for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the East Hat Mesa Unit Area, comprising 2197 acres, more or less, of State and Federal lands in Township 21 South, Range 33 East.

CASE 7211: Application of Gulf Oil Corporation for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the North Rock Lake State Unit Area, comprising 2880 acres, more or less, of State land in Township 22 South, Range 35 East.

CASE 7212: Application of Bass Enterprises Production Co. for a dual completion, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the dual completion of its Poker Lake Unit Well No. 50 located in Unit C of Section 4, Township 25 South, Range 31 East, to produce gas from the Atoka and Wolfcamp formations through the tubing and casing-tubing annulus, respectively.

CASE 7213: Application of Exxon Company USA for a dual completion and downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Greenwood Well No. 13 located in Unit L of Section 9, Township 22 South, Range 37 East, to produce oil from the Brunson-Fusselman Pool through tubing and commingled Blinebry and Tubb production through the casing-tubing annulus.

CASE 7214: Application of Pioneer Production Corporation for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Chacra and Basin-Dakota production in the wellbore of its Dustin Well No. 1E located in Unit J of Section 6, Township 29 North, Range 12 West.

CASE 7215: Application of Amoco Production Company for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Wolfcamp-Penn location of its Willow Lake Unit Well No. 4Y to be drilled 1980 feet from the South line and 660 feet from the West line of Section 14, Township 24 South, Range 28 East, the S/2 of said Section 14 to be dedicated to the well.

CASE 7216: Application of Amoco Production Company for downhole commingling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Gallup and Chacon-Dakota production in the wellbore of its Jicarilla 396 Well No. 1 located in the NE/4 of Section 8, Township 23 North, Range 3 West.

CASE 7217: Application of Harvey E. Yates Company for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Morrow location of its Travis Ohio State Com Well No. 1 to be drilled 660 feet from the South and West lines of Section 13, Township 18 South, Range 28 East, the S/2 of said Section 13 to be dedicated to the well.

CASE 7218: Application of Yates Petroleum Corporation for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Wolfcamp-Penn location of its Federal "BQ" Well No. 1 to be drilled 660 feet from the North line and 990 feet from the West line of Section 27, Township 17 South, Range 25 East, the N/2 of said Section 27 to be dedicated to the well.

CASE 7165: (Readvertised)

Application of ARCO Oil and Gas Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Ellenburger, Strawn, McKee, and Devonian formations, Langley Field, underlying the N/2 of Section 33, Township 22 South, Range 36 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7219: In the matter of the hearing called by the Oil Conservation Division on its own motion for an order creating and extending certain pools in Chaves, Eddy, Lea, and Roosevelt Counties, New Mexico:

(a) CREATE a new pool in Roosevelt County, New Mexico, classified as a gas pool for San Andres production and designated as the North Bluitt-San Andres Gas Pool. The discovery well is Holly Energy, Inc. Holly 27 Federal Well No. 1 located in Unit J of Section 27, Township 7 South, Range 37 East, NMPM. Said pool would comprise:

TOWNSHIP 7 SOUTH, RANGE 37 EAST, NMPM
Section 27: SE/4

(b) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the Bootleg Ridge-Morrow Gas Pool. The discovery well is Pogo Production Company NBR Well No. 1 located in Unit J of Section 18, Township 22 South, Range 33 East, NMPM. Said pool would comprise:

TOWNSHIP 22 SOUTH, RANGE 33 EAST, NMPM
Section 18: E/2

(c) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Morrow production and designated as the Bunting Ranch-Morrow Gas Pool. The discovery well is Mitchell Energy Corporation State 36 Well No. 1 located in Unit B of Section 36, Township 9 South, Range 21 East, NMPM. Said pool would comprise:

TOWNSHIP 19 SOUTH, RANGE 21 EAST, NMPM
Section 36: N/2

(d) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the West LaRica-Morrow Gas Pool. The discovery well is Sun Oil Company Pennzoil Federal Com Well No. 1 located in Unit J of Section 29, Township 18 South, Range 34 East, NMPM. Said pool would comprise:

TOWNSHIP 18 SOUTH, RANGE 34 EAST, NMPM
Section 29: E/2

(e) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Morrow production and designated as the Pronghorn-Morrow Gas Pool. The discovery well is Yates Petroleum Corporation Pronghorn Unit Well No. 1 located in Unit G of Section 6, Township 23 South, Range 33 East, NMPM. Said pool would comprise:

TOWNSHIP 23 SOUTH, RANGE 33 EAST, NMPM
Section 6: N/2

(f) CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Wolfcamp production and designated as the Scharb-Wolfcamp Pool. The discovery well is Southland Royalty Company Scharb "4" Well No. 2 located in Unit F of Section 4, Township 19 South, Range 35 East, NMPM. Said pool would comprise:

TOWNSHIP 19 SOUTH, RANGE 35 EAST, NMPM
Section 4: NW/4

(g) CREATE a new pool in Chaves County, New Mexico, classified as a gas pool for Morrow production and designated as the Springer Basin-Morrow Gas Pool. The discovery well is Yates Petroleum Corporation Phillips KH Federal Com Well No. 1 located in Unit H of Section 23, Township 14 South, Range 27 East, NMPM. Said pool would comprise:

TOWNSHIP 14 SOUTH, RANGE 27 EAST, NMPM
Section 14: E/2
Section 23: E/2

(h) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Mississippian production and designated as the North Townsend-Mississippian Gas Pool. The discovery well is U.S. Operating, Inc. Leavelle Well No. 1 located in Unit B of Section 23, Township 16 South, Range 35 East, NMPM. Said pool would comprise:

TOWNSHIP 16 SOUTH, RANGE 35 EAST, NMPM
Section 23: N/2

(i) EXTEND the Bowers-Seven Rivers Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 38 EAST, NMPM
Section 4: SE/4

(j) EXTEND the Boyd-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 24 EAST, NMPM
Section 11: E/2
Section 14: N/2

(k) EXTEND the Brunson-Fusselman Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
Section 9: SW/4

(l) EXTEND the North Burton Flats-Wolfcamp Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 28 EAST, NMPM
Section 11: E/2
Section 12: W/2

(m) EXTEND the Carson-Morrow Gas Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 9 SOUTH, RANGE 31 EAST, NMPM
Section 10: S/2
Section 15: N/2

(n) EXTEND the Cato-San Andres Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 8 SOUTH, RANGE 30 EAST, NMPM
Section 18: NE/4

(o) EXTEND the Chaveroo-San Andres Pool in Roosevelt County, New Mexico, to include therein:

TOWNSHIP 7 SOUTH, RANGE 32 EAST, NMPM
Section 27: SW/4

(p) EXTEND the Comanche Stateline Tansill-Yates-Seven Rivers-Queen Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 26 SOUTH, RANGE 36 EAST, NMPM
Section 22: SW/4

(q) EXTEND the South Corbin-Wolfcamp Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 33 EAST, NMPM
Section 33: W/2 and SE/4

(r) EXTEND the Crooked Creek-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 24 SOUTH, RANGE 24 EAST, NMPM
Section 17: N/2

(s) EXTEND the Crow Flats-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 16 SOUTH, RANGE 28 EAST, NMPM
Section 19: S/2
Section 30: W/2

(t) EXTEND the Drinkard Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 36 EAST, NMPM
Section 13: NW/4

(u) EXTEND the South Empire-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM
Section 13: S/2
Section 24: E/2

(v) EXTEND the East Grama Ridge-Morrow Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 21 SOUTH, RANGE 34 EAST, NMPM
Section 25: S/2

(w) EXTEND the Henshaw Queen-Grayburg-San Andres Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 16 SOUTH, RANGE 31 EAST, NMPM
Section 19: NW/4 NW/4

(x) EXTEND the Hoag Tank-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 24 EAST, NMPM
Section 16: All

(y) EXTEND the Indian Basin-Upper Pennsylvanian Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 21 SOUTH, RANGE 23 EAST, NMPM
Section 30: All

(z) EXTEND the Indian Flats-Delaware Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 21 SOUTH, RANGE 28 EAST, NMPM
Section 35: SW/4 SE/4

(aa) EXTEND the Kemnitz-Cisco Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 16 SOUTH, RANGE 34 EAST, NMPM
Section 15: NW/4
Section 16: NE/4

(bb) EXTEND the Northeast Lusk-Yates Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 32 EAST, NMPM
Section 15: NW/4

(cc) EXTEND the West Malaga-Atoka Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 24 SOUTH, RANGE 28 EAST, NMPM
Section 4: All

(dd) EXTEND the Monument-Abo Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 36 EAST, NMPM
Section 2: N/2

(ee) EXTEND the Penasco Draw San Andres-Yeso Associated Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 26 EAST, NMPM
Section 31: SE/4 SW/4

(ff) EXTEND the South Peterson-Pennsylvanian Pool in Roosevelt County, New Mexico, to include therein:

TOWNSHIP 6 SOUTH, RANGE 33 EAST, NMPM
Section 11: NE/4

(gg) EXTEND the Race Track-San Andres Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 10 SOUTH, RANGE 28 EAST, NMPM
Section 19: S/2 NE/4 and SE/4

(hh) EXTEND the Richard Knob Atoka-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 25 EAST, NMPM
Section 3: W/2
Section 4: N/2

Docket No. 12-81

(ii) EXTEND the West Sand Dunes-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 31 EAST, NMPM
Section 21: S/2
Section 28: N/2

(jj) EXTEND the Scoggin Draw-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM
Section 3: W/2
Section 4: All
Section 10: W/2

(kk) EXTEND the East Terry-Blinebry Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 39 EAST, NMPM
Section 31: N/2

(ll) EXTEND the Tomahawk-San Andres Pool in Roosevelt County, New Mexico, to include therein:

TOWNSHIP 7 SOUTH, RANGE 32 EAST, NMPM
Section 19: SW/4

(mm) EXTEND the Tom Tom-San Andres Pool in Chaves County, New Mexico, to include therein:

TOWNSHIP 7 SOUTH, RANGE 31 EAST, NMPM
Section 29: SW/4

(nn) EXTEND the Townsend-Morrow Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 16 SOUTH, RANGE 35 EAST, NMPM
Section 20: N/2

(oo) EXTEND the North Turkey Track-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 29 EAST, NMPM
Section 35: All
Section 36: S/2

(pp) EXTEND the Vacuum Grayburg-San Andres Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 36 EAST, NMPM
Section 19: SW/4
Section 29: NW/4
Section 30: N/2

****

Docket No. 13-81

DOCKET: EXAMINER HEARING - WEDNESDAY - APRIL 15, 1981

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM,
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Daniel S. Nutter, Examiner, or Richard L. Stamets, Alternate Examiner:

ALLOWABLE: (1) Consideration of the allowable production of gas for May, 1981, from fifteen prorated pools in Lea, Eddy, and Chaves Counties, New Mexico.

(2) Consideration of the allowable production of gas for May, 1981, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.

CASE 7237: (Continued and Readvertised)

Application of Conoco Inc. for a dual completion and downhole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dually complete its State "F-1" Well No. 10 located in Unit V of Section 1, Township 21 South, Range 36 East, to produce oil from the Hardy-Blinebry Pool and commingled Hardy-Drinkard and undesignated Tubb production.

CASE 7267: Application of Conoco Inc. for a dual completion and unorthodox location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dually complete its SEMU Burger Well No. 107 to produce oil from the Skaggs-Grayburg and an undesignated Paddock Pool at an unorthodox location 2615 feet from the South and East lines of Section 19, Township 20 South, Range 38 East.

CASE 7268: Application of Conoco Inc. for pool extension and contraction, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the upward extension of the vertical limits of the Skaggs-Grayburg Pool to include the lowermost 100 feet of the Queen formation underlying all of Section 13, the E/2 of Section 24, and NE/4 of Section 25, Township 20 South, Range 37 East, and the W/2 of Section 18, all of Section 19, NW/4 of Section 20, and N/2 of Section 30, Township 20 South, Range 38 East. Applicant also proposes the contraction of the vertical limits of the Eumont Pool by deletion of the lowermost 100 feet of the Queen formation underlying the NW/4 of Section 13 and E/2 of Section 24, Township 20 South, Range 37 East, and the W/2 of Section 18 and W/2 of Section 19, Township 20 South, Range 38 East.

CASE 7248: (Continued from May 6, 1981, Examiner Hearing)

Application of Inexco Oil Company for pool creation, special pool rules, and an oil discovery allowable, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the creation of a new Wolfcamp oil pool for its Federal 10 State Com. Well No. 1 located in Unit L of Section 10, Township 21 South, Range 26 East, and the promulgation of special rules therefor, including provisions for 160-acre spacing. Applicant further seeks the assignment of approximately 42,290 barrels of discovery allowable to the aforesaid well.

CASE 7269: Application of Alpha Twenty-One Production Company for an unorthodox gas well location and a non-standard proration unit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval of a 120-acre non-standard proration unit comprising the E/2 SW/4 and the SW/4 SE/4 of Section 21, Township 21 South, Range 37 East, Eumont Gas Pool, to be dedicated to its Lansford Well No. 4 at an unorthodox location 810 feet from the South line and 1880 feet from the East line of said Section 21.

CASE 7270: Application of Southland Royalty Company for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the N/2 of Section 21, Township 19 South, Range 27 East, to be dedicated to its Pecos River Federal 21-A Com Well No. 1 drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7250: (Continued from May 6, 1981, Examiner Hearing)

Application of Southland Royalty Company for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Pennsylvanian formation underlying the N/2 of Section 22, Township 18 South, Range 29 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7271: Application of Morris R. Antweil for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in all formations from the surface down through the Drinkard formation underlying the NW/4 SE/4 of Section 5, Township 20 South, Range 38 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7086: (Continued from May 20, 1981, Examiner Hearing)

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Pictured Cliffs formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

Dockets Nos. 19-81 and 20-81 are tentatively set for June 17 and July 2, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - JUNE 3, 1981

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 7261: Application of Robert N. Enfield for a unit agreement, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval for the Pecos River Bluff Unit Area, comprising 4789 acres, more or less, of State and Federal lands in Township 13 South, Range 27 East.

CASE 7262: Application of Union Oil Company of California for a unit agreement, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the Berry State Unit Area, comprising 2,228 acres, more or less, of State lands in Township 21 South, Ranges 33 and 34 East.

CASE 7263: Application of Yates Petroleum Corporation for amendment of Order No. R-5527, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Division Order No. R-5527, which approved an unorthodox Morrow location, to permit the recompletion of its Blevins "IK" Well No. 1 in Unit D of Section 35, Township 17 South, Range 26 East, as an unorthodox gas well location in all Wolfcamp and Pennsylvanian formations.

CASE 7238: (Continued from May 6, 1981, Examiner Hearing)

Application of Holly Energy, Inc. for directional drilling and an unorthodox gas well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to directionally drill its Salt Lake South Deep Well No. 1, the surface location of which is 2139 feet from the North line and 500 feet from the East line of Section 6, Township 21 South, Range 32 East, South Salt Lake-Morrow Gas Pool, in a northerly direction to bottom it within 150 feet of the center of Unit A (Lot 1) of said Section 6, Lots 1 thru 8 to be dedicated to the well.

CASE 7217: (Continued and Readvertised)

Application of Harvey E. Yates Company for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Wolfcamp-Pennsylvanian location of its Travis Ohio State Com Well No. 1 to be drilled 760 feet from the South line and 660 feet from the West line of Section 13, Township 18 South, Range 28 East, the S/2 of said Section 13 to be dedicated to the well.

CASE 7251: (Continued from May 6, 1981, Examiner Hearing)

Application of Southern Union Exploration Company of Texas for compulsory pooling, Rio Arriba County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the West Puerto Chiquito-Mancos Oil Pool underlying all of Section 36, Township 24 North, Range 1 West, to be dedicated to its Mobil Federal Well No. 1 drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7264: Application of Cities Service Company for a salt water disposal well, McKinley County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the Entrada formation at a depth of 5200 feet to 5350 feet in its Federal "E" Well No. 2 in Unit H of Section 28, Township 19 North, Range 5 West.

CASE 7265: Application of Tenneco Oil Company for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a well to be drilled 2310 feet from the North line and 990 feet from the West line of Section 13, Township 21 South, Range 25 East, Catclaw Draw-Morrow Gas Pool, the N/2 of said Section 13 to be dedicated to the well.

CASE 7266: Application of Tenneco Oil Company for an unorthodox gas well location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of a well to be drilled 660 feet from the North line and 1650 feet from the East line of Section 14, Township 21 South, Range 25 East, Catclaw Draw-Morrow Gas Pool, the N/2 of said Section 14 to be dedicated to the well.

Dockets Nos. 17-81 and 18-81 are tentatively set for June 3 and 17, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - MAY 20, 1981

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Daniel S. Nutter, Examiner, or Richard L. Stamets, Alternate Examiner:

ALLOWABLE: (1) Consideration of the allowable production of gas for June, 1981, from fifteen prorated pools in Lea, Eddy, and Chaves Counties, New Mexico.

(2) Consideration of the allowable production of gas for June, 1981, from four prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico.

CASE 7242: (Readvertised)

Application of Harvey E. Yates Company for an unorthodox gas well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Wolfcamp-Mississippian location of its McDonald Well No. 1 to be drilled 660 feet from the South line and 990 feet from the East line of Section 33, Township 13 South, Range 36 East, the S/2 of said Section 33 to be dedicated to the well.

CASE 7243: (Readvertised)

Application of Harvey E. Yates Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Pennsylvanian and Mississippian formations underlying the S/2 of Section 33, Township 13 South, Range 36 East, for a gas completion and/or all mineral interests in the Pennsylvanian-Devonian formations underlying the SE/4 SE/4 of said Section 33 for an oil completion. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7253: Application of Bandera Energy Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Morrow formation underlying the E/2 of Section 27, Township 16 South, Range 35 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7254: Application of Mesa Petroleum Company for compulsory pooling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Mesaverde formation underlying the W/2 of Section 15, Township 30 North, Range 11 West, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7255: Application of Gulf Oil Corporation for compulsory ponling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests from the top of the Wolfcamp formation to the base of the Morrow formation underlying the W/2 of Section 28, Township 18 South, Range 32 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7256: Application of Petro-Lewis Corporation for downhole commingling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the downhole commingling of Blinebry, Drinkard, and Abo production in the wellbore of its Gulf Sarkeys Well No. 2 located in Unit F of Section 25, Township 21 South, Range 37 East.

CASE 7257: (This case will be dismissed and a different well will be docketed for hearing later.)

Application of Cities Service Company for a salt water disposal well, McKinley County, New Mexico. Applicant, in the above-styled cause, seeks authority to dispose of produced salt water into the Entrada formation at approximately 5300 feet in its Federal "M" Well No. 1 in Unit P of Section 21, Township 19 North, Range 5 West.

Docket No. 16-81

CASE 7225: (Continued from April 22, 1981, Examiner Hearing)

Application of Knox Industries, Inc. for an unorthodox gas well location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox Morrow location of its Maddox Well No. 1 to be drilled 1980 feet from the South line and 660 feet from the West line of Section 12, Township 23 South, Range 34 East, Northeast Antelope Ridge Field, the S/2 of said Section 12 to be dedicated to the well.

CASE 7258: Application of HNG Oil Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the S/2 of Section 32, Township 21 South, Range 35 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for the risk involved in drilling said well.

CASE 7086: (Continued from April 8, 1981, Examiner Hearing)

Application of Blackwood & Nichols Company, Ltd. for designation of a tight formation, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the designation of the Pictured Cliffs formation underlying portions of Townships 30 and 31 North, Ranges 6, 7, and 8 West, containing 33,500 acres, more or less, as a tight formation pursuant to Section 107 of the Natural Gas Policy Act and 18 CFR Section 271.701-705.

CASE 7259: In the matter of the hearing called by the Oil Conservation Division on its own motion to permit New Mexico State University and Fireman's Fund Insurance Company to appear and show cause why two certain geothermal wells, being the New Mexico State University Well No. TG-3 and Well No. DT-4, both located in the NW/4 SE/4 of Section 14, Township 29 South, Range 8 West, Luna County, New Mexico, should not be ordered plugged and abandoned in accordance with a Division-approved plugging program.

CASE 7260: In the matter of the hearing called by the Oil Conservation Division on its own motion for an order creating, abolishing, contracting vertical limits, and extending horizontal limits of certain pools in Eddy, Lea, and Roosevelt Counties, New Mexico:

(a) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Atoka production and designated as the West Antelope Ridge-Atoka Gas Pool. The discovery well is Moncanto Company Back Basin Well No. 1 located in Unit I of Section 29, Township 23 South, Range 34 East, NMPM. Said pool would comprise:

TOWNSHIP 23 SOUTH, RANGE 34 EAST, NMPM
Section 20: E/2

(b) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Strawn production and designated as the Antelope Ridge-Strawn Gas Pool. The discovery well is Estoril Production Corporation Curry Federal Well No. 1 located in Unit I of Section 22, Township 23 South, Range 34 East, NMPM. Said pool would comprise:

TOWNSHIP 23 SOUTH, RANGE 34 EAST, NMPM
Section 15: S/2
Section 22: All

(c) CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Montoya production and designated as the Fowler-Montoya Pool. The discovery well is Gulf Oil Corporation Lillie Well No. 1 located in Unit D of Section 23, Township 24 South, Range 37 East, NMPM. Said pool would comprise:

TOWNSHIP 24 SOUTH, RANGE 37 EAST, NMPM
Section 23: NW/4

(d) CREATE a new pool in Lea County, New Mexico, classified as a gas pool for Atoka production and designated as the Grama Ridge-Atoka Gas Pool. The discovery well is Minerals, Inc. Llano 33 State Well No. 1 located in Unit J of Section 33, Township 21 South, Range 34 East, NMPM. Said pool would comprise:

TOWNSHIP 21 SOUTH, RANGE 34 EAST, NMPM
Section 33: S/2

(e) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Wolfcamp production and designated as the McMillan-Wolfcamp Gas Pool. The discovery well is Marbob Energy Corporation State CJ Com Well No. 1 located in Unit G of Section 24, Township 20 South, Range 26 East, NMPM. Said pool would comprise:

TOWNSHIP 20 SOUTH, RANGE 26 EAST, NMPM
Section 24: N/2

(f) CREATE a new pool in Lea County, New Mexico, classified as an oil pool for Bone Spring production and designated as the North Osudo-Bone Spring Pool. The discovery well is Jake L. Hamon Hamon-Samedan-Petty Well No. 1 located in Unit N of Section 8, Township 20 South, Range 36 East, NMPM. Said pool would comprise:

TOWNSHIP 20 SOUTH, RANGE 36 EAST, NMPM
Section 8: SW/4

(g) CREATE a new pool in Eddy County, New Mexico, classified as an oil pool for Wolfcamp production and designated as the West Palmillo-Wolfcamp Pool. The discovery well is Bass Enterprises Production Company Palmillo State Well No. 1 located in Unit J of Section 1, Township 19 South, Range 28 East, NMPM. Said pool would comprise:

TOWNSHIP 19 SOUTH, RANGE 28 EAST, NMPM
Section 1: NW/4 SE/4

(h) CREATE a new pool in Eddy County, New Mexico, classified as a gas pool for Atoka production and designated as the Scoggin Draw-Atoka Gas Pool. The discovery well is Amoco Production Company Federal F Gas Com Well No. 1 located in Unit G of Section 3, Township 18 South, Range 27 East, NMPM. Said pool would comprise:

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM
Section 3: E/2

(i) CREATE a new pool in Roosevelt County, New Mexico, classified as an oil pool for Cisco production and designated as the East Tanneyhill-Cisco Pool. The discovery well is Energy Reserves Group, Inc. El Paso State Well No. 1 located in Unit P of Section 8, Township 6 South, Range 34 East, NMPM. Said pool would comprise:

TOWNSHIP 6 SOUTH, RANGE 34 EAST, NMPM
Section 8: SE/4

(j) ABOLISH the Carlsbad-Canyon Gas Pool in Eddy County, New Mexico, described as: (acreage to be added to East Carlsbad-Wolfcamp Gas Pool)

TOWNSHIP 22 SOUTH, RANGE 27 EAST, NMPM
Section 21: S/2

(k) ABOLISH the Carlsbad Permo-Pennsylvanian Gas Pool in Eddy County, New Mexico, described as: (acreage to be added to East Carlsbad-Wolfcamp Gas Pool)

TOWNSHIP 22 SOUTH, RANGE 27 EAST, NMPM
Section 15: All

(l) EXTEND the Baldridge Canyon-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 24 EAST, NMPM
Section 36: S/2

TOWNSHIP 23 SOUTH, RANGE 25 EAST, NMPM
Section 31: S/2

TOWNSHIP 24 SOUTH, RANGE 24 EAST, NMPM
Section 1: E/2
Section 12: E/2

TOWNSHIP 24 SOUTH, RANGE 25 EAST, NMPM
Section 6: W/2
Section 7: N/2

(m) EXTEND the Baum-Upper Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 13 SOUTH, RANGE 33 EAST, NMPM
Section 30: SE/4

(n) EXTEND the Bull's Eye-San Andres Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 8 SOUTH, RANGE 28 EAST, NMPM
Section 12: N/2 SE/4

TOWNSHIP 8 SOUTH, RANGE 29 EAST, NMPM
Section 7: NW/4 SW/4

(o) EXTEND the North Caprock-Mississippian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 12 SOUTH, RANGE 32 EAST, NMPM
Section 5: SE/4

(p) EXTEND the East Carlsbad-Wolfcamp Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 27 EAST, NMPM
Section 14: N/2
Section 15: All
Section 16: E/2
Section 20: E/2
Section 21: All

(q) EXTEND the Catclaw Draw-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 26 EAST, NMPM
Section 33: E/2

(r) EXTEND the Comanche Stateline Tansill-Yates-Seven Rivers-Queen Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 26 SOUTH, RANGE 36 EAST, NMPM
Section 20: E/2 NE/4

(s) EXTEND the Diamond Mound-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 16 SOUTH, RANGE 28 EAST, NMPM
Section 6: S/2

(t) EXTEND the Dublin Ranch-Atoka Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 28 EAST, NMPM
Section 22: S/2
Section 27: N/2

(u) EXTEND the East Empire Yates-Seven Rivers Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM
Section 23: NW/4 SW/4

(v) EXTEND the Hare-San Andres Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 21 SOUTH, RANGE 37 EAST, NMPM
Section 21: S/2

(w) EXTEND the South Kemnitz Atoka-Morrow Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 16 SOUTH, RANGE 34 EAST, NMPM
Section 30: E/2

(x) EXTEND the North McMillan-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 19 SOUTH, RANGE 27 EAST, NMPM
Section 21: S/2

(y) EXTEND the Maljamar-Strawn Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 32 EAST, NMPM
Section 28: W/2

(z) EXTEND the Malaga-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 24 SOUTH, RANGE 28 EAST, NMPM
Section 10: S/2
Section 23: N/2

(aa) EXTEND the North Peterson-Pennsylvanian Pool in Roosevelt County, New Mexico, to include therein:

TOWNSHIP 4 SOUTH, RANGE 33 EAST, NMPM
Section 17: SE/4

(bb) EXTEND the South Salt Lake-Morrow Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 21 SOUTH, RANGE 32 EAST, NMPM
Section 5: Lots 1, 2, 3, 4, 5, 6, 7, and 8

(cc) CONTRACT the vertical limits of the Shugart-Pennsylvanian Gas Pool to include the Morrow formation only and redesignate said pool as Shugart-Morrow Gas Pool, and extend the horizontal limits of said pool to include therein:

TOWNSHIP 18 SOUTH, RANGE 31 EAST, NMPM
Section 26: N/2

(dd) EXTEND the North Shugart-Morrow Gas Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 31 EAST, NMPM
Section 7: E/2
Section 18: All

(ee) EXTEND the East Weir-Blinebry Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 20 SOUTH, RANGE 38 EAST, NMPM
Section 7: N/2 N/2
Section 8: N/2 N/2
Section 9: W/2 NW/4

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

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

CASE NO. 7086
Order No. R- 6746

APPLICATION OF BLACKWOOD & NICHOLS CO., LTD. FOR DESIGNATION OF A TIGHT FORMATION, SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on June 3, 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this _____ day of June, 1981, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant Blackwood & Nichols Co., Ltd., requests that the Division in accordance with Section 107 of the Natural Gas Policy Act, and 18 C.F.R. §271.703 recommend to the Federal Energy Regulatory Commission that the Pictured Cliffs formation underlying the following lands situated in San Juan and Rio Arriba Counties, New Mexico, hereinafter referred to as the Pictured Cliffs formation, be designated as a tight formation in said Federal Energy Regulatory Commission's regulations:

Township 30 North, Range 7 West, N.M.P.M.
Sections 2 through 21: All
Section 22: W/2 W/2
Section 29: N/2

Township 30 North, Range 8 West, N.M.P.M.
Section 1: All
Section 12: All
Section 13: All
Section 24: All

Township 31 North, Range 6 West, N.M.P.M.
Section 6: Lots 8, 9, 10 and 11, S/2
Section 7: All
Sections 18 through 20: All
Section 30: All

Township 31 North, Range 7 West, N.M.P.M.
Section 1: Lots 5, 6, 7 and 8, S/2
Sections 9 through 16: All
Sections 19 through 36: All

Township 31 North, Range 8 West, N.M.P.M.
Section 25: All
Section 36: All

(3) That the applicant did not present evidence relative to the following described acreage and it should be excluded from consideration for tight formation recommendation:

Township 30 North, Range 7 West, NMPM
Section 11 through 15: All
Section 16: ~~All~~ E/2
Section 22: W/2 W/2

Township 31 North, Range 7 West, NMPM
Section 9: N/2
Section 10: N/2

(4) That the Pictured Cliffs formation underlies the above described lands; that the formation consists of shales, coal seams and sandstone lenses, about 150 feet thick, composed of fine to medium grained, well sorted, angular to subrounded sand, composed mainly of quartz with some ferromagnesium minerals and glauconite cemented with calcite and bentonite; that the top of such formation is found at an average depth of 3200 feet below the surface of the area set out in Finding No. (2) above; and that the thickness of such formation is from 150 to 250 feet within said area.

(5) That the type section for the Pictured Cliffs formation for the proposed tight formation designation is found at a depth of from approximately 3230 feet to 3360 feet on the Laserlog dated July 30, 1978 from the Northeast Blanco Unit Well No. 17-A located in Unit D of Section 9, Township 30 North, Range 10 West, San Juan and Rio Arriba Counties, New Mexico.

(6) That the following described wells produce natural gas from the Pictured Cliffs formation within the proposed area:

Northeast Blanco Unit Well #202	NE/4, Section 11, T-31-N, R-7-W, San Juan County, New Mexico
Northeast Blanco Unit Well #204	SW/4, Section 1, T-31-N, R-7-W, San Juan County, New Mexico

(7) That the Pictured Cliffs formation underlying the above described lands has been penetrated by several other wells, none of which produce natural gas in commercial quantities from the Pictured Cliffs formation.

(8) That the evidence presented in this case demonstrated that no well formerly or currently completed in the Pictured Cliffs formation within the proposed area exhibited permeability, gas productivity, or crude oil productivity in excess of the following parameters:

(a) average in situ gas permeability throughout the pay section of 0.1 millidarcy; and

(b) stabilized production rates, without stimulation, against atmospheric pressure, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and

(c) production of more than five barrels of crude oil per day.

(8) That based on analysis of available data from existing wells within the proposed area and utilizing generally and customarily accepted petroleum engineering techniques and measurements:

(a) The estimated average in situ gas permeability throughout the pay section of the Pictured Cliffs formation is expected to be 0.1 millidarcy or less; and

(b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the Pictured Cliffs formation, without stimulation, is not expected to exceed production levels determined by reference to well depth, as found in the table set out in 18 C.F.R. §271.703(c)(2)(B) of the regulations; and

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

(10) ~~(9)~~ That within the proposed area there is a recognized aquifer being the Ojo Alamo, found at depths of from 500 feet to 1100 feet or approximately 2100 feet above the Pictured Cliffs formation. ± 1500 ft

(11) ~~(10)~~ That existing State of New Mexico and Federal Regulations relating to casing and cementing of wells will assure that development of the Pictured Cliffs formation will not adversely affect said aquifers.

(12) ~~(11)~~ That the Pictured Cliffs formation within the proposed area should be recommended to the Federal Energy Regulatory Commission for designation as a tight formation.

IT IS THEREFORE ORDERED:

(1) That it be and hereby is recommended to the Federal Energy Regulatory Commission pursuant to Section 107 of the Natural Gas Policy Act of 1978, and 18 C.F.R. §271.703 of the regulations that the Pictured Cliffs formation underlying the following described lands in San Juan and Rio Arriba Counties, New Mexico, be designated as a tight formation:

TOWNSHIP 30 NORTH, RANGE 7 WEST, NMPM	
Sections 2 through 21:	All
Section 22:	W/2 W/2
Sections 29:	N/2
TOWNSHIP 30 NORTH, RANGE 8 WEST, NMPM	
Section 1:	All
Section 12:	All
Section 13:	All
Section 24:	All

TOWNSHIP 30 NORTH, RANGE 7 WEST, NMPM
Sections 2 through 10: All
Section 16: W/2
Sections 17 through 21: All
Section 29: N/2

TOWNSHIP 30 NORTH, RANGE 8 WEST, NMPM
Section 1: All
Sections 12 and 13: All
Section 24: All

TOWNSHIP 31 NORTH, RANGE 6 WEST, NMPM
Section 6: Lots 8, 9, 10 and 11 and S/2
Section 7: All
Sections 18 through 20: All
Section 30: All

TOWNSHIP 31 NORTH, RANGE 7 WEST, NMPM
Section 1: Lots 5, 6, 7 and 8 and S/2
Section 9: S/2
Section 10: S/2
Sections 11 through 16: All
Sections 19 through 36: All

TOWNSHIP 31 NORTH, RANGE 8 WEST, NMPM
Section 25: All
Section 36: All

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

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

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY
Director

S E A L

rules since the changes would relieve regulatory burdens. In addition, a longer period is not in the public interest as it would unnecessarily delay consideration of regulatory changes to improve Federal credit union asset-liability management.

By order of the National Credit Union Administration Board on the 24th of September 1981.

Roesmary Brady,

Secretary of the Board.

[FR Doc. 81-29478 Filed 10-6-81; 8:45 am]

BILLING CODE 7535-01-M

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

18 CFR Part 271

[Docket No. RM79-76 (New Mexico-7)]

High-Cost Gas Produced From Tight Formations; Notice of Proposed Rulemaking

AGENCY: Federal Energy Regulatory Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Federal Energy Regulatory Commission is authorized by section 107(c)(5) of the Natural Gas Policy Act of 1978 to designate certain types of natural gas as high-cost gas where the Commission determines that the gas is produced under conditions which present extraordinary risks or costs. Under section 107(c)(5), the Commission issued a final regulation designating natural gas produced from tight formations as high-cost gas which may receive an incentive price (18 CFR 271.703). This rule established procedures for jurisdictional agencies to submit to the Commission recommendations of areas for designation as tight formations. This notice of proposed rulemaking by the Director of the Office of Pipeline and Producer Regulation contains the recommendation of the State of New Mexico that the Pictured Cliffs Formation be designated as a tight formation under § 271.703(d).

DATE: Comments on the proposed rule are due on November 2, 1981.

Public hearing: No public hearing is scheduled in this docket as yet. Written requests for a public hearing are due on October 19, 1981.

ADDRESS: Comments and requests for hearing must be filed with the Office of the Secretary, 825 North Capitol Street, NE. Washington, D.C. 20426.

FOR FURTHER INFORMATION CONTACT: Leslie Lawner, (202) 357-8307, or Victor Zabel, (202) 357-8616.

Issued October 2, 1981.

SUPPLEMENTARY INFORMATION:

I. Background

On September 16, 1981, the State of New Mexico Oil Conservation Division (New Mexico) submitted to the Commission a recommendation, in accordance with § 271.703 of the Commission's regulations (45 F.R. 56034, August 22, 1980), that the Pictured Cliffs Formation located in San Juan and Rio Arriba Counties, New Mexico, be designated as a tight formation. Pursuant to § 271.703(c)(4) of the regulations, this Notice of Proposed Rulemaking is hereby issued to determine whether New Mexico's recommendation that the Pictured Cliffs Formation be designated a tight formation should be adopted. The United States Geological Survey concurs with New Mexico's recommendation. New Mexico's recommendation and supporting data are on file with the Commission and are available for public inspection.

II. Description of Recommendation

The recommended formation underlies certain lands in San Juan and Rio Arriba Counties, New Mexico, and is located on the northeast flank of the San Juan Basin of northwest New Mexico. The recommended area contains approximately 33,500 acres within portions of Townships 30 and 31 North, Ranges 7 and 8 West, and Township 31 North, Range 6 West. NMPM.

The recommended formation ranges in thickness from 150 to 250 feet. The average depth to the top of the formation is approximately 3,200 feet.

III. Discussion of Recommendation

New Mexico claims in its submission that evidence gathered through information and testimony presented at a public hearing in Case No. 7086 convened by New Mexico on this matter demonstrates that:

(1) The average *in situ* gas permeability throughout the pay section of the proposed area is not expected to exceed 0.1 millidarcy;

(2) The stabilized production rate, against atmospheric pressure, of wells completed for production from the recommended formation, without stimulation, is not expected to exceed the maximum allowable production rate set out in § 271.703(c)(2)(i)(B); and

(3) No well drilled into the recommended formation is expected to produce more than five (5) barrels of oil per day.

New Mexico further asserts that existing State and Federal Regulations assure that development of this formation will not adversely affect any fresh water aquifers.

Accordingly, pursuant to the authority delegated to the Director of the Office of Pipeline and Producer Regulation by Commission Order No. 97, issued in Docket No. RM80-68 (45 FR 53456, August 12, 1980), notice is hereby given of the proposal submitted by New Mexico that the Pictured Cliffs Formation, as described and delineated in New Mexico's recommendation as filed with the Commission, be designated as a tight formation pursuant to § 271.703.

IV. Public Comment Procedures

Interested persons may comment on this proposed rulemaking by submitting written data, views or arguments to the Office of the Secretary, Federal Energy Regulatory Commission, 825 North Capitol Street, NE., Washington, D.C. 20426, on or before November 2, 1981. Each person submitting a comment should indicate that the comment is being submitted in Docket No. RM79-76 (New Mexico-7), and should give reasons including supporting data for any recommendations. Comments should include the name, title, mailing address, and telephone number of one person to whom communications concerning the proposal may be addressed. An original and 14 conformed copies should be filed with the Secretary of the Commission. Written comments will be available for public inspection at the Commission's Office of Public Information, Room 1000, 825 North Capitol Street, NE., Washington, D.C., during business hours.

Any person wishing to present testimony, views, data, or otherwise participate at a public hearing should notify the Commission in writing that they wish to make an oral presentation and therefore request a public hearing. Such request shall specify the amount of time requested at the hearing. Requests should be filed with the Secretary of the Commission no later than October 19, 1981.

(Natural Gas Policy Act of 1978, 15 U.S.C. §§ 3301-3342)

Accordingly, the Commission proposes to amend the regulations in Part 271, Subchapter H, Chapter 1, Title 18, Code of Federal Regulations, as set

forth below, in the event New Mexico's recommendation is adopted.

Kenneth A. Williams,

Director, Office of Pipeline and Producer Regulation.

PART 271—CEILING PRICES

Section 271.703(d) is amended by adding new subparagraph (69) to read as follows:

§ 271.703 Tight formations.

* * * * *

(d) *Designated tight formations.* The following formations are designated as tight formations. A more detailed description of the geographical extent and geological parameters of the designated tight formations is located in the Commission's official file for Docket No. RM79-76, subindexed as indicated, and is also located in the official files of the jurisdictional agency that submitted the recommendation.

* * * * *

(55) through (68) [Reserved]

(69) *Pictured Cliffs Formation in New Mexico.* RM79-76 (New Mexico-7).

(i) *Delineation of formation.* The Pictured Cliffs Formation is found in the San Juan Basin and underlies portions of Townships 30 and 31 North, Ranges 7 and 8 West, and Township 31 North, Range 8 West, NMPM, in San Juan and Rio Arriba Counties, New Mexico.

(ii) *Depth.* The average depth to the top of the Pictured Cliffs Formation is approximately 3,200 feet. The thickness of the Pictured Cliffs Formation ranges from 150 to 250 feet.

[FR Doc. 81-29475 Filed 10-8-81; 8:45 am]

BILLING CODE 6717-02-M

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 52

[A-5-FRL 1955-3]

Approval and Promulgation of Implementation Plans; Nonattainment Area Plans for the State of Indiana

AGENCY: U.S. Environmental Protection Agency.

ACTION: Extension of public comment period.

SUMMARY: On August 27, 1981 (46 FR 43188), the Environmental Protection Agency proposed to approve revisions to the carbon monoxide and ozone portions of the State Implementation Plan. In response to a request from the State of Indiana, the public comment period is being extended to October 30, 1981.

DATE: Comments must be received on or before October 30, 1981. Please send an original and three copies, if possible.

ADDRESSES: Comments should be submitted to: Gary Gulezian, Chief, Regulatory Analysis Section, Air Programs Branch, Region V, U.S. Environmental Protection Agency, 230 South Dearborn Street, Chicago, Illinois 60604.

FOR FURTHER INFORMATION CONTACT: Gerald Kellman at (312) 353-6070.

Dated: September 25, 1981.

Valdas V. Adamkus,

Acting Regional Administrator.

[FR Doc. 81-29453 Filed 10-8-81; 8:45 am]

BILLING CODE 6560-38-M

INTERSTATE COMMERCE COMMISSION

49 CFR 1047

[No. 38622]

Petition of New Jersey Transit Corporation to Exempt Mass Transportation Services

AGENCY: Interstate Commerce Commission.

ACTION: Withdrawal of proposed rulemaking (exemption) and discontinuance of proceeding.

SUMMARY: In a notice of proposed rulemaking, the Commission proposed to grant New Jersey Transit Corporation, et al. a partial exemption under 49 U.S.C. 1608(f)(1) regarding rate and service matters. The requested exemption from various rate, service, and insurance regulations filed by New Jersey Transit Corporation, Transport of New Jersey, and Maplewood Equipment Company has been found inconsistent with statutory criteria and, accordingly, denied.

EFFECTIVE DATE: September 30, 1981.

FOR FURTHER INFORMATION CONTACT: Jane F. Mackall (202) 275-7656.

SUPPLEMENTARY INFORMATION: By a prior Federal Register Notice, 46 FR 38721 (published July 15, 1981 and extended at 46 FR 41831, August 18, 1981), we sought public comment on a petition filed pursuant to the Urban Mass Transportation Act of 1964, as amended, to exempt mass transportation provided by a state body from certain aspects of our jurisdiction. Specifically, we contemplated exempting the New Jersey Transit Corporation (Transit), Transport of New Jersey (Transport), and Maplewood Equipment Company (Maplewood), pursuant to 49 U.S.C. 1608(f)(1), from provisions in former Part II of the Interstate Commerce Act, including those governing changes in fares; increases, curtailments, or abandonment of service; insurance requirements; financial filing requirements; and regulation of service adequacy.

Transit is an entity of the State of New Jersey. Its functions and operations will be discussed in detail below. Transport is a wholly owned subsidiary of Transit. Maplewood is a wholly owned subsidiary of Transport. Transit, Transport, and Maplewood (collectively referred to as Petitioners) specify however that they do not seek an exemption from our regulations governing charter and special services, acquisitions and mergers, issuance or transfers of operating rights (except for transfers between Transport and Maplewood) or removal of restrictions on operating rights.

The comments we received in response to our Federal Register Notice convince us that the request exemptions are not warranted.

Preliminary Matters

Greyhound Lines, Inc., one of the parties filing comments, requested an oral hearing and an opportunity to cross-examine Transit's representatives regarding the extent of the requested exemption. However, Greyhound has not shown that such hearing and cross-examination would add meaningfully to the written comments. Accordingly, its request is denied. The American Bus Association (ABA) requested a procedure for submission of replies to comments and, subsequently, for leave to file a reply. Its requests are also denied since the ABA fails to show why such replies are necessary or desirable.

Greyhound and ABA also both requested that we define "mass transportation" and express their views in this regard. They argue that in light of the Urban Mass Transportation Act of 1964, as amended, "mass transportation" within the context of 49 U.S.C. 1608(f) must be "urban" and should not extend to transportation among intercity pairs. They envision the "mass transportation" which may be exempted to be primarily transportation of large masses of people from the city to the suburbs or back during the weekday rush-hours with commutes being not more than 50 or 100 miles. In their view it should not extend, as was proposed here, to discretionary travel, vacation, sightseeing and casino gaming. ABA argues that the term "commuter operations" used in our Notice of Proposed Rulemaking has no precise meaning, and fails to confine the exemption to its lawful scope.