Case No.

126 File #1

Application, Transcript,
Small Exhibits, Etc.

COPY

P. O. Box 871
January 26, 1943

The Farmington Times
Farmington, New Mexico

RE: Case No. 126 - Notice of Publication

Gentlemen:

Please publish the enclosed notice once, immediately. Please proof-read the notice carefully and send a copy of the paper carrying such notice.

UPON COMPLETION OF THE PUBLICATION, [illegible] AFFIDAVIT IN DUPLICATE.

For payment please submit statement in duplicate, accompanied by voucher executed in duplicate. The necessary blanks are enclosed.

Very truly yours,

[illegible],
Attorney

bxw

cc: [illegible]

LEGAL NOTICE

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

The State of New Mexico, by its Oil Conservation Commission, hereby gives notice, pursuant to law, of the following public hearings to be held February 17, 1948, beginning at 10:00 oclock a. m. on that day in the City of Santa Fe, New Mexico:

STATE OF NEW MEXICO TO: All named parties in the following cases, and notice to the public:

Case No. 126

In the matter of the petition of Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canyon and Fulcher Basin gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters including special approval of unorthodox well locations where necessary.

Given under the seal of the Oil Conservation Commission of New Mexico, at Santa Fe, New Mexico, on January 26, 1948.

STATE OF NEW MEXICO
OIL CONSERVATION
COMMISSION
By R. R. SPURRIER,
Secretary

(SEAL)

Published in Farmington Times Hustler. Farmington, New Mexico.
Friday, Jan. 30, 1948.

PROOF OF PUBLICATION

State of New M[illegible]o,
County of San Juan—ss.

G. L. Butler

being first duly sworn upon his oath deposes and says:— That during the time of the publication of the notice hereinafter mentioned, he was the

Manager

of the FARMINGTON TIMES HUSTLER, a weekly newspaper published at Farmington in said County of San Juan and State of New Mexico; that the notice of

Publication State of N[illegible]ex

Oil Conservation Commission

of which a printed copy taken from said newspaper is hereto annexed, was published in the regular issues of said newspaper once in each week for

one successive

weeks; that the date of the first publication thereof was the 30th day of January 8 and the date of the last publication thereof was the 30th day of January 8; that said newspaper is published and of general circulation in said county, and is a legal newspaper qualified to publish any notice required by law to be published.

Receipt is hereby acknowledged by the publishers of payment in full for publication of the above mentioned legal notice.

G. L. Butler

Subscribed and sworn to before me this 7th day of Feb. 194[illegible]

[signature]
Notary Public.

My Commission expires Feb. 24, 1948

BEFORE THE OIL CONSERVATION COMMISSION OF THE
STATE OF NEW MEXICO

IN THE MATTER OF A HEARING CALLED
BY THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO FOR THE
PURPOSE OF CONSIDERING:

CASE NO. 126
ORDER NO. 748

IN THE MATTER OF THE PETITION OF THE SOUTHERN UNION PRODUCTION COMPANY FOR AN ORDER FIXING THE SPACING OF WELLS IN THE KUTZ CANYON-FULCHER BASIN GAS FIELDS OF SAN JUAN COUNTY (AS THEY MAY BE EXTENDED) ON THE BASIS OF ONE WELL TO A DRILLING UNIT OF APPROXIMATELY 160 ACRES WITH SUITABLE PROVISIONS FOR ANY RELATED MATTERS, INCLUDING SPECIAL APPROVAL OF NONCONFORMING WELL LOCATIONS WHERE NECESSARY.

ORDER OF THE COMMISSION

BY THE COMMISSION:

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canyon-Fulcher Basin gas field, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing.

FINDS, from the evidence adduced:

A. That the Kutz Canyon and Fulcher Basin gas pools are productive of natural gas from the Pictured Cliffs sandstone formation, that such pools are contiguous and from all information available to date appear to be one continuous gas producing area or pool in the Pictured Cliffs sandstone;

B. That such pool has produced natural gas for more than 15 years, during which time the average of well-head pressures has declined approximately 200 P.S.I. gauge.

C. That by reason of rules of this Commission previously applicable to the pool, of the general practices of certain operators in the area and of policies of the U. S. Geological Survey, a fairly uniform spacing of one well to 160 acres has heretofore prevailed throughout most of the pool;

D. That one well will, in view of present evidence, economically and effectively drain the recoverable gas from at least 160 acres of the pool, and, accordingly, that more dense spacing in the pool may be conducive to waste and will unnecessarily increase the costs of development and production.

E. That for wells hereafter drilled, a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160-acre tracts, for which general spacing pattern the pooling of properties should be encouraged when necessary;

F. That the gas productive area of the pool is likely to be substantially more extensive than the presently developed portion thereof;

G. That waste will result in the drilling of wells in the pool, unless special rules and regulations are adopted for the prevention thereof; and

4. That, while the Kutz Canyon-Fulcher Basin gas field has been commercially productive for more than 15 years, it has not been subject to cooperative action representative of the interest of all the operators or lease-holders within the area during that period. In addition, properties, holdings and/or leases of an undetermined number of small landowners or lease-holders, whose total acreage is either less than 160 acres or includes portions of 160-acre tracts, still exist within the pool boundaries, as herein defined. The number of such holdings will be likely to increase as the pool boundaries are extended by subsequent drilling.

THEREFORE, IT IS ORDERED that, effective on the date of this order, the following rules and regulations shall apply to wells hereafter drilled or completed or recompleted to the Pictured Cliff pool in the Kutz Canyon-Fulcher Basin area, defined below, in addition to the Commission's applicable rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

Section 1. No well shall be drilled or completed or recompleted, and no Notice of Intention to Drill or drilling permit shall be approved, unless

(a) such well be located on a designated drilling unit of not less than one hundred sixty (160) acres of land, more or less, according to legal subdivisions of the United States Land Surveys, in which unit all the interests are consolidated by pooling agreement or otherwise and on which no other well is completed, or approved for completion, in the pool;

(b) such drilling unit be in the shape of a square except for normal variations in legal subdivisions of the United States Lands Surveys; and

(c) such well be located on its drilling unit at a distance from the unit boundaries of not less than nine hundred ninety feet (990); provided, if such proposed new well is to be an offset to any then producing gas well completed in the pool, or the drilling of which has authorized prior to the effective date of this order, located on an adjoining unit in which the interests are not identical with those in the unit proposed to be drilled, such proposed well may be located and drilled offsetting the existing well and as close to the common unit boundary line as the well to be so offset.

Section 2. Any provision herein to the contrary notwithstanding, the Commission may, and in proper cases will, on petition or on its own motion, by order entered after notice and hearing to the extent required by law, grant exceptions and permit drilling locations to become effective, thereby authorizing the drilling or completion of wells in the pool not in conformity to the requirements of Section 1 above if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce gas from the pool in the absence of such exception, and shall also find one or more of the following conditions is met:

(a) that consolidation or pooling of the property sought to be drilled with adjoining land, notwithstanding diligent efforts made in good faith, is impossible or impractical;

(b) that the property sought to be drilled is located within a then developed portion of the pool and its non-conforming size or shape is due to the adjoining developed properties in the pool;

(c) that because of the nature of the terrain, location of the proposed well at a lesser distance from the boundaries of the drilling unit should be permitted; or

(d) that by reason of the location of the property to be drilled along the southwest or northeast flank of the developed portion of the area, it appears improbable that gas can be produced in paying quantities if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 as to such well to the extent it deems necessary.

Irrespective of such findings, if the Commission shall find that by reason of all circumstances an exception is proper in the prevention of waste, or undue drainage between properties, or otherwise in the exercise by the Commission of its jurisdiction over the spacing of wells or its other powers conferred by law, express or implied.

IT IS FURTHER ORDERED that, in accordance with recommendations of the Northwestern New Mexico Nomenclature Committee approved and adopted by this Commission, the Pictured Cliff gas producing pool in the Kutz Canyon-Fulcher Basin area, to which this order applies, is defined to include the following described land in San Juan County, New Mexico:

Township 27 North, Range 10 West	
Sec. 3	W/2
Secs. 4 & 5	All

Township 28 North, Range 10 West	
Secs. 7 & 8	All
Sec. 15	W/2
Secs. 16,17,18,19 20,21	All
Sec. 22	W/2
Sec. 27	W/2
Secs. 28,29,30,31, 32,33	All
Sec. 34	W/2

Township 28 North, Range 11 West	
Secs. 9,10,11,12,13 14,15,16,22,23,24,25,26	All

Township 29 North, Range 11 West	
Secs. 6,7,8,16,17,18, 19,20,21,22,26,27,28, 29,30,31,32,33,34,35, 36	All

Township 29 North, Range 12 West	
Secs. 1,2,3,4,5,6,9, 10,11,12,13,14,15,23, 24,25	All

Township 29 North, Range 13 West	
Sec. 1	All

Township 30 North, Range 12 West	
Sec. 19	All
Sec. 20	S/2
Secs. 24,27,28,29, 30,31,32,33,34,35, 36	All

Township 30 North, Range 13 West	
Secs. 24,25,36	All

All additional lands located within one-half (1/2) mile of any land in the pool as defined or as it may be extended shall conform to these rules and regulations; provided, however, that such pool shall in no event be extended so as to include any lands now or hereafter included by the Commission in some other producing area formally designated as an oil or gas pool in the

Pictured Cliffs, provided, further, by order of this Commission the pool may be redesignated from time to time so as to embrace other lands in the vicinity which are believed, on the basis of additional developments, to be capable of producing gas from the Kutz Canyon-Pulcher Basin pool, whether or not such other lands shall have been at one time included in another designated field or pool producing from the Pictured Cliffs.

Entered and adopted by the Oil Conservation Commission this 22 day of June 1948.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

CHAIRMAN

MEMBER

SECRETARY

April 5, 1948

CASE NO. 126, Southern Union
Production Company.

MEMORANDUM:

Testimony shows that in Fulcher Basin-Kutz Canyon, San Juan County, that there was an original rock pressure of 585 pounds as of 1927 and 1928. A pressure survey in 1947 showed that the average rock pressure of gas to be 385 pounds, and it is indicated that since 1947 test the gas pressure has declined from the average of 385 pounds.

Certain wells, some of which have been drilled during recent years, are shown by chart to be below the original 585-pound pressure, but slightly above the 385-pound average of 1947. Evidence was submitted to the effect that approximately one-third of the gas of the field has already been taken out.

Upon the plat or diagram submitted there are "two sinks" indicating roughly the two old fields. In these the pressure is down to about to 350 pounds. Some of the recent wells drilled showed the pressure of between 400 and 500 pounds, which is below the pressure in the Feasel Well to the northwest end of the field which has 565-pound pressure indicating that the closely drilled wells has caused pressure decline.

The petitioner offered in evidence the results of an

interference test covering seven wells on a 160-acre spacing to substantiate claim that there was gas drainage across 160 acres. The test consisted of Walker No. 1, Walker No. 2, McGrath 1, 2, and 3, Kattler No. 1, and Hudson No. 2 wells. All were shut in for twelve days, then all except Walker No. 1 were put on production against a line pressure of 261 P F I. Thereafter, on the following day, the six surrounding wells were taken off the gas line and blown to the air, with the Walker No. 1 continuing to be shut in. A recording pressure chart on the wellhead of Walker No. 1, the shut in well, showed a considerable gain in pressure, explained as the normal build up. Pressures on the third and fourth days continued this build up. On th fourth day, the six surrounding wells were put back on production. On the fifth day, the pressure of Walker No. 1 fell back below because of previous delays, thus indicating pressure interference. The average pressures dropped 1.8 pounds pressure, (not large but petitioner urges that in consideration of other reservoir factors is conclusive for a material drainage under 160 acres). The drop-back was about two pounds. Figures submitted were that the porosity of the Pictured Cliff was about 20%, estimated from about 20 core samples. The engineer calculated that under 160 acres under original pressure of 585 pounds that there was an approximate 1,878,000,000 cubic feet. The field would not be any good

after the pressure goes down to 150 pounds, figured about 72% of the initial gas in place

Box 871

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

State of New Mexico to:

All named parties in the following case,
and notice to the public:

CASE NO. 126

In the matter of the petition of Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canon and Fulcher Basin gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters including special approval of unorthodox well locations where necessary.

BY MR. WILLIS LEA, Attorney for Southern Union Production Company.

If the Commission please, for the Petitioner we have Willis Lea of Dallas and Manuel Sanches of Santa Fe.

This is a petition of the Southern Union Production Company for an order of the Commission to fix a spacing program in Kutz Canon and Fulcher Basin. We have referred to them as two fields and it may be two fields, however, more recent drilling has developed the fact that the fields are contiguous. I believe our evidence will indicate, for practical purposes at least, the fields are one.

This problem of spacing has been handled rather satisfactorily heretofore because of several well known facts. During the war the P. A. W. had a spacing program of 160 acres, and this Commission conformed to it. Prior to that the activity in the area did not seem to require any particular spacing. Shortly after the war the 160 acre rule of this Commission applicable to that area was rescinded, with the result that the general spacing rule which I believe is 40 acres, with wells to be drilled 330 feet from lease boundary lines, has prevailed. This is an economic problem. We all know in a given reservoir there is only so much gas and only so much can be commercially extracted. This field is 20 years old, the first well was drilled in 1929; it has developed sometimes gradually and sometimes rapidly. The facts the Southern Union Production Company has accumulated over the years as one of the oldest operators are available to us. The Company has made its own study of spacing and what is the proper spacing in that area. This is no oil area unless you want to call the oil turned up in the so-called Farmington series.

It may be one or more of the wells might commercially produce oil from the Farmington. In fact, I know of no well that is producing oil in this immediate area. We have a gas problem. We recently employed Mr. Earl Nichols of Dallas to test our figures and reach his own conclusions; for the benefit of the Commission and others interested as to what is a proper spacing unit for that field. His conclusions go not only to the area which a well will drain, but also go to the question of the economics of drilling on the 160 acres as opposed to some smaller spacing units. I don't think we have a pro-ration problem; it is not our view to do that. We have peculiarly a spacing problem.The wells in that area that have been drilled today have been connected with a pipe line. The gas comes to Santa Fe and Albuquerque. If there are any exceptions I don't believe I know of them, and if there are the wells must be recently completed and pipe line connection in the process of being made. As we all know, gas is maintained and necessarily so from other areas; some of it comes from Barker Dome.

(After being duly sworn Mr. Earl Nichols and Mr. Van Thompson testified as follows)

MR. LEA:

Mr. Nichols, state your name for the record.

MR. NICHOLS:

Earl Nichols.

Q. You live in Dallas, Texas?

A. That is right.

Q. What is your profession?

A. Petroleum Engineer.

Q. You are actively engaged in that profession at the present time?

That is right, consultant.

Q. For how long?

A. As consultant or petroleum engineer?

Q. Petroleum engineer?

A. Since the first of 1938 - about 10 years.

Q. What has been the nature of your experience since 1938?

A. I spent about three years with Carter Oil Company in Oklahoma, during that time they put me through the training program - gasoline plant work, research work in chemical laboratory, field engineering, office and inventory courses - a little bit of everything they felt a Petroleum Engineer should have. After I left Carter I worked for Phillips in their research department for a short while; then with Core Laboratories, Inc., in Dallas. I worked for them about 6½ years as manager of the reservoir fluid analysis department.

Q. You have had experience in the study of reservoir conditions?

A. Primarily that has been the biggest majority of my work.

Q. Included the study of reserves and porosity?

A. That is right.

Q. What is your educational background?

A. I received my degree from Texas Christian University, major in physics and math, a small amount of graduate work in physics from the Washington University in St. Louis.

Q. Have you been employed by Southern Union Production Company to make a study of statistics and conditions applicable to Kutz Canon-Fulcher Basin?

A. That is right.

Q. Is this the first time you have been employed by Southern Union Production Company?

A. That is right.

Q. Were the Company's data made available to you in so far as they apply to these fields?

A. Yes, they gave me all their data.

Q. Did you find those data complete or not for your purpose in making the required study?

A. Yes.

Q. How many wells located in these areas?

A. Approximately 77.

Q. Do you know when the first well was drilled?

A. I don't have that information.

MR. VAN THOMPSON:

The first well was completed in 1927 or 1928.

Q. What would you say to have been the initial field pressure in that area?

MR. NICHOLS:

In the order of 585 pounds, might be some variation one way or the other.

Q. 585 pounds Virgin Rock Preasure?

A. Yes, sir.

Q. From your study of the present conditions of that area what do you find to be the arithmetical average of pressures presently prevailing in wells completed in that area?

A. A lot of the work was based upon the last pressure survey of April 1947. The arithmetic average pressure at that time was 385 pounds.

Q. As opposed to 585 pounds originally?

A. That is right.

Q. Would you state whether or not the pressure is likely to have declined under 385 pounds since the last test in April of 1947?

A. I think it is reasonable to assume that it would have - yes.

Q. In connection with these pressures, have you prepared a chart showing graphically the initial field pressure of approximately 585 pounds as compared with the average prevailing pressures in this field by years and also showing the initial well-head pressures of certain wells more recently completed in that area?

A. I have.

Q. Is this the study you refer to? (Presented charts)

A. Yes, it is.

Q. Will you please state what that means for the benefit of the record?

A. This particular compilation of data is divided into two areas, Kutz Canon and Fulcher Basin. In the Kutz Canon field the average arithmetic pressure in the wells producing at any given time has been plotted versus the time in years, that is the lower broken line near the middle or bottom of the page. The upper dotted line is a flat line showing approximately the initial pressure of the field. Between these two lines some of the wells have been drilled later in the life of the field. Some of them have been drilled during the last year, and the pressure in those wells is spotted in the proper position. The pressure on those wells does not lie near the 585 pound but between the 585 pound line and the average field pressure. A line has been drawn through these new wells representing an average of their pressures.

Q. Is it approximately one-half way between?

A. Yes. Not any individual well, but groups of wells by average, and it lies approximately one-half way between. There is a definite indication that in those areas where these wells have been drilled there had been pressure decline from the initial pressure, indicating you had pressure reduction out there previous to those wells having been drilled. The same would apply to Fulcher Basin.

Q. What is the conclusion or conclusions to be drawn from this type of study?

A. You have undoubtedly had, if the initial field pressure over the area is 585 pounds, and if you have drilled in adjacent areas since that time it is pretty conclusive you have had pressure decline in those areas. If you had pressure decline you have had removal of gas out of there.

Q. What does it mean with respect to the quantity of gas ultimately to be recovered from one of the wells more recently drilled?

A. The quantity of gas existing in a given unit of the reservoir is proportional to pressure existing on that gas. Whatever your pressure might be the quantity of gas you will recover is proportionate to the pressure of the gas existing. You would expect less gas from these wells drilled in lower pressure areas.

Q. If you drill a well with initial rock pressure of 400 pounds you could compute the quantity of gas which might be ultimately recovered from that well as opposed to the quantity expected to be recovered from a well having approximately the 585 pound virgin field pressure?

A. You could.

Q. In any event, to the extent that your initial rock pressure in any well is below the initial field pressure of 585 pounds, the quantity of gas to be recovered is reduced?

A. That is right.

Q. Would it be a fair question to ask you if you could approximate by a fraction of the total reserves recoverable from a given spacing unit that will not be recovered because of the lower pressure from the recently drilled wells?

A. If the average pressure is 385 pounds and the initial 585 pounds you would have a ratio of 400 to 600 pounds absolute, and would have approximately 1/3 of your gas having already been produced.

Q. That is 1/3 of the gas that originally underlay a drilling unit that has been taken out by drilling not on that unit but on adjacent units?

A. That is right.

Q. Have you prepared, Mr. Nichols, what I will refer to as pressure contour map, showing in general terms at least, the prevailing well-head pressures in this field?

A. That is right.

Q. If the Commission please, may we have identified as Petitioner's Exhibits 1 and 2 the schedules concerning which Mr. Nichols has just testified to?

COMMISSIONER MILES:

You may.

Q. We will offer them in evidence at a later time.

May we have similarly identified as Petitioner's Exhibit No. 3 the map I will refer to as a pressure contour map, dated January 7, 1948?

COMMISSIONER MILES:

You may.

Q. Mr. Nichols, I hand you this map identified as Petitioner's Exhibit No. 3, and ask you to explain the method of its preparation and give the conclusions to be drawn from it.

A. On this particular map, I took the pressures existing in April of 1947 and spotted them in their proper geographical location, adjacent to the well location. Then drawing lines of equal pressures in their proper place between these pressure points, we get what we call a pressure contour map showing the overall pressure picture of the area. The outer line is the 575 pound contour. These are in 25 pound intervals so the innermost contour is the 375 pound contour. The innermost further down on the map is the 350 pound contour. There are two "sinks", and it is rather apparent those lie roughly in the center of the two old fields, with the intervening area having remained undrilled for sometime, It is normal you would expect in the older areas to have larger pressure declines. You will notice also in the new intervening area between the two sinks. That sink is quite likely due to the influence of production from the two older areas. Another sink is forming in the upper northwest area; that is due to the total withdrawals from that area being proportionately large due to the small well spacing units.

Q. Is it not a fact that the area on the northwest is a newer developed area?

A. I believe that is right.

Q. Do you have the dates on which those wells were drilled?

A. Yes, sir. Waggoner #1, June 1946. Waggoner #2, September 1947. Copp #1 September 1946. Copp #3, October 1947. Wyper #2 January 1947

Q. All fairly recent drilling?

A. That is right.

Q. What can you say with respect to the pressure in that area surrounding those wells?

A. You have pressures existing all the way from 475 pounds to 500 pounds, which is 100 pounds or so lower than the initial field pressure. It looks like the pressure decline there is rather rapid in that particular area.

Q. Are those wells more or less densely spaced than the wells further to the south?

A. I think by observation they are more closely spaced.

Q. Any comparison between the pressure declines in these more densely spaced wells in comparison with the wells to the south which appear to be drilled on the 160 acre unit?

MR. THOMPSON:

That last record is in April 1947, and the majority of them have completed since that time.

MR. NICHOLS:

Your question could be tied back to withdrawals in any area regardless of the wells. Your total withdrawals on an area basis would give you an indication.

Q. Referring to this well in the extreme southeast portion of the field, the Feasel #1, what is its original rock pressure?

A. 565 pounds. Some 20 pounds lower than the initial of the field.

Q. Is it very close to any other well drilled in the area?

A. No it isn't.

Q. In other words, the Feasel well was drilled some distance from the other wells and you found initial pressure within 20 pounds of the original virgin rock pressure?

A. That is right.

Q. Will you compare that to some wells more recently drilled?

A. The wells in the center section, drilled a year or so ago, some of the Mangum wells, had pressures in April existing between the 425 pound and 450 pounds contour.

Q. Those were initial pressures?

A. Those were pressures existing in April 1947.
The Mangum #1 was completed in February 1947, and the initial pressure was 492 pounds, No. 2 was completed in June 1947 at 454 pounds, No. 3 was completed in July 1947 at 440 pounds.

Q. How do you account for the fact that those wells had lower initial pressure than the Feasel No. 1 well?

A. The drainage from these two adjacent areas seemingly had a great effect on this pressure.

Q. That is because production from adjacent wells previously drilled had so reduced the pressure in that vicinity that in the main portion of the field you find lower initial pressures?

A. That is right.

Q. Anything else in particular to be said about this map?

A. I don't believe so.

Q. Mr. Nichols, state whether or not the Company caused to be made an interference test at your suggestion on six or seven wells drilled in this area with a spacing unit of 160 acres for each well?

A. They did.

Q. Will you state in general terms how the interference test was conducted and what assumptions were necessary and what was found as a result of the interference test?

A. I believe my letter to Mr. Thompson dated February 5, 1948 will explain that.

(Letter as follows)

"EARL A NICHOLS
Consulting Petroleum Engineer
2000 Kidwell Street
Dallas, Texas
T3-4422

February 5, 1948

Mr. Van Thompson
Southern Union Gas Co.
Burt Building
Dallas, Texas

Dear Mr. Thompson:

"I have received the charts giving the results of the recommended field tests. These tests were performed on the Kutz Canyon - Fulcher Basin Field in order to attempt to establish a positive, mechanical answer as to whether pressure interference exists across 160 acre tracts in the above mentioned field. It was our belief that should such pressure interference exist between wells now drilled on approximately 160 acre spacing, one could accordingly feel that drainage across 160 acres tracts existed.

"Seven wells whose approximate spacing are 160 acres per well were chosen. They were the SUP Walker #1, SUP Walker #2, SUP Mc Grath #1, SUP Mc Grath #2, SUP McGrath #3, SUP Kattler #1, and the SUP Hudson #2 wells. These wells were shut in at noon January 9, 1948 and remained shut in until 8:30 A.M. January 12, 1948. At this time all of the wells except the Walker # 1 were put on production against a line pressure of 261 to 270 P.S.I. ga. At 9:00 A.M. on January 13th, the surrounding wells were taken off of the line and blown to the air, the Walker #1 still remaining shut in. A recording pressure chart on the well head of the Walker # 1 well during this test reveals the attached tabulated and graphical results.

"It is to be noticed that due to the normal cycle of atmospheric temperature change during a 24 hour period, the temperature effect on the recording instrument shows a distinctive 24 hour cycle change on the recorded pressures. To help clarify this effect, the pressures were plotted versus time of day and this graph is included. It will be noticed that, irregardless of these temperature effects, the overall curve of pressures for the second day lie considerably above the curve of the pressures for the first day of the shut in period. This is explained, of course, as being the normal build up of pressure due to the well being shut in. Likewise, the curves of pressure for the 3rd and 4th days lie respectively higher each day, showing this same build up. The surrounding wells were put on production, on the morning of the 4th day, but their effect on Walker # 1 is not significantly felt until the 5th day. It will be

noticed that the curve of pressures for the 5th day falls back below those of the 4th day, very definitely indicating pressure interference had reached the Walker # 1 from the outlying wells.

"In order to try to evaluate the magnitude of this pressure drop, an arithmetic average of the pressures the last 21 hours of the tests give a value of 401, 8 P.S.I. gauge. An arithmetic average of the pressures during the same hours of the preceding day gave 403.6 P.S.I. gauge. This is a 1.8 pound drop. This may not seem like a large drop, but after consideraing all of the reservoir factors involved, this is felt to be as large a pressure drop as one might expect.

"It is my feeling that these tests have conclusively shown pressure interference between wells now drilled on a 160 acre pattern. It is further my feeling that since pressure draw down can be experienced between such wells, drainage of reservoir material across 160 acre tracts exists under such conditions.

"If there are any points discussed on which you would like further comment, please contact me.

Very truly yours,

/s/ Earl A. Nichols

Earl A. Nichols

EAN/ly"

The Chart accompanying Mr. Nichols' letter was marked for identification as Petitioner's Exhibit #4.

MR. LEA:

Lets try to identify where these wells are located.

MR. THOMPSON:

Sections 2 and 3, Township 29; Section 34, Township 30, each in Range 12 W.

Q. Identify for us on this map the test well - Walker No. 1, outlining the spacing unit of Walker #1.

A. NE/4 Section 3, 29 N, 12 W.

Q. Will you identify for us the surrounding units on which the other six wells are located?

A. Walker #2, McGrath #3, McGrath #1, Kattler #1, Hudson #2, Southern Union Production McGrath #2.

Q. Your test well is located right in the middle of these other units?

A. That is right.

Q. Your pressures were taken on the Walker No. 1 Well?

A. MR. NICHOLS:

Yes, sir, those adjacent wells had been shut in. The pressures throughout that whole period of time were measured on the Walker Well.

Q. That is, I believe, without exception 160 acre spacing units with the well located in approximate center of the spacing unit? The fourth day is the red line?

A. That is right. The fifth day fell below the fourth day and in certain periods below the third day. The pressure during the last hour was below the third and fourth day pressures.

Q. Yet during this entire time the Walker No. 1 was shut in, the outlying wells were being produced during the last how many hours of the test?

A. Approximately 25 hours of the test.

Q. From the time the outlying wells were open to the air, how long did it take the pressure decline to be noted in the centrally located test well?

A. The remaining wells were put on the line at 8:30 a.m., January 12th at 9:00 o'clock a.m., January 13th twenty five hours later, they were taken off and put on the air, and there was approximately 24 hours remaining in this test.

Q. You regard the result of this interference test as being significant?

A. I do.

Q. Does it not indicate that not only did the outlying wells pull down their own pressures on 160 acre units - but that the outlying production also pulled down the pressure on the centrally located test well?

A. That is right.

Q. Is not each of those wells located on a regular 160 acre tract?

A. That is right.

Q. It is not noteworthy that instead of continuing to build up the test well pressure not only ceased to build up but in fact declined?

A. That is right. I think it might be expected that the well would have continued to build up for some time longer, how long I don't want to say. Might be a day or a week.

MR. SPURRIER:

How much did it drop back?

A. About 2 pounds. That is the arithmetical average in the last 21 hours.

MR. LEA:

Looking at this chart I find at the beginning of the first day a pressure of approximately 381 pounds on Walker #1.

A. It varies by the hour, it started at 381 pounds.

Q. At the same hour of the second day the well had built up to 398 pounds.

A. That is right.

Q. Approximately 17 pounds build up.

That is right.

Q. The same hour the next day it had built up to approximately 403 pounds.

A. Right.

Q. At the same hour the fourth day the build up was approximately 407 pounds.

A. Right.

Q. At the same hour the fifth day I find a very noticeable pressure interference had been commenced.

A. That is right. It was at that hour of the fifth day that the interference began to show up. There was undoubtedly some effect after the fifth day.

Q. From the data available, has it been possible for you to compute the total gross number of cubic feet of gas which should be expected to be in the reservoir under 160 acres of land?

A. Yes, it has been. There are certain assumptions one frequently has to use. An attempt was made to calculate the actual reservoir gas in place from the available reservoir data.

We had one set of core analysis data on the Cozzens #2 well. This is certainly a minimum amount of core analysis.

Sample Number	Permeability Millidarcys	Porosity Per Cent
1	98	18.3
2	92	16.7
3	74	23.3
4	90	18.6
5	102	14.3
6	10	9.8
7	51	12.3
8	83	9.6
9	99	17.5
10	5.5	8.1
11	18	20.5
12	16	19.3
13	8.6	19.5
14	10	18.3
15	18	17.7
16	11	16.3
17	18	19.1
18	15	10.3
19	44	15.5
20	17	18.5
21	50	19.2
22	95	12.3
23	118	13.1
24	340	11.1
25	423	19.5
26	160	16.2
27	6.5	6.1
28	15	18.5

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standard conditions existed in 160 acres of the reservoir initially.

That is the total gas in place. Below a certain pressure this field cannot be operated economically. We set it at 150 pounds. The net gas that can be taken from the reservoir between 585 pounds and 150 pounds is 1,361,000,000, or about 72% of the initial gas in place.

MR. CASWELL SILVER - Florence Company:

Would you consider all of those permeabilities as being within the effective pay?

MR. NICHOLS:

There was no consideration made as to the permeability in determining the effective pay. I presume you are referring to the thickness data. It was taken from the various drilling logs available and one or two electric logs were taken into consideration.

The amount of gas - net gas you might expect to recover between 585 pounds and 150 pounds, multiplied by 5¢ per thousand cu.ft. and allowing for State taxes, royalty and production tax brings the net down to about 84¢ which would give gross income irregardless of time of about $56,000 per 160 acre block. That does not give any consideration to operating expense or the present worth of a dollar. A lot of these dollars are going to be obtained a number of years hence. This is simply the gross income minus royalty and tax. The cost of drilling wells would be roughly $16,000 per well varying from person to person. That would allow a ratio of dollars returned on your investment of about 3½ to 1.

If you will take 160 acres at the present pressure average of the field of 385 pounds. The ultimate total income to be recovered over the years would be $30,000 after deducting royalty and taxes, but without giving any effect to operating expenses or other factors.

MR. SILVER:

That is assuming initial well-head pressure of 385 pounds would give you a ratio of about 1.9?

A. Yes - it would give you a ratio of about 1.9 to 1. If we look at it as a 40 acre drilling unit and calculate the ultimate returns you might expect in the order of $14,000 with the initial pressure of 585 pounds. If the well cost you $16,000 you would be in the red to begin with. If your well was drilled in an area with 385 pound pressure your total revenue would be in the order of $7,500 and your well would still cost $16,000.

MR. LEA:

Mr. Nichols, would you care to express an opinion from the studies made and data reviewed - whether or not one well drilled on 160 acres at approximately the center could be reasonably expected to drain in this field more or less than 160 acres or exactly 160 acres.

A. I feel the material we have looked at here has shown that the drainage from one well is adequate for a 160 acre block. You will be able to drain a 160 acre block with one well.

Q. Are there any instances where the gas produced from one of the older wells in the field exceeds ~~the field exceeds~~ the calculated quantity of gas initially in place under 160 acres.

A. There are several wells where total production to date has already either exceeded or been very close to the 1,873,000,000 cu. ft. of gas in 160 acres. The Browning and Stewart No. 4 well has produced over 2 billion cubic feet; that well still has 305 pounds of pressure and will undoubtedly produce still more gas.

MR. ENGLISH:

Who owns that well?

MR. THOMPSON:

We do now - Southern Union recently bought it from Browning and Stewart.

MR. NICHOLS:

Angels Peak, the 9-B and 10-B - between the two of them there has been 2,600,000,000 cubic feet of gas in 160 acres, and one-half of this is 1,300,000,000 each, which is approaching the 1,878,000,000. Summit #1 has produced 1½ billion and the Summit #2 has produced 1-1/10 billion. The Cornell wells 3 and 4 have together produced nearly 1½ billion, one half of which for each well is 7/10 billion with 373 pounds pressure remaining.

MR. ENGLISH:

Where you are drawing more gas off one well, would that make a difference in your pressure? Your pressure would be lower than where you did not have to draw as much gas?

A. Yes, especially if you did not have any gas from other areas to help re-build your pressure. Those pressure sinks had been influenced from some adjacent areas. This is indicated by the pressure build-up. There have been times when some areas have been shut in and have had a considerable build up, indicating you have had pressure build-up from these outlying areas.

MR. LEA:

In making assumptions necessary to compute the total reserves of gas under the 160 acre tract you have taken such data as was available?

A. That is right.

Q. Where assumptions had to be made were you on the long side or on the low side in making your estimate.

A. I feel in all these estimates we have been optimistic in making the necessary assumptions for computing reserves.

(EXAMINATION OF MR. VAN THOMPSON)

MR. LEA:

Your name is Van Thompson and you live in Dallas?

MR. THOMPSON:

Yes, sir.

Q. You are employed by the Southern Union Gas Company and the Southern Union Production Company?

A. That is right.

Q. How long have you worked for Southern Union?

A. Since 1930.

Q. What is your present capacity?

A. I am Chief Engineer of the Company in charge of production for all properties.

Q. Are you familiar with the gas situation in Kutz Canon and Fulcher Basin?

A. I have been personally familiar with it since 1932.

Q. Is it, at the present time, under your personal supervision?

A. Yes, sir.

Q. Are you familiar with the statistics and data in the way of gas production, open flow capacity, pressures, etc.?

A. That is right - our Company has accumulated this information by years since the beginning . We had a practice instituted of shutting all wells in for a week and took pressures during that time every year.

Q. Was that the data made available to Mr. Nichols in the course of his study?

A. Yes, sir.

Q. You have heard Mr. Nichols testify, are his findings made in connection with the study of this field - have they confirmed or altered your own conclusions?

A. Yes, it has convinced me that on a lot of the wells we have drilled in the middle of the field on closer spacings we will never get our money back out of them - it isn't economical.

Q. Did your figures on the total reserves of gas on 160 acres correspond with the figures Mr. Nichols has given us?

A. I would say, if anything, they would probably be a little less.

Q. Your figures would be less than his?

A. Yes, sir.

Q. What experience have you had in connection with unitization or more simple form of commutization of separately owned tracts?

A. Well, during the last 1½ years we have unitized about seven different tracts into 160 acre drilling units. These have included fee land and federal land, so far they have not included any state land.

Q. Have you used the so-called short form of commutization agreement in these?

A. Yes, sir.

Q. Has your experience been satisfactory or unsatisfactory?

A. So far it has worked very well, it hasn't taken long to get them approved.

Q. Have you commutized federal land with fee land?

A. Yes, sir.

Q. How about commutized with federal and federal?

A. I think we are working on one at the present time but it isn't completed.

Q. In general, your experience has been good and delay has not been too bad?

A. Right.

MR. LEA:

If the Commission please, we would like now to offer in evidence Exhibits which have been identified as Petitioner's exhibits 1 to 4 respectively.

COMMISSIONER MILES:

Exhibits received.

MR. LEA:

Mr. Foster Morrell wrote a letter regarding this proceeding in his letter suggested he would have no objection to the use of it in this proceeding. It may be well known that Mr. Morrell, and I presume his predecessors, have participated to some extent in the 160 acre spacing condition which generally prevails at the present time.

He writes under date of February 10, 1948 - -

"UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 997
Roswell, New Mexico
February 10, 1948

Mr. Willis L. Lea, Jr.
Southern Union Production Company
Burt Building
Dallas, Texas

Dear Mr. Lea:

"Reference is made to your letter of January 26, enclosing for our information a copy of Southern Union Production Company's petition forwarded to the New Mexico Oil Conservation Commission requesting an order, after notice and hearing fixing spacing requirements for wells hereafter drilled in the Kutz Canyon-Fulcher Basin gas fields, San Juan County, New Mexico. You requested our opinion concerning the proper spacing of wells in these fields.

"The essential facts presented in your petition are substantiated by the records of this office, and, accordingly, this office concurs in your request for the establishment of a well spacing plan with a minimum of one well to 160 acres to promote orderly development without waste in the Kutz Canyon and Fulcher Basin gas fields.

"As most of the lands in these fields are public lands of the United States, it is the desire of this office to encourage uniform and economic development and greatest ultimate recovery of gas from these fields. This can be accomplished only so long as areasonable profit can be secured from capital invested. Federal leases have been developed generally on a well spacing pattern of one well to 160 acres, except where necessary to protect properties from closer spacing by offset operators.

"Only where the market demand and marketing facilities are unlimited for continued expansion with the completion of additional outlets or producing gas wells can necessary profit be obtained to continue development. These conditions are not present in the fields under consideration. Hence the drilling of unnecessary wells does not proportionately increase the ultimate volume of gas available for sale but instead tends to reduce the margin of profit of all wells in the fields and to discourage proper development of the fields.

"Future development at a well density consistent with the majority of past development is essential to prevent injury to neighboring leases or properties and to protect equities involved.

"There is no objection to your use of this letter in connection with your petition to the New Mexico Oil Conservation Commission. As this office is very interested in the subject, I expect to be present at the hearing in Santa Fe on February 17.

Very truly yours,

/s/ Foster Morrell

FOSTER MORRELL
Supervisor, Oil and Gas Operations"

MR. LEA:

I would like to have this in evidence as Petitioner's Exhibit No. 5. I believe that is all we have at the present time.

(Exhibit No. 5 admitted).

DUDLEY CORNELL:

I would like to ask Mr. Nichols is it a fact that the conclusions which you have drawn from your work here would support an application for pro-ration of gas in this field on a 160 acre basis just as fully as it does on 160 acre spacing?

A. My conclusion is that there is adequate drainage by one well on a 160 acre block.

Q. The petition here would really prevent the wells being drilled on 40 acres - have you given any thought to the wells on 40 acre spacing?

A. My purpose was to determine if adequate drainage can be obtained by one well, on a 160 acre block.

Q. If 160 acre spacing in this field is used, do you have any suggestions in handling the present wells on 40 acre spacing?

A. I have not given the problem any consideration. I think you will find some precedent set up, however.

MR. LEA:

We have always visualized this matter as a spacing matter. For that reason I am sure Mr. Nichols has not approached it on pro-ration.

MR. CORNELL:

I cannot see how the two problems can be separated, I was wondering if you would ignore the situation.

MR. LEA:

I would make a statement - Here is the way we see it, this field is 20 years old or more. It has been growing and developing by fits and starts ever since, but it is an old field with a rather loose spacing regulation which has prevailed during most of the time. It is only natural there have grown up several inequities where the spacing of units is too close to larger adjoining units. I have your situation in mind among others. Pro-ration may have to come to the Kutz Canon-Fulcher Basin field on a proper pro-ration proposal. I can say now my Company will have no objection to pro-ration but we will be very much interested because of the additional burden cast upon us by pro-ration, and I think the Commission will be very much interested because of the additional burden of administering pro-ration.

MR. CORNELL:

You have referred to my own situation, makes it personal - I would like to ask Mr. Thompson one or two questions.

You have an 80 acre lease on which you have two wells known as the Cornell-SUG 3 and 4?

MR. THOMPSON:

That is right, yes, sir.

MR. CORNELL:

And that 80 is entirely surrounded by acreage I am interested in.

MR. THOMPSON:

I am not sure it is surrounded on the south.

MR. CORNELL:

Yes, sir. How far do you think those two wells are draining?

MR. THOMPSON:

They are draining considerably more than 80 acres.

(CONTINUED ON PAGE 17)

Q. In this study you say it is draining across the 160 acres, would you say this draining would go ½ mile from the well?

A. No, I wouldn't say it is draining that far. That would be a half section in each direction.

Q. Presupposing 160 acre spacing, the drainage would go across the next 40 acres?

A. Yes, sir.

Q. A well located such as that would at least drain the 40 acres adjoining it?

A. That is correct.

Q. With an 80 acre lease - 2 - 40 acres on east, west, north and south, 6 - 40's plus the 80 you have, your two wells would be effective draining 640 acres?

A. In the petition we are asking for 160 acres minimum spacing and the purpose is to prevent what is happening right there.

Q. I am simply making a little argument for this pro-ration; wouldn't it be true those two wells would be draining effective 640 acres?

A. Possibly so. We are contending one well would drain 160.

Q. If your spacing rule is put into effect without pro-ration those two wells will continue to drain 640 acres.

MR. LEA:

I don't believe the witness is in agreement with you that the two wells were draining 640 acres. It is conceded that one well will drain 160 acres.

MR. SILVER:

You make a presumption that Mr. Nichols has proved that. I don't believe the Commission has yet admitted that.

MR. LEA:

My statement was I did not think the evidence submitted would substantiate the idea, or that the witness agreed, that the two wells would drain the 640 acres.

MR. SILVER:

No one has admitted that a well would drain the 160.

MR. LEA:

We are willing to grant to Mr. Cornell the two wells referred to do drain more than the 80 acres on which they are located.

Q. [illegible]:

You are willing to admit that the Commission has not agreed?

A. [illegible]:

Mr. Silver, I can't make any statement binding on this Commission.

MR. CORNELL:

I agree with the witnesses from the standpoint of the economics of drilling these wells on the 40 acres, but the spacing rule without a follow-up with a pro-ration order, I think is just doing one-half the job, and creates additional inequalities. I would like to suggest what we need for this field is a pro-ration order, ratable taking and common purchaser act. I would like to suggest to this Commission that some leader appoint a committee to present such legislation for the next legislature, that it be carefully prepared and operators have a chance to voice their suggestions and at this next legislature all the operators combined with their influence, to the end we do obtain a common purchaser and ratable taking law for gas. I think there has been changeon some operators in this subject. I think it ties into this application here.
I would like to ask another question - Mr. Nichols, with reference to your interference test of the seven wells, isn't it a fact that the original pressures on those wells differ and that their open flow potentials are different.

MR. NICHOLS:

That is right, I am sure it is.

Q. Very considerable difference isn't there?

A. I can check them and see.

Q. I would like to develop more fully in the economics in those wells, the amount of gas withdrawn and their open flow potentials.

A. In the interference test all the measurements were made on one well, the Walker No. 1. Irregardless of the open flow potentials and the pressures on the surrounding wells the pressures on this well built up to the fifth day and then dropped back. The only difference which the open flow potentials of the surrounding wells might make would be in the quantity of gas produced from them during the test, which in turn might influence only the magnitude of the pressure drop during that time.

MR. THOMPSON:

Hudson #2 well had an open flow in January 1948 of 560 MCF, McGrath #1 of 416 MCF, McGrath #2 140 MCF, McGrath #3, 596 MCF - Walker No. 1 584 MCF

Q. I did not have in mind proving anything particularly, but thought that information should be in the record.

MR. SILVER:

How are these wells gauged?

MR. NICHOLS:

The Walker No. 1 well had a recording instrument on the well head.

Q. What kind of recording instrument, dead weight?

MR. THOMPSON:

Bristol Spring Gauge - recording gauge.

Q. Mr. Nichols, you are familiar with spring gauges. To your knowledge isn't it true spring gauges have variation of five to 10 pounds. In use of spring guages they have to be tested against larger tested gauges?

A. That is true in any type of gauge.

Q. In Sections 11 and 14, township 29 N, range 10 W, wasn't there considerable variation in rock pressure when the wells were brought in?

A. I think that is brought out in the exhibit showing initial field pressures and pressures of wells drilled later in the life of the field.

Q. Isn't it true that the pressure measured on a well is in part functional of the length of time in which that well is allowed to remain idle?

A. Your build-up time certainly affects the pressure measurements.

Q. Isn't it also true that the permeability changes and that the lower the permeability the longer the pressure build-up required to reach stabilization?

A. I am not aware the permeability changes in a given field.

Q. I have the permeability as given me here. (Quoting certain figures noted from evidence).

A. The permeabilities you are reading there are indivudual measurements on individual feet - one sample for each foot. That is normal in any kind of reservoir. Permeability of a given foot is constant and does not change during life of the well.

Q. Isn't it true the permeability in this well, which is the only well in the field that has core analysis, is not a good test of the permeability?

A. In what manner?

Q. In that one well, if the variation of permeability is so great from foot to foot vertically, then conceiveably the permeability from foot to foot horizontally is just as great.

A. Getting back to your point, it is true that the amount of our core analysis data is on the low side. I pointed out early in my discussion that we had in that instance a minimum of data, and that we had to assume certain things - for example the deviation factor.

Q. I have no objections to your deviation value.

A. Along that same line of thought we have a minimum of permeability data but we used what we had, which is the best we can do.

Q. The point I was attempting to bring out was the very serious effedt permeability would have on your concept of drainage across 160 acres - I wanted to point the manner in which they affect that.

A. I think we can approach it from this angle; the permeability is a measure of the rate at which a well can produce, but not a measure of the total amount it will produce. Permeability times feet will be an index of the open flow. Potentials on every well in the field are not exactly the same.

Q. That is exactly right.

MR. THOMPSON:

Would you mind stating what you think minimum spacing should be?

MR. SILVER:

We have a field of our own on which we own considerable part or majority of acreage in the San Juan Basin that has almost exactly similar reservoir conditions. Any decision the Commission might make with respect to your field will certainly have a bearing on a field almost exactly like it geologically. We have no opinion as to what the well spacing should be in this field, we are only interested in finding out what the most economic spacing would be.

Therefore, we are vitally interested in this case. That will determine what the economic spacing is in our field. Therefore, I want to bring out some of the inadequate data presented by Mr. Nichols. The fact that an additional test should be made which may aid the Commission to determine the type of drainage on 160 acre spacing they would want, but by 160 acre spacing the data presented today, I do not think is adequate. By meeting with Mr. Nichols I believe we could find out.

MR. NICHOLS:

Back to about the last point I made in regard to total production from certain blocks - that is based on porosity. It does not tie back into permeability or productivity.

MR. SILVER:

As I stated before, I thought you were over generous in the amount of gas in place.

A. That fact tied with the actual production from some of these wells is pretty hard to overlook.

MR. SILVER:

Let's go into the problem of reservoir development - each well is a sink and each field is in itself a larger sink within a known gas area. I think there are men in this audience who know there have been wells drilled outside this field which have encountered gas and that gas has been non-commercial. It is entirely conceivable this is the only commercial gas production in the area. If you have a sink here what is the optimum number of wells draining this basin.

A. That is an economic problem. I think the productivity of the wells is related directly to permeability. I think the fact that there has been greater production from these wells on the 160 acre block than the total original gas in place proves very definitely drainage across those areas.

MR. SILVER:

I do not believe this whole heartedly myself, but as a point of reasonable doubt, Mr. Thompson, you have drilled many wells in the area, the United States Geological Survey in its professional paper No. 134, by Mr. J. B. Reeside, Jr., gives the thickness of the Picture Cliff sand zone in this zone between 75 and 225 gross feet.

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MR. THOMPSON:

The gross and effective thickness are two different things.

MR. SILVER:

Q. We have cored as much as 25 feet of such sand and found the core bleeding gas all the way.

MR. THOMPSON:

This appears in wells of that type as well as wells of thicknesses of 10 and 12 feet.

MR. SILVER:

Q. You get some influx of drainage of gas upward from the lower permeability zones?

A. Is it in the lower part?

MR. SILVER:

Q. Usually it is in the lower part but you get streaks of higher permeability with lower permeability.

MR. CORNELL:

Mr. Nichols, you stated in your opinion 72% of the gas underlying 160 acres would be withdrawn under 160 acre spacing - how much do you think under 40 acre spacing?

MR. NICHOLS:

I said it was, if we want to assume the abandonment pressure of 150#, it would be 72%.

Q. What would be the recovery from 40 acre block as compared to 160 acres?

A. You would have $\frac{1}{4}$ as much gas.

Q. How much gas is going to be missed in the sand - approximately 28% of the gas?

A. It would be the same percentage if your pressure was brought to the same pressure regardless of size of the unit.

MR. SILVER:

You could withdraw more gas on 40 acre spacing than 160 acres.

A. That is an economical problem. I don't know why you could.

Q. This isn't economics, I am just helping Mr. Cornell get his point.

A. You could take it to absolute zero pressure but you would be there an awful long time.

MR. ENGLISH:

Finishing the wells - the Picture Cliff wells have all got coal and water just above the pay zone. I wonder if it would make any difference in the finishing of the well - if it would make any difference in your pressures. We drilled a well and got $\frac{1}{2}$ more gas - we cemented off some of that gas, I wondered if that would make any difference in your pressure?

A. If you cemented the casing above that water it would make some difference.

Q. Some of these wells you are getting your figures off of - if they are wells of bad completion jobs and have some water in the well bore.

MR. THOMPSON:

We have siphon lines in every one, even then we get pressure that will be 10 to 20 pounds low.

MR. NICHOLS:

If your well bore goes into the main part of Picture Cliff sand your build-up on that well is determined by the permeability - your pressure would be all right.

COMMISSIONER MILES:

One question was asked I did not get the answer on - someone asked if it would be more complete recovery of gas with a well on 40 acres than 160 acres.

MR. NICHOLS:

If your pressure over the whole block, whether it be 40 or 160 acres, is drawn down to 150# your gas recovery percentage would be the same-recovery of gas from a 40 acre block would be $\frac{1}{4}$ of the gas recovered from a 160 acre block.

MR. LEA:

Let me get this question clear - take a 40 acre unit as opposed to a 160 acre unit. If during the commercially productive life of this field you had one well on 160 acres as opposed to one on 40 acres, in the center of each unit, and no drainage between the units, would you be able to get from a 40 acre tract more than 25% of what you would get out of a 160 acre tract - during the productive life of the entire field. For your ultimate productivity of gas during the productive life of the field would recovery be substantially greater in the case [illegible]

is it just a question of time?

MR. NICHOLS:

If your pressure is stabilized, if you draw down that whole area to 150# the same in any geographical area, if your complete 40 acre block is drawn down to exactly 150#, you would get ¼ of what is recoverable on the 160 acre block drawn down to exactly 150#. Those things are true because equal withdrawals in a given unit will be as your pressure is drawn down; just the same in a large area as a small. You will get the gas out one way or the other. It is this question of drainage from 160 acres being adequate and I believe it is.

MR. LEA:

Given a reasonable period of time, which might be measured by the economic life of the field, would your pressure equalization of 160 acres with one well be substantially all the way across that 160 acres?

A. If your permeability from one area to another is substantially the same, whether foot by foot does not matter - the permeability times the feet is uniform geographically, the answer is yes.

MR. LEA:

Would you be able to state from the study of this field and from the data available that there exists, generally speaking, that type of permeability - are you satisfied there is drainage across 160 acre tracts by virtue of permeability of the areas?

A. I believe about the first thing we introduced was that those wells drilled later in the life of the field had initial pressures considerably lower than the field initial of 585#. Those were taken where they might happen to hit and have indicated that generally speaking you have sufficient permeability for drainage over large areas.

MR. ALBERT GREER:

In your first exhibit you have shown these wells - the new wells come in with pressure between the old field pressure and the initial field pressure. In other words, you found a pressure differential which here approximates 100#. You made the statement that the wells would probably have to be abandoned at 150# pressure which I assume to be the seven day shut-in pressure you have recorded.

MR. NICHOLS:

I do not believe I stated that they had to be abandoned at 150#. This 150# arbitrarily has been set as possible abandonment pressure.

MR. GREER:

There would still be a pressure differential between the old wells and new wells.

MR. NICHOLS:

These wells vary from well to well. Even drilled at a given time there is as much as 70# difference from well to well. It would depend on where you drilled your well.

MR. GREER:

Too, isn't the differential increasing as the pressure in the old field declines.

MR. NICHOLS:

Magnitude, yes. It is not declining by percentages.

MR. GREER:

At 150# for the field we may expect a differential of 150 or 200#.

MR. THOMPSON:

I don't think there will be any new wells at that point.

MR. GREER:

I was assuming there would be - doesn't that 200# represent additional recoverable gas if the wells had been drilled on closer spacing?

MR. THOMPSON:

If you found a position to drill where that was true - but that would be uneconomical, don't you think?

MR. GREER:

I think that ought to be decided by the Commission. Approximately 3/4 of the gas originally in the place would still be there.

MR. THOMPSON:

This well - a theoretical well - what is the actual pressure - 150 plus 200# - - -

MR. GREER:

Would there be a greater recovery of gas with denser spacing - there will be more, just how much you are just about to figure out.

MR. NICHOLS:

If your pressure is 365# and initial 600# you would have approximately 61% of your pressure remaining or approximately 1,100,000,000 cu. ft. of gas. At 150# we have a little over 500,000,000 remaining, which would amount to a difference of 500 or 600 million that could be obtained between 365# and 150#.

MR. GREER:

Which represents a very large volume of gas when you consider a large field.

MR. NICHOLS:

On a 160 acre block at 5¢ a thousand, it would be about $30,000 derived.

MR. GREER:

If the operator could reduce the cost from 14 or 15 thousand dollars to 10 thousand dollars he would have a ratio of 3 to 1 and could do it economically.

MR. NICHOLS:

If your drilling cost could be reduced that great, those conditions would hold true.

MR. GREER:

That is one thing possibly an operator could do.

MR. NICHOLS:

It doesn't prove that closer spacings would recover more gas - if your pressure reduction is such that you have equalization of pressure of 150# over the entire area you will recover the same amount of gas regardless of well density.

MR. GREER:

The information you present here does not substantiate that fact. The wells open with most bottom hole pressure and the well you were testing had a draw down, very small draw down compared to very many of the oil and gas fields in the state.
We have a great draw down but spacings are not changed. The operators believed they would recover more oil or gas due to the fact that they get greater production. Draw down of approximately 400# in adjoining wells that caused draw-down of 2# in the adjoining wells was very small.

MR. NICHOLS:

But is an indication of differential.

MR. GREER:

You will have that anywhere in the United States. The question is one of how much will it draw down and how much will it affect it.

MR. THOMPSON:

I think these wells shown in the outlying area - show that.

MR. GREER:

What percentage?

MR. THOMPSON:

It is 150# compared with 600#. You are assuming pressure of some theoretical amount in the outlying area.

MR. GREER:

You do not have evidence to support that and we don't know it will do it.

MR. THOMPSON:

You have got drainage across there.

MR. GREER:

Drainage, but how much drainage and at the end of the time how much gas is left in the reservoir that you could have produced?
Spacing on 160 acres it would be adjoining wells on your spacings. We can take wells in most of the fields of New Mexico and West Texas and you will find the same type of pressure interference between wells on adjoining units. That factor alone is not sufficient evidence, it is a minor important consideration. The well spacing itself - it is going to result to the unrecoverable gas and cost of drilling the wells. There is a question it will be a considerable amount of gas left.

MR. THOMPSON:

I don't follow you. If you drilled a well on 160 acres - we are going to abandon that particular well at 150#, you could not possibly have 360# pressure inside the unit.

MR. GREER:

We are not talking about new wells - two or three miles in some cases, in most cases they are off to the sides - the average.

MR. THOMPSON:

In some cases they are 160 acres from the old wells.

MR. GREER:

When you have that you have no differential at all.

MR. THOMPSON:

All these wells had not been produced at all when this was taken. That was a dead section, no production being taken out there at all.

MR. GREER:

Let's take a close one - 416#, that is a difference of 60# on a 160 acre unit.

MR. THOMPSON:

This well wasn't being produced at the time. It had just been drilled. When you connect it with the pipe line it will immediately start declining. You would have an area of 1/4 or 1/2 mile - everywhere else where you had a well connected with the pipeline it will be coming down in pressure.

MR. GREER:

So would the well drilled five miles away, but how far would it deplete the area? Mr. Morrell said something about inadequate market for all the wells and the drilling of additional wells would further decrease the take from any individual well. It was his opinion 160 acre spacing would tend to alleviate that situation. It appears to me 160 acres would tend to aggravate rather than alleviate. There are a great many wells now drilled that lie on the inside of any particular block but the company drilled the well, which is greater than 1320 feet from the edge of the lease. This well then does not force the offset on the adjoining lease. If the 160 acre spacing is taken up a great many more offsets will be forced and required than is now existing in the field on 40 acre spacing ruling. If we take this information presented today as correct, a man would have the right and privilege to say to the land owners - I do not believe I can economically drill this well on 40 acres - it is possible he can unitize with someone or he would have a reasonable excuse for not drilling a well himself. 160 acres, he would not have the excuse or reason for not drilling the well and you would have additional wells drilled not forced or required. I think for the 160 acre spacing you require some 30 or 40 offsets in the field.

MR. LEA:

You assume that if the requested order is ordered, any 160 acre unit which wants a 160 acre unit you have got to have a well drilled on it?

MR. GREER:

I presume that to be so, if the Commission passes this ruling. It is now a 40 acre ruling and I believe it would be the same for 160.

MR. LEA:

I, If you are predicating that the government is going to [illegible] on this ruling, but if you are asserting the necessity for such offsetting I would be inclined

to disagree with you.

A. The government thinks this is the logical thing to do. It will depend on how your lease is written up. I believe they are federal leases in the Kutz Canon area - - -

MR. ENGLISH:

The majority of them.

MR. GREER:

I believe this should be taken into consideration.

MR. THOMPSON:

Nichols and I checked the amount of gas withdrawals from the two fields for last year. The average take from the whole field was 17% of its open flow.

MR. GREER:

You feel any wells in those fields would be granted an allowable to what it has been in the past, regardless of the production and spacing.

MR. THOMPSON:

I did not follow you at all.

MR. GREER:

I believe if you will show the government acreage in these fields you will find approximately 15 or 20 additional locations which will be forced if the 160 acre ruling is upheld.

MR. THOMPSON:

Why on 160 if it is not being forced on 40?

MR. GREER:

Some of the wells now drilled are more than 1320 feet from the edge of the lease.

MR. THOMPSON:

I believe that is a problem of the United States Geological Survey.

MR. SPURRIER:

Al do you mean to say that the distance of 1320 feet is the offset distance. If I am drilling a well closer than 1320 feet to your acreage then you will be forced to drill an offset. - By whose rules and regulations?

MR. GREER:

Mr. Morrell will you contradict or add to that?

MR. MORRELL:

I would like to make my statement all at one time.

MR. SPURRIER:

Is it reasonable to believe that the price of gas in this area will remain at 6¢ per thousand and it so long. I am not happy

facetious in the least - Mr. Nichols' figures were necessarily predicted on 5¢ a thousand but also the prices were assumed.

MR. GREER:

Additional recoverable gas left in the ground more from it and possibly additional wells. Just how much gas would be left is the question.

COMMISSIONER MILES:

The point I am interested in is as to the recovery. It may become more valuable - but the recovery is what I am interested in.

MANUEL SANCHEZ:

Wouldn't your regulations have to be changed then? It is a matter to be considered at the time. When the time comes if you can recover it below 150# economically, isn't that the time to come in and pass regulations?

COMMISSIONER MILES:

If it could be recovered now that would be the time to consider it.

MR. SANCHEZ:

Has there ever been any basic figure fixed upon which recovery at the present time could not be had economically?

MR. NICHOLS:

I think that varies both with your drilling cost and operating expense in any given areas; I think it would be considerably misleading for me to try to give a point such as that.

MR. GREER:

It is conceivable all gas could be recovered on 160 acre basis - it is better for the operators to get together and decide among themselves as to what they prefer. Certainly an operator is not going to drill a well closer than he feels he can recover gas economically in and at the same time he would like to be able to drill on smaller area if he feels he can.

MR. LEA:

Mr. Commissioner, I would like to make a statement. Mr. Spurrier asked the question regarding the price of gas. We don't know what is going to happen to the price of gas in San Juan County or any other location. We only know the price of gas in this general area has increased within the last 18 months from 3½¢ to 5¢. The concensus of opinion among producers is that the price of gas will increase. We all know the value of gas in a given area depends on many factors, not the least of which is the amount of gas available in that area. I don't know whether 150# or 100# or some other figure is the abandonment pressure for this field, but it strikes me that the operating costs of the producers or of the gathering company is a real and positive barrier, not only on the value of the gas but on the abandonment pressure for the field. Unless I am badly informed, I believe Southern Union Production Company in its operations in this Kutz Canon - Pulcher Basin area is required to visit every well on a daily or twice daily basis for the purpose of checking the well as to its operating condition. Having operated up in that field for a long time it has been our view, as evidenced by our own operations, we have operated on a basis of one well to 160 acres - we believe one well will reasonably and economically drain 160 acres. Anyone is entitled to his views, and ours should not necessarily prevail; however, we have gone to some effort to either confirm or modify our own conclusions and while it is probable that in any given period you can get more gas out by putting four wells on 160 acres; it is also true and cannot be denied that you do have drainage, counter drainage, cross drainage and drainage

from wide areas. If the present spacing rule prevails - I have heard some comments that made me wonder whether someone would really like to see 240 or 320 acre spacing, but so long as the present 40 acre ruling prevails in these fields some 20 years old - where pressures have declined without exception because of adjoining wells - we contend there is ample drainage across 160 acres. 1/3 of the gas has already been taken out. To leave the spacing like it is will permit or perhaps encourage the drilling of wells on a 40 acre basis, and is actually going to reduce the value of gas produced from that field because of additional operating cost, ultimately, to the man interested in getting value from that gas. My people are convinced we should have had 160 acres in the field all the time. To a large extent we have, in fact, operated on the basis of 160 acres; it is the smallest area that we think is a proper spacing unit. It isn't really feasible to try to unitize any smaller, but if you did you would almost be compelled to go to 40 acres. There might be some gas in remote areas that will never be recovered but we cannot see the economics of it. We can see it is liable to permit and encourage the operators to drill to their own self-destruction. I think we are all interested in getting the most gas for the least money. We want all the gas we can produce consistently with reasonable investment. It will naturally take longer to get that 71% of the total reserves out of one well on 160 acres than it will take with one well on each 40 acres; as pressures get lower and lower it is naturally going to produce less.

With the Southern Union Compressor Station serving this area - it is now some 2000 HP - and the gathering lines and with 160 acre spacing prevailing we aren't concerned about our ability to get the gas out of there. There is a definite danger to anybody owning and operating in that field under a spacing rule that will permit the drilling of wells on 40 acre units. We have just had an example of it - we have some wells located on like units, under the rule of the Commission and don't criticize it. Under your rules, however, it was proposed recently to drill a well up in the neck of three 160 acre units 330 feet from each of them. Such well would require a 3 way offset and that kind of thing isn't even 40 acre spacing. We would be forced to pay compensatory royalty or drill three wells to offset - I am sure my figures are right and the distance between those wells is only 660 feet. If that is not 10 acre spacing I am badly mistaken. It is this very situation that brought this matter before this Commission. The well was re-located before it was commenced and put in the center of a 160 acre unit. We sincerely have brought this thing to the Commission because we felt that something had to be done. We are drilling in an old area where 1/3 of the gas is already gone. As to the old wells on small units, the wells were drilled properly and lawfully at the time. They are there and if we had it all to do over again we wouldn't drill them in some cases. Whether that is true with some other people I don't know, but there the wells are and we cannot do anything about it. We do know that one well will drain more than 160 acres of land if given a reasonable opportunity in point of time. We suggest 160 acres because that is the generally established spacing.

COMMISSIONER MILLS:

Anybody else like to ask any questions?

(No response)

Let me get one point straight - as an overall picture, I was talking about the number we were discussing at that particular time pertaining to whether or not we would produce more gas from 4 wells on 40 acres each than 1 well on 160 acres.

MR. LEA:

I would concede it is manifest that in the same period of time you can extract more gas on 160 acre tracts by drilling 4 wells than one well. It is the limiting factor of the open flow. I think everyone realizes that they can produce more gas per day with 4 wells than one. Our problem is to find an optimum spacing unit being the reasonably adequate and economical unit for the field. We certainly cannot produce more gas ultimately from 4 wells than if we looked on a 160 acre unit.

JUDGE SETH:

On behalf of the Stanolind Oil Company I am instructed to advise the Commission they have no objection, but believe the spacing should be larger than the 160 acres in these pools of gas.

DUDLEY CORNELL:

Mr. A. Greer has been informal chairman of independent operators, and he asked me to ask that a copy of these exhibits be made available - and that the independent operators be allowed a rebuttal at the next meeting of the Commission.

MR. LEA:

I don't know what that means exactly, but it strikes me a little singular. We went to the extreme of mailing to each person a copy of our petition with the suggestion that we exchange information with a view to ending our business properly at this hearing. I do not comprehend exactly why it should be necessary under those conditions - adequate notice has been given and we had no request from anyone for information. We did not hear from Mr. Cornell. We are not denying the opportunity to anyone to be heard in this matter, but I believe the opportunity has been given.

MR. SILVER:

I would like to make a statement for my employer. As I said before, we have no particular desire about well spacing other than the most economical. We have a peculiar problem in San Juan Basin of having a like permeability of sand structure, productive areas which are not too well understood to the present day. We do not particularly have any preference in this field, we have a small amount of acreage on which we probably will never drill. We would like to see, if possible, additional data on this field as time goes on. So far as the 160 acre spacing is concerned, it is entirely feasible that a greater or lesser spacing might be desirable. That should be determined from the economic facts. We would like to see the data given here today given to us in some form.

COMMISSIONER MILLS:

Mr. Lea, you do not feel you can operate on less than 160 acres from an economical standpoint?

MR. LEA:

We sincerely think it would be a mistake to do it. Mr. Nichols' figures assume $16,000.00 cost and a 5¢ rate on present day conditions. If you could find a spot where a well drilled could produce 535¢ and you drill on 40 acres, the only thing other than 160 acres that is feasible, you would recover only 87½ of your investment disregarding operating cost and disregarding the fact that it would take you years to do it in. If you drill a well with 400# of pressure you would recover - assuming you had this kind of condition, exactly one-half your original investment.

MR. ENGLISH:

You fellows have been talking on pressure all day and have never mentioned the millions of feet you could get.

MANUEL SANCHEZ:

Mr. Nichols gave it in the record.

MR. ENGLISH:

I would like to know about millions of feet of gas.

MR. THOMSON:

The testimony has developed the net recoverable gas on 160 acres as 1,300,000,000 feet. If you drill on 40 acres and everybody else does, your recoverable gas would [illegible] the area of the present field covers approximately 22,000 acres; if you drill [illegible]

wells at $16,000.00 a well - would be almost $8,000,000.00 you would have to spend. It would be impossible to ever recover the original investment.

MR. LEA:

My statement was made on the same assumption, a 400# well could never produce the same quantity of gas as a 585# well.

MR. ENGLISH:

You fellows have anything against ratable taking?

MR. LEA:

No. But about a year ago there was a bill appeared - about a year ago - and it was the most immature I have seen. If we are going to have one, let's have a good one.

COMMISSIONER MILES:

That was the only bill presented, you had the same opportunity of anybody else to present one. The meeting was called for the purpose of discussing it and that should not be taken as an example.

MR. LEA:

I did not mean to suggest that at all, but the fact does remain that a bill was presented and we thought it a bad one and had to oppose it. Pro-ration may come to this field, perhaps it should. There are people in the field today that would be hurt by this. Our only question about pro-ration would be the additional burden on the operators and the Commission.

COMMISSIONER MILES:

This is a matter to come before the Legislature and not this Commission.

MR. GREER:

I would like to request that the Commission consider the offsets that will be required if a 160 acre spacing ruling is upheld or in deciding on spacing ruling that they be taken into consideration; and the reason for that being considered I would refer to Mr. Foster Morrell's letter in which he remarks about the market, and the increased number of wells causing the production from each well to be so small as to make it uneconomical to drill additional wells. Also the rule 4 - 40 acres to a unit, and establishing a great number of bad spaced wells throughout the field. I doubt that the average spacing in the field exceeds 120 acres. I do not believe the retaining of the 40 acre spacing unit will see additional wells in the old field unless it does become economically feasible.

FOSTER MORRELL:

I would like to clarify the points that have been raised.

First, in order to show the interest that the Federal Government has in the Kutz Canyon - Pulcher Basin areas, I have prepared some acreage figures. A conservative estimate taking in more than 1/2 mile from present existing wells - arrived at a figure of approximately 22,080 acres that could be considered as proven production. From the south end of Section 32 up to Section 19, 30 N, 12 W - of that acreage the federal is 16,200 or 71%, fee land 6400 acres or 29%. According to our maps there are 80 acres of state land we could not get percentage mark on. On that proven acreage there have been 77 wells completed; 45 on government lands and 32 on fee lands. The development, 58% of the wells, against 42% for fee lands as compared to 71% of the acreage, broken down to fields - Pulcher Basin total is 12,800 - 58% lands government, 42% fee and no state.

In the Fulcher Basin fields, 40% of the wells on U. S. land, in number 21 on U.S. land, 31 on fee land - a total of 52. Kutz Canon is a total of 10,280 acres, of the federal interest represents 96%, of the fee 4%. Twenty-five wells have been completed, 24 of those 25 wells are on our federal land, with the control we have under the lease act and federal leases in Kutz Canon, we have 96% of the acreage developed by 96% of the wells. Going back somewhat into history of the development, I think the whole picture is somewhat complicated by the variance of opinions of individuals versus companies which we always have with us, but our position is one that equity should be provided regardless of whether the operator is a major company or an individual or small company. The facts with respect to development are indicated in a very short statement I reported recently to Washington, that during the past six years wells increased from 8 as of December 31, 1941 in Fulcher Basin only to 15 as of December 31, 1944 and 51 as of December 31, 1947. A ratio of 8 to 51 or over six times increase. The field withdrawals during that period is represented by the figures of 1 billion cu. ft. for 1942, 1.9 billion in 1945, and 2.6 billion in 1947. That is a ratio of one to 2.6. We have a number of outlying producing wells but the number of wells increased 6 times and the market increased by only 2.6 on all wells in the same period. The withdrawal per unit decreased.

MR. ENGLISH:

Have they been taking all that gas?

A. They have a market for all the gas.

MR. ENGLISH:

If you are furnishing gas from Barker you wouldn't be taking as much gas from Fulcher Basin?

MR. MORRELL:

Barker comes into the pipeline south of Kutz Canyon and does not affect the deliveries in the Kutz Canyon - Fulcher Basin area.

Any market from any field will depend on deliverability of the gas from that field, and deliverability depends on the open flow capacity. You can't get away from pressure at the rate to which the wells can get it up.

MR. ENGLISH:

At one time they had the same pressure in each field. You are not going to try and tell me there isn't any more gas than before. How do you know this field won't reach out and take in a large area?

MR. MORRELL:

This is just a matter of record of past production. The point we are making is that you have greater increased wells than you have in the market, which means you will have to divvy up your market.

MR. ENGLISH:

From what I hear there is a pretty good size market.

MR. GREER:

Isn't it natural for the pressure of gas wells to decline in any gas field? They could have taken more gas from time to time by lowering their pressure.

MR. MORRELL:

I don't know about lowered pressure in order to get more gas. It is a matter of record in all gas publications that for protection of reservoirs gas should not exceed 25% of the flow. Over the years you will find this limit to maintain.

MR. GREER:

The question of whether it should be maintained at 25% of the open flow and

whether you hurt the reservoir by taking more is certainly an open question.

MR. MORRELL:

It has been debated for the last 30 years and there has been very little proof otherwise. You are getting to the matter of rate at which a reservoir will re-charge itself. If you pull it out too fast when it comes you are going to have to sit there and wait for it.

MR. GREER:

I do not believe you could find evidence to substantiate that.

MR. SILVER:

This field and your data given - more gas by harder draws and I believe it will be substantiated.

MR. THOMPSON:

I said the average annual take was 17% of its open flow, I don't know of a field in the country that is being given a better pull than that.

MR. MORRELL:

In the earlier days of development, there were certain spacing exceptions made before it was determined that a 160 acre spacing was the most economical and best for the reservoir - at that time by agreement with both Southern Union Gas and Dudley Cornell in connection with the development of the Fulcher Basin field, the only one active at that time - we set up 160 acre units. P.A.W. had the 640 acre limitation and at the request of Cornell and Southern Union Gas, several 160 acre exceptions were made.

MR. CORNELL:

MR. CORNELL:

Southern Union Gas refused to join with me in my application at that time.

MR. MORRELL:

The fact was that we had 160 acre spacing and the Oil Conservation Commission adopted an order for that field - Order 561 effective in June 1943.

On application from private land operators and after a hearing of the Commission, the Commission cancelled the order. The Interstate Compact Commission made a recommendation that well spacing adopted during the war should be continued wherever feasible to protect equities. A great additional development - this increase from 15 to 31 over a three year period has been to a considerable extent caused by the recent development on private lands along the Animas River. I think they are entitled to all the gas underneath their ground and should be given considerations, but I don't think that acreage should set up spacing for the entire field. What the Commission could do and should do has been pointed out in the testimony. The only other thing I could see at this time would be by legislation for pro-ration, as Mr. Cornell proposed. As I understand the petition of the Southern Union Gas it is for development from now on and will not adversely affect any existing wells up to this time. In answer to some of the questions that have been raised, Mr. Greer has given us some ideas. Maybe we can get more wells drilled ourselves.

MR. ENGLISH:

That is what we are afraid of.

MR. MORRELL:

The question of offsets is a matter of your lease terms, lease terms on private lands are more strict than on federal land. If the operator does not do what the owner thinks he should, he can take it into court and you have to drill an offset. The public lands leases allow considerable discretion - that discretion is in favor of the operator. Compensatory royalty is called for in lieu of actual

drilling. We made this as to each location and wherever a possible location might be we take into consideration all known facts. If we think there is drainage we will call on you to show cause why you shouldn't drill. You have a chance to show us and if the information is adequate that is all there is to it. Our office at Roswell has leaned over backwards on the spacing matter in Fulcher Basin, primarily because of the small type of production obtained. To let this thing come to a head where it can get to a point of development - I have in mind a tract surrounded by four wells, immediately adjoining that 120 on which we have asked Byrd-Frost to drill one well, but if the Commission does not see fit to protect the equity of operators who have already drilled and allows unnecessary wells to be drilled on 40 acre tracts - - -

MR. ENGLISH:

What well is that?

MR. MORRELL:

That is the Byrd-Frost Hudson.

MR. ENGLISH:

You don't consider that a gas well?

MR. MORRELL:

That is a gas well of the type being completed in that field.

If the Commission does not see fit to set up a minimum spacing for that, more than 40 acres and up to 160, it may become necessary for us to essentially draw a fence around private operations by requiring offsets where we have a block of acreage on 160 acre spacing. We don't want to do that, that is false economy. The testimony presented has shown this is more a matter of economics than anything else. I would like to take exception to Mr. Greer's statements as to the gas left in the ground. There will not be any more gas in the 160 than the 40. I would also like to correct a statement made by Mr. Silver - you said you had an identical field.

MR. SILVER:

I meant the geological boundaries - type of formation, age, conditions of accumulation, everything but the pressure.

MR. MORRELL:

Would you name that for the record - the name of the field?

MR. SILVER:

Blanco field - two producing zones, Mesa Verde formation and Point Lookout sandstone. 4400 feet and approximately 5051 feet.

MR. MORRELL:

Pressure is about what?

MR. SILVER:

The pressure is around 1300#, the only difference, the accumulation is currents of gas the limits of the field and their field is not limited by geological conditions so much as by economical factors of production and development. We feel we have a field limited the same way by economic factors of production and development. The geological factors closely approximate those in Fulcher Basin - Kutz Canon.

MR. MORRELL:

I understood you were talking of an entire different reservoir. You made the statement what was done in the Fulcher Basin and Kutz Canon would apply directly to your field.

MR. SILVER:

I meant what action the Commission might take on low permeability reservoir, it is economically a marginal reservoir, has to be produced as such. We feel also our reservoir might be marginal reservoir and will have to be produced as such. The action of the Commission in this case will have some bearing on our field.

MR. MORRELL:

Did you have in mind a spacing of 160 acres or more.

MR. SILVER:

Our pressure is greater. We could not conceivably see less than 320 acre spacing.

MR. MORRELL:

As I recall, the south of your present wells at San Juan, the river crosses your structures on which there is considerable land. The same question could arise in the Blanco area as in Fulcher Basin.

It may be a good idea to make an application to the Oil Conservation Commission before it gets out of hand.

MR. SILVER:

We feel we cannot discuss it with the Oil Conservation Commission without a geological survey.

MR. LEA:

Yours is a new field?

MR. SILVER:

No, it is fully as old as Fulcher Basin.

MR. MORRELL:

I would like to mention for the information of the Commission - I think Governor Miles mentioned something about 5¢ gas - I think the operators in Fulcher Basin - Kutz Canon should feel very fortunate that they are receiving 5¢ mcf because there is no other gas produced in the State of New Mexico that is getting 5¢ per mcf. The standard price in Lea County - the best you can get on normal sale is 3½¢ mcf.

I do say, as stated in this letter, the 160 acre spacing is a necessary thing to protect all parties who have drilled wells - to protect them from losing the money they have invested - the questions that have been asked indicates a lack of knowledge of what may happen in the future on the part of some individual operators who may be making investments and end up in the red. If we have operators losing money it is going to discourage development. We want to keep operators on a profitable basis.

MR. [illegible]:

If we get 160 acre spacing and if we want to drill a well in Farmington.

MR. MORRELL:

Wouldn't have any effect.

COMMISSIONER MILES:

Anyone have a question or statement to make?

MR. J. E. GALLEGOS:

I would like to present these petitions from farmers in San Juan County, and [illegible] record.

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COMMISSIONER MILES:

They will be considered by the Commission and included in the record.

MR. LEA:

While all these statements have been made without the benefit of the testimony I have some other statements for the record.

One from the Western Natural Gas Company expressing approval of the plan, and one from J. J. Hudson. There seems to be several spots of concern about exceptions; I guess we have taken it for granted that exceptions would be provided by the Commission. There will be and there are situations in which if the operator can find it economically feasible to drill he should be permitted to do so, on petition to this Commission describing what he expects to do and be given full consideration whatever spacing unit should be adopted. That applies not only in the well developed field but in the flanking areas where open flows and permeability are a little out of the trend. The citizens from Farmington seem concerned over the statement in the petition that the Commission's order should govern the field or area as it might be extended. The only purpose of that is to make unnecessary new orders of the Commission on account of extensions. The Commission's order should include the immediate surrounding area of the field as it is extended; otherwise, it could only be controlled by repeated orders of the Commission. I did not suppose anyone had the idea this field would include other developed areas. The Commission's order should have a provision to include this field and exclude other producing areas. So far as other areas are concerned it strikes us there is not sufficient information to this Commission or to the operator to know what is needed. There is no reason to prevent this Commission from entering, on petition, whatever additional orders might be necessary.

MR. MORRELL:

Of the wells drilled 71% of the total and 96% in Kutz Canon and 54%, I believe, in Fulcher Basin are on Federal land. I would like to add we have had in the past several applications and one current for relief an account of high operating costs, for relief from rentals on public land leases from $1.00 an acre to 25¢ an acre. In granting those the Department has recognized the low return. We have one by Mr. Carroll and Mr. Carroll has developed his own lease on 160 acre spacing and still needs reduction on the rental.

This increased number of wells and the annual rate of withdrawals at 2.6 billion for 1947 and estimated for 1948 approximately the same. Fifty one gas wells in Fulcher Basin $15,000 or $16,000 per well for cost of drilling. You can add your taxes, you would have in the neighborhood of $1,000 to $1,500 net per year, in the neighborhood of $100 per month. That is the situation if you get into excess wells it will continue to decrease. Instead of $100 to $150 per month you get $75 to $100 per month.

MR. GORDON:

Byrd-Frost encourages spacing not less than 160 acres to the well, but we are concerned with this offset proposition and also feel when the boundaries of the field is reached there should be some latitude given on the location of wells less than 1/2 mile if possible, and should be a little latitude there.

MR. [illegible]:

The geological limitation of the field we have been discussing will be more by economics than by geology.

MR. MORRELL:

I will say as much.

MR. ENGLISH:

According to the United States Geological Survey there is no structure there.

MR. MORRELL:

I am afraid we would have to differ, anything is a structure.

MR. GRAHAM:

What area did the proposed order apply to?

MR. THOMPSON:

Approximate area is described in the application.

COMMISSIONER MILES:

Anybody else any question to ask or any statement to make?

The Commission is going to take this case under advisement and anyone who wants to file a written statement to the Commission, we will be glad to have you do so.

C
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P
Y

ALBERT R. GIL JR.
Registered Petroleum Engineer
State of New Mexico

1020 North Shipp
Hobbs, New Mexico
February 21, 1948

The New Mexico Oil Conservation Commission

Santa Fe, New Mexico

Concerning: Brief submitted on behalf of some of the independent operators and small land owners of San Juan County in regard to:

Case Number 186, relative to the request of The Southern Union Gas Company for a spacing ruling for the Fulcher Basin-Kutz Canyon Gas Fields, San Juan County.

Gentlemen:

I wish to submit herewith for your consideration in this matter a few written statements concerning my own and testimony pertaining thereto, as I have analyzed it.

1. The general problem of optimum spacing in any field requires careful study and a large amount of carefully gathered and compiled information.

2. Until approximately two weeks prior to this hearing all of the necessary [illegible] was available only to the Southern Union Gas Company. [illegible] information has been compiled by them [illegible] available to [illegible]. [illegible] individual. [illegible] adequate to provide a [illegible].

3. A spacing ruling in an old field without regard to proration--or without a proration ruling--would, in effect, be a direct contradiction to the conception of correlative rights as understood in the petroleum industry.

> For, just as new 40-acre wells offsetting old wells on 160 acres would unfairly drain the 160-acre tract; so would new 160-acre units be drained by old wells on 40-acre tracts.

4. The problem of increased wells without an unlimited market, and resulting smaller [illegible] production rate as brought out by Mr. [illegible] of the [illegible] would, in my opinion, be more likely aggravated by 160-acre units than relieved; due to the increased number of forced offsets.

5. In regard to the evidence presented at the hearing, February 17, 1943 it was shown that old wells had a drainage influence over extended distances in some areas, and in interference test conducted on adjoining wells established communication between them: but the evidence presented did not show how much [illegible] as will be left unrecovered in the reservoir at abandonment for various well spacings; nor did the testimony describe the manner in which wells [illegible] located on 160-acre units [illegible] wells could [illegible] feasible.

[illegible] point out:

> (a) [illegible]

> (b) [illegible]

in the reservoir for various well spacings; for which subject inadequate testimony was presented.

(c) A provision should be made, if a spacing of 160 acres per well is contemplated, to permit later infilled drilling on a closer spacing, if ever proven economically feasible. It should be recognized that the next smallest, practical spacing from 160-acre units is 80 acres per well; and this is possible only if the wells on the initial 160-acre tracts are spotted on 80-acre patterns. If a rigid center-spot location on 160 acres is required, the only uniform spacing on infilled drilling for each 160-acre tract, would require 4 more wells, or an average of 32 acres per well.

From the testimony presented at the hearing it can be seen that an increase in the price of gas, plus a decrease in the cost of drilling the wells (both of which are normal trends*) would justify infilled drilling on 80-acre locationsif it is found later that as much as approximately 25% more gas can be recovered on the closer spacing. This same information indicates that infilled drilling of 32 acres per well would probably never be economically feasible. Hence, 160-acre center-spot locations would make later infilled drilling on individual 160-acre tracts forever impossible.

Moreover, a study of the field indicates that a large number of the drilling units can be more effectively drained by locating the wells in the most permeable part of the unit; and this permeable part is not necessarily in the center of 160-acre tracts. For the same number of wells, the field can be more effectively drained by placing the wells in the most permeable parts of units rather than rigid centerspot locations.

It is therefore requested, that in the event the Commission decides to set a spacing pattern requiring 160-acres per well, that consideration be given to flexibility of locating each well on its unit; in order that maximum advantage [illegible] from the continuously developed [illegible] and [illegible] information; and in order that operators may have the opportunity to locate their wells on 80-acre patterns if they so choose, so that they would be in position in the future to infill wells if proven

e onomically justifiable.

6. It is realized that some action may be necessary to protect the investment of operators who drilled wells on 160-acre tracts. It is possible, however that the entire situation could best be handled by an operators committee formed by active operators in the area. Regular meetings could be held and all additional information studied and discussed. In the event of failure of such a committee to bring reasonable agreement among the operators, resort could be had to legal action by the Oil Conservation Commission.

Yours very truly,

/s/ Albert L. Greer
Albert L. Greer

* The decrease in the cost of drilling would result from improved methods and competition in drilling as more activity centers in this area.

El Fidel Hotel
Albuquerque, New Mexico

February 13, 1948

Oil Conservation Commission
Santa Fe, New Mexico

Gentlemen:

The writer has made a study of the petition of Southern Union Production Company for a spacing order fixing the spacing of wells hereafter drilled in the Kutz-Canyon-Fulcher Basin gas fields, looking towards the best interest of the United States, the State of New Mexico and the development of potential areas involved. It is my opinion that this proposed program is sound. No doubt, there will be instances where exceptions are warranted, which would come under the wise discretion of the New Mexico Oil Conservation Commission.

Respectfully,

J. J. Hudson

JJH:fr

cc - Southern Union Production Company ✓
Burt Building
Dallas 1, Texas

EARL A. NICHOLS
Consulting Petroleum Engineer
2000 KIDWELL STREET
DALLAS, TEXAS
TJ-1122

E-4-126

February 5, 1946

Mr. Van Thompson
Southern Union Gas Co.
Burt Building
Dallas, Texas

Dear Mr. Thompson:

I have received the charts giving the results of the recommended field tests. These tests were performed on the Lutz Cannon - Fulcher Basin Field in order to attempt to establish a positive, mechanical answer as to whether pressure interference exists across 160 acre tracts in the above mentioned field. It was our belief that should such pressure interference exist between wells now drilled on approximately 160 acre spacing, one could accordingly feel that drainage across 160 acre tracts existed.

Seven wells whose approximate spacing are 160 acres per well were chosen. They were the SUP Walker #1, SUP Walker #2, SUP Mc Grath #1, SUP Mc Grath # 2, SUP Mc Grath # 3, SUP Kattler # 1, and the SUP Hudson # 2 wells. These wells were shut in at noon January 9, 1946 and remained shut in until 8:30 A.M. January 12, 1946. At this time all of the wells except the Walker # 1 were put on production against a line pressure of 261 to 270 P.S.I. ga. at 9:00 A.M. on January 13th, the surrounding wells were taken off of the line and blown to the air, the Walker #1 still remaining shut in. A recording pressure chart on the well head of the Walker # 1 well during this test reveals the attached tabulated and graphical results.

It is to be noticed that due to the normal cycle of atmospheric temperature change during a 24 hour period, the temperature effect on the recording instrument shows a distinctive 24 hour cycle change on the recorded pressures. To help clarify this effect, the pressures were plotted versus time of day and this graph is included. It will be noticed that, in spite of these temperature effects, the overall curve of pressures for the second day [illegible] shows the [illegible] first [illegible] shut in period. This is explained, of course, [illegible] will [illegible] of pressure due [illegible] shut in. Likewise, [illegible] of pressure for the 3rd [illegible] day, showing this same build up. The [illegible] production, on the [illegible] day, but the effect on Walker # 1 is not significantly felt until the 5th day. It will be noticed that the curve of pressures for the 5th day falls much below those of the 4th day, [illegible] pressure [illegible].

In order to try to evaluate the magnitude of this pressure drop, an arithmetic average of the pressures the last 24 hours of the tests give a value of 101,8 P.S.I. gauge. An arithmetic average of the pressures during the same hours of the preceding day gave 103.6 P.S.I. gauge. This is a 1,8 pound drop. This may not seem like a large drop, but after considering all of the reservoir factors involved, this is felt to be as large a pressure drop as one might expect.

It is my feeling that these tests have conclusively shown pressure interference between wells now drilled on a 160 acre pattern. It is further my feeling that since pressure draw down can be experienced between such wells, drainage of reservoir material across 160 acre tracts exists under such conditions.

If there are any points discussed on which you would like further comment, please contact me.

Very truly yours,

Earl A. Nichols

Earl A. Nichols

EAN/lv

SHUT IN PRESSURES on WALKER # 1

Time	1st day	2nd day	3rd day	4th day	5th day
Noon	363	398	402	407	407
1 PM	381	398	403	407	407
2 "	384	401	405	408	402
3 "	387	403	406	402	402
4 "	389	401	404	402	402
5 "	387	398	402	407	403
6 "	383	395	401	406	404
7 "	383	394	400	404	403
8 "	382	393	400	404	403
9 "	381	392	398	403	403
10 "	382	391	396	403	402
11 "	381	391	394	402	402
12 Midnight	381	390	395	402	401
1 AM	381	398	393	402	400
2 "	381	396	398	401	400
3 "	382	396	393	401	400
4 "	382	394	393	401	400
5 "	383	394	394	400	400
6 "	383	394	394	400	399
7 "	384	394	394	400	398
8 "	388	390	401	402	399
9 "	392	397	403	403	
10 "	396	399	404	404	
11 "	398	402	406	407	

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Ed 5-126

P. O. Box 997
Roswell, New Mexico
February 10, 1948

AIR MAIL

Mr. Willis L. Lea, Jr.
Southern Union Production Company
Burt Building
Dallas, Texas

Dear Mr. Lea:

Reference is made to your letter of January 26, enclosing for our information a copy of Southern Union Production Company's petition forwarded to the New Mexico Oil Conservation Commission requesting an order, after notice and hearing, fixing spacing requirements for wells hereafter drilled in the Kutz Canyon-Fulcher Basin gas fields, San Juan County, New Mexico. You requested our opinion concerning the proper spacing of wells in these fields.

The essential facts presented in your petition are substantiated by the records of this office, and, accordingly, this office concurs in your request for the establishment of a well spacing plan with a minimum of one well to 160 acres to promote orderly development without waste in the Kutz Canyon and Fulcher Basin gas fields.

As most of the lands in these fields are public lands of the United States, it is the desire of this office to encourage uniform and economic development and greatest ultimate recovery of gas from these fields. This can be accomplished only so long as a reasonable profit can be secured from capital invested. Federal leases have been developed generally on a well spacing pattern of one well to 160 acres, except where necessary to protect properties from closer spacing by offset operators.

Only where the market demand and marketing facilities are unlimited for continued expansion with the completion of additional outlets or producing gas wells can necessary profit be obtained to continue development. These conditions are not present in the fields under consideration. Hence the drilling of unnecessary wells does not proportionately increase the ultimate volume of gas available for sale but instead tends to reduce the margin of profit of all wells in the fields and to discourage proper development of the fields.

Future development at a well density consistent with the majority of past development is essential to prevent injury to neighboring leases or properties and to protect equities involved.

There is no objection to your use of this letter in connection with your petition to the New Mexico Oil Conservation Commission. As this office is very interested in the subject, I expect to be present at the hearing in Santa Fe on February 17.

Very truly yours,

Foster Morrell

FOSTER MORRELL,
Supervisor, Oil and Gas Operations

Include in case file #126

ALBERT R. GREER
REGISTERED PETROLEUM ENGINEER
STATE OF NEW MEXICO

1020 North Shipp
Hobbs, New Mexico
February 21, 1948

The New Mexico Oil Conservation Commission

Santa Fe, New Mexico

Concerning: Brief submitted on the behalf of some of the independent operators and small land owners of San Juan County in regard to: Case Numuber 126, relative to the request of the Southern Union Gas Company for a spacing ruling for the Fulcher Basin-Kutz Canyon Gas Fields, San Juan County.

Gentlemen:

I wish to submit herewith for your consideration in this matter a few written statements summarizing this case and testimony pertaining thereto, as I have analyzed it.

1. The general problem of optimum spacing in any field requires careful study and a large amount of carefully gathered and compiled information.

2. Until approximately two weeks prior to this hearing all of the necessary information has been available only to the Southern Union Gas Company. At that time part of this necessary information had been compiled by them from their files and made available to interested parties. Two weeks is not sufficient time, however, to permit a study of this nature by an outside company or individual. Moreover, the information assembled at that time was not adequate to provide a definite solution.

3. A spacing ruling in an old field without regard to proration-- or without a proration ruling— would, in effect, be a direct contradiction to the conception of correlative rights, as understood in the petroleum industry. For, just as new 40-acre wells offsetting old wells on 160 acres would unfairly drain the 160-acre tract; so would new 160-acre units be drained by old wells on 40-acre tracts.

4. The problem of increased wells without an unlimited market, and

resulting smaller per well production rate as brought out by Mr. Foster Morrell of the USGS would, in my opinion, be more likely aggravated by 160-acre units than relieved; due to the increased number of forced offsets.

5. In regard to the evidence presented at the hearing, February 17, 1948 it was shown that old wells had a drainage influence over extended distances in some areas, and an interference test conducted on adjoining wells established communication between them: but the evidence presented did not show how much gas will be left unrecovered in the reservoir at abandonment for various well spacings; nor did the testimony describe the manner in which wells would be located on 160-acre units in order that wells could later be infilled on smaller tracts, if proven economically feasible.

To briefly clarify these points, I wish to point out:

(a) That, although drainage over extended distances has been proven and communication has been established between adjoining wells; the Kutz Canyon-Fulcher Basin Field is not unique in this respect. The same can be shown for most of the oil and gas fields now in existence.

(b) In view of this, a decision on a spacing ruling should be based—not from evidence of communication and some drainage alone— but also from a consideration of the value of the ultimately unrecoverable gas left in the reservoir for various well spacings; for which subject inadequate testimony was presented.

(c) A provision should be made, if a spacing of 160 acres per well is contemplated, to permit later infilled drilling on a closer spacing, if ever proven economically feasible. It should be recognized that the next smallest, practical spacing from 160-acre units is 80 acres per well; and this is possible only if the wells on the initial 160-acre tracts are spotted on 80-acre patterns. If a rigid center-spot location on 160 acres is required, the only uniform spacing on infilled drilling for each 160-acre tract would require 4 more wells, or an average of 32 acres per well.

From the testimony presented at the hearing, it can be seen that an increase in the price of gas, plus a decrease in the cost of drilling the wells

ALBERT R. GREER
REGISTERED PETROLEUM ENGINEER
STATE OF NEW MEXICO

(both of which are normal trends*) would justify infilled drilling on 80-acre locations if it is found later that as much as approximately 25% more gas can be recovered on the closer spacing. This same information indicates that infilled drilling of 32 acres per well would probably never be economically feasible. Hence, 160-acre center-spot locations would make later infilled drilling on individual 160-acre tracts forever impossible.

Moreover, a study of the field indicates that a large number of the drilling units can be more effectively drained by locating the wells in the most permeable part of the unit; and this permeable part is not necessarily in the center of 160-acre tracts. For the same number of wells, the field can be more effectively drained by placing the wells in the most permeable parts of units rather than rigid center-spot locations.

It is therefore requested, that in the event the Commission decides to set a spacing ruling requiring 160-acres per well, that consideration be given to flexibility of locating each well on its unit: in order that maximum advantage may be realized from the continuously developed geological and engineering information; and in order that operators may have the opportunity to locate their wells on 80-acre patterns if they so choose,so that they would be in position in the future to infill wells if proven economically justifiable.

6. It is realized that some action may be necessary to protect the investment of operators who drilled wells on 160-acre tracts. It is possible, however that the entire situation could best be handled by an operators committee formed by active operators in the area. Regular meetings could be held and all additional information studied and discussed. In the event of failure of such a committee to bring reasonable agreement among the operators, resort could be had to legal action by the Oil Conservation Commission.

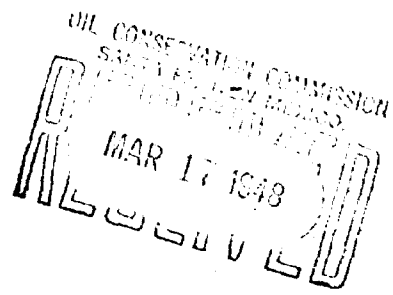
Yours very truly,

Albert R. Greer

*The decrease in the cost of drilling would result from improved methods and competition in drilling as more activity centers in this area.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 997
Roswell, New Mexico
March 15, 1948



Mr. R. R. Spurrier
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Dear Mr. Spurrier:

Reference is made to the petition of the Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canyon and Fulcher Basin gas fields, San Juan County, New Mexico, on the basis of one well to a drilling unit of approximately 160 acres, testimony on which was taken under Case No. 126 at the hearing held in Santa Fe on February 17.

The Department of the Interior has approved five agreements communitizing Federal lands with fee lands in these two fields for drilling units of 160 acres. In approving these agreements the Department has stated

> "The major portion of the gas production in the Fulcher Basin (or Kutz Canyon) field has been developed on an average spacing pattern of approximately 160 acres per well. Development on the basis of 160 acres per well is considered to be adequate for efficient exploitation of the gas reserves."

In the Approval-Certification-Determination executed by the Assistant Secretary for each of these agreements, which included separate or isolated 40 or 80 acre tracts of Federal land, is the following action:

> "Determine that the portion of the Federal leasehold committed to the attached agreement cannot be independently developed and operated in conformity with the established well-spacing pattern for the (Kutz Canyon or Fulcher Basin) gas field and that consummation of the agreement will be in the public interest."

Your files should show the conditions under which 160 acres well spacing exceptions for drilling gas wells in these fields were granted by the Petroleum Administrator for War which include the following:

each well be drilled on a drilling unit of not less than 160 surface acres; each well be drilled at least 1980 feet from all other wells; and each well be drilled at least 990 feet from any lease line, property line, or subdivision line which separates unconsolidated property interests.

Enclosed is a copy of a form letter dated March 1 from Fred Peasel and a copy of my instructions of March 10 regarding the spacing of gas wells on Federal leases adjoining lease Serial No. 076563, issued to Peasel.

This information is being furnished with the hope that it would be helpful to the Commission to have further knowledge of the position taken by the Department of the Interior and by this office with respect to well spacing in the two gas fields as to Federal land. I would like to add that if at all feasible under existing State statutes, it would be most equitable to all parties concerned to include provision for allocation of gas in any order the Commission may issue establishing well spacing units in the Kutz Canyon and Fulcher Basin gas fields.

Very truly yours,

Foster Morrell

FOSTER MORRELL,
Supervisor, Oil and Gas Operations.

Enclosures

FRED FEASEL
LAWYER
FOSTORIA 4, OHIO

March 1, 1948

U. S. Geological Survey
Box 187
Artesia, New Mexico

Re: Lease Santa Fe 046563
Fred Feasel, Lessee

Gentlemen:

The Oil Conservation Commission of New Mexico is now considering the advisability of adopting the policy of only one gas well, centrally located, to every 160 acres in the Kutz Canyon and Fulcher Basin Fields. If this policy is adopted, it should mean that no well would be located nearer than 1320 feet to the property line of any designated lease.

Anticipating that the above contemplated policy will shortly become a principle to be followed by the United States Geological Survey, I request that no one be authorized to drill on any Federal lands closer than 1320 feet from the property line of Santa Fe Lease Serial Number 046563, which is described as follows:

T. 27 N., R. 10 W., N.M.P.M., New Mexico

Sec. 2, Lots 3,4, S½NW¼, S½, S½NE¼;
Sec. 3, Lot 1;

T. 28 N., R. 10 W., N.M.P.M., New Mexico

Sec. 32, All;
Sec. 33, All;
Sec. 34, All.

Very truly yours,

Fred Feasel

cc: U.S.G.S.
P.O. Box 997,
Roswell, New Mexico

U.S.G.S.
Federal Works Building
Washington 25, D. C.

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C
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TO : Mr. John A. Frost, Artesia Office March 10, 1948

FROM : Foster Morrell, Roswell Office

SUBJECT : Lease Santa Fe 046563

Reference is made to several letters dated March 1 from Fred Feasel requesting that no one be authorized to drill on any adjoining Federal leases closer than 1320 feet from the property line of lease Santa Fe 046563. This request is based on the probability that the Oil Conservation Commission of New Mexico may adopt a well spacing pattern of one well to each 160 acres in the Kutz Canon and Pulcher Basin fields. Separate letters were submitted by Mr. Feasel covering each of the Federal oil and gas leases adjoining lease Santa Fe 046563.

Pursuant to Mr. Feasel's request, you are directed not to approve drilling on Federal leases adjoining lease 046463 closer than 990 feet from the outer boundaries of that lease. Mr. Feasel is mistaken in the principle that the well spacing pattern of 160 acres would require the gas well to be located exactly in the center of the drilling unit.

The spacing practice in these two fields for operating on Federal leases has been to limit development to one well to 160 acres. However, the wells are generally located 990 feet from the center of the 160 acre tract and not closer than 990 feet from the outer boundary of such well spacing unit. It is preferred, of course, that the drilling units be in the form of a square wherever practicable, which is the form of such units under the five communitization agreements previously approved by the Department.

A copy of this letter is being forwarded to Mr. Feasel for his information.

[illegible],
Supervisor, Oil and Gas Operations.

cc: Mr. Fred Feasel
for Oil,
Albuquerque, New Mexico

cc: [illegible]

Graham: These are my revisions - dig the nomenclature

NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

In the matter of the petition of the Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canon-Fulcher Basin Gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters, including special approval of non-conforming well locations where necessary.

ORDER NO. _____

CASE NO. _____

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canon-Fulcher Basin gas fields, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing,

FINDS, from the evidence adduced:

A. That the Kutz Canon and Fulcher Basin gas ~~fields~~ pool is are productive of natural gas from the Pictured Cliff sandstone formation, that such ~~fields~~ pool is are contiguous and from all information available to date appear to be one continuous gas producing area or pool in the Pictured Cliff, with a total of over 75 producing gas wells at the present time;

B. That such pool has produced natural gas for more than 15 years, during which time the average of well-head pressures has declined to approximately 385 P.S.I. gauge from an initial field pressure of approximately 585 P.S.I. gauge, the difference indicating the substantial quantities of gas heretofore produced from the pool;

C. That by reason of rules of this Commission previously applicable to the pool, of the general practices of certain operators in the area and of policies of the U. S. Geological Survey (having jurisdiction over oil and gas practices

affecting the substantial federal acreage involved), a fairly uniform spacing of one well to 160 acres has heretofore prevailed in the pool;

D. That one well will, except in unusual instances, economically (and effectively) drain the recoverable gas in an orderly manner from at least 160 acres of the Pictured Cliff pool and, accordingly, that more dense spacing in the pool will, as a general rule, result in (waste or in unnecessary hazards conducive to waste) and unnecessarily increase the costs of development and production;

E. That, except in unusual instances, the volume of recoverable gas in the pool does not under existing conditions afford economic justification for the drilling of wells on units of less than 160 acres, more dense spacing being, therefore, likely to result in retardation of development, premature abandonment of wells and in other conditions wasteful or conducive to waste;

F. That for wells hereafter drilled a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160-acre tracts, for which general spacing pattern the pooling of properties should be encouraged when necessary;

G. That the gas productive area of the pool ~~is likely to~~ may be substantially more extensive, in one or more directions, than the presently developed portion thereof;

H. That the definition of the pool, contained herein, is reasonable and is necessary to the efficacy of this spacing order; and

I. That waste will result in the drilling of wells in the pool, as hereinafter defined, unless special rules and regulations are adopted for the prevention thereof, and that the special rules and regulations provided below are necessary to prevent such waste and hazards conducive to waste, to protect present equities and to provide for the orderly development and operation of such pool, as it may be extended.

THEREFORE, IT IS ORDERED that, effective immediately, the following rules and regulations shall apply to wells hereafter authorized by the Commission to be drilled or completed or recompleted to the Pictured Cliff pool in the Kutz

Canon-Fulcher Basin pool/ area, defined below, in addition to the Commission's applicable rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

Section 1. No well shall be drilled or completed or recompleted, and no Notice of Intention to Drill or drilling permit with respect to a well shall be granted or drilling location otherwise permitted to become effective, unless

(a) such well be located on a designated drilling unit of not less than one hundred sixty (160) acres of land, more or less, according to legal subdivisions of the United States Land Surveys, in which unit all the interests are consolidated by pooling agreement or otherwise and on which no other well is completed, or authorized for completion, in the pool;

(b) such drilling unit be as near as possible in the shape of a square except for normal variations in legal subdivisions of the United States Lands Surveys; and

(c) such well be located on its drilling unit at a distance from the outside unit boundaries of not less than seven hundred fifty feet (750'); provided, if such proposed new well is to be an offset to any then producing gas well completed in the pool, or the drilling of which was authorized, prior to the effective date of this order, located on an adjoining unit in which the interests are not identical with those in the unit proposed to be drilled, such proposed well may be located and drilled offsetting the existing well and as close to the common unit boundary line as the well to be so offset.

why not 990'?

Section 2. Any provision herein to the contrary notwithstanding, the Commission may, and in proper cases will, on petition or on its own motion, by order entered after notice and hearing to the extent required by law, grant exceptions and permit drilling locations to become effective, thereby authorizing the drilling or completion of wells in the pool not conform-

ing to the requirements of Section 1 above if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce his share of gas from the pool in the absence of such exception, and shall also find one or more of the following conditions to exist:

(a) that consolidation or pooling of the property sought to be drilled with necessary adjoining land, notwithstanding diligent efforts made in good faith, is impossible or impractical;

(b) that the property sought to be drilled is located within a then developed portion of the pool and its non-conforming size or shape is due to the adjoining developed properties in the pool;

(c) that because of the nature of the terrain, location of the proposed well at a lesser distance from one of the outer boundaries of its drilling unit should be permitted; or

(d) that by reason of the location of the property sought to be drilled along the southwest or northeast flank of a developed portion of the area; it appears improbable that gas which can be produced in paying quantities will be encountered if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 as to such well to the extent it deems necessary; provided, it shall be the general policy of the Commission in any such case to require the pooling of properties to consolidate interests in at least 160 acres if practical to do so, whether or not in the shape of a square, and to require that the well be located, if practical to do so, at least thirteen hundred twenty feet (1320') from each other well completed, or authorized for completion, in the pool;

or, irrespective of such findings, if the Commission shall find that by reason of all circumstances an exception is proper in the prevention of waste, hazards conducive to waste, or undue drainage between properties, or otherwise in the exercise by the Commission of its jurisdiction over the spacing of wells or its other powers conferred by law, express or implied.

The Commission reserves the right to impose any and all reasonable conditions upon the granting of any such exception, and to take all other proper actions in the exercise of its jurisdiction over the spacing of wells or its other powers conferred by law, express or implied.

IT IS FURTHER ORDERED that, in accordance with recommendations of the New Mexico Nomenclature Committee approved and adopted by this Commission, the Pictured Cliff gas producing pool in the Kutz Canon-Fulcher Basin area, to which this order applies, is defined to include initially the following described land in San Juan County, New Mexico:

Township 30 North, Range 12 West

Sections	28, 29, 30, 32, 33, 34:	All
Sections	19 & 20 :	S½
Section	31 :	N½ & SE¼
Section	35 :	S½ & NW¼
Section	36 :	S½
Section	27 :	S½ & NW¼

Township 29 North, Range 12 West

Sections	1, 2, 3, 10, 11, 12, 13:	All
Sections	4 & 24 :	N½ & SE¼
Section	14 :	N½
Section	15 :	N½

Township 29 North, Range 11 West

Sections	7, 18, 19, 20, 21, 28, 29, 33, 34:	All
Section	6 :	SW¼
Sections	16 & 26 :	SW¼
Section	27 :	S½ & NW¼
Section	35 :	W½ & SE¼
Section	17 :	S½
Sections	30 & 32 :	E½ & NW¼

Township 28 North, Range 11 West

Sections	11, 12, 13, 14, 24 :	All
Sections	10 & 15 :	E½
Section	22 :	NE¼
Section	23 :	W½ & SW¼
Section	25 :	N½

Township 28 North, Range 10 West

Sections	7, 18, 19, 20, 29, 30, 32, 28, 33:	All
Section	21 :	SW¼
Section	34 :	W½

?

Not yet approved

Township 27 North, Range 10 West		
Section 4	:	All
Section 3	:	W½

~~and also to include, without the necessity of further action by the Committee or this Commission, all additional lands located within three-fourths (3/4) mile of any part of a drilling unit established hereunder which includes land in the pool as it is initially defined or as it may be extended by the application of this provision; provided, however, that such pool shall in no event be automatically extended so as to include any lands now or hereafter included by the Commission in some other producing area formally designated as an oil or gas pool or field in the Pictured Cliff;~~ provided, ~~further,~~ by order of this Commission the pool may be redesignated from time to time so as to embrace other lands in the vicinity which are believed, on the basis of additional developments, to be capable of producing gas from the Kutz Canon-Fulcher Basin pool, whether or not such other lands shall have been at one time included in another designated field or pool producing from the Pictured Cliff.

Entered and adopted by the Oil Conservation Commission this _____ day of _____, 1948.

_____
Chairman

_____
Commissioner

_____
Commissioner

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

1201

JOSEPH L. EGAN
PRESIDENT

SYMBOLS
DL = Day Letter
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

VA51 PD=MONTICELLO UTAH 17 840A

VAN THOMPSON=

SOUTHERN UNION GAS CO LAFONDA HOTEL

THE PROPOSED 160 ACRES WELL SPACING ORDER IN THE PICTURED CLIFF FORMATION IN THE FULCHER BASIN AND KUTZ CANYON FIELD IN NORTHWEST NEW MEXICO APPEARS TO BE REASONABLE AND IS AGREEABLE WITH US=

WESTERN NATURAL GAS CO W K DAVIS.

160.

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

CLASS OF SERVICE

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WESTERN UNION

1201

JOSEPH L. EGAN
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VA212 DL PD=FARMINGTON NMEX 16 300P

CHAIRMAN OIL CONSERVATION COMMISSION=

RESPECTFULLY REQUEST COMMISSION TO REFUSE SOUTHERN UNION GAS COMPANY'S REQUEST FOR 160 ACRE SPACING IN SAN JUAN COUNTY. CITIZENS OF THIS AREA FEEL THAT SUCH SPACING WOULD BE VERY DETRIMENTAL TO IMMEDIATE AND FUTURE OIL AND GAS DEVELOPMENT OF AREA, ALSO THAT NO VALID REASON EXISTS FOR 160 ACRE SPACING AT THIS TIME=

FARMINGTON CHAMBER OF COMMERCE.

160 160.

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

CLASS OF SERVICE

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WESTERN UNION

1201

JOSEPH L. EGAN
PRESIDENT

SYMBOLS

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Ship Radiogram

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

VA75 DL PD=AZ NEWYORK NY 13 1117A

RICHARD SPURRIER=

STATE CAPITOL SANTA FE NMEX=

JUST LEARNED OF SOUTHERN UNION HEARING SET FOR 17TH WOULD LIKE TO PUT STATEMENT IN RECORD BEFORE ORDER IS ENTERED PLEASE NOTIFY COMMISSION=

JOHN DEMPSEY.

Case

126

17.

Southern Union Production Company
Burt Building
Dallas, Texas

April 6, 1948

Mr. R. R. Spurrier, Secretary
New Mexico Oil Conservation Commission
Santa Fe, New Mexico

Dear Mr. Spurrier:

Having had an opportunity to review the stenographic transcript of our February 17 hearing, I wanted to call to your attention one or two minor discrepancies.

At page 8 in the center of the page Exhibit 4 should consist of "the chart and data accompanying Mr. Nichols' letter. . .". I notice that the letter is made a part of the transcript proper and to complete the record both the accompanying chart and data should be attached as Exhibit 4.

At page 10 the first sentence appearing below the appended core analysis information should be amended by deleting the word "to" so as to make the sentence read "From the data the average porosity is found to be 20%."

If you concur in these corrections, please advise me so that I may make them on my copy of the record. At the same time please call to my attention any other discrepancies which you observed.

Mr. Thompson has now returned to Dallas and we are trying to get together during the day with respect to revision of the suggested form of order. In any case, we will expedite our work and let you hear from us as promptly as possible.

I appreciate the very satisfactory conference we had in your office last week and trust that an appropriate order can be promptly entered.

With best regards and thanks, I am

Yours very truly,

Willis L. Lea, Jr.

WLL:fr
cc - Mr. George Graham ✓

NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

In the matter of the petition of the Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canon and Fulcher Basin Gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters including special approval of unorthodox well locations where necessary.

ORDER NO._____

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canon-Fulcher Basin gas fields, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing,

FINDS, from the evidence adduced:

1. That the Kutz Canon and Fulcher Basin gas fields are productive of natural gas from the Pictured Cliff sandstone formation encountered at depths ranging between 1700 and 2300 feet, approximately; that such fields are contiguous and from all information available to date appear to be one continuous gas producing area;

2. That such area has produced natural gas for more than 15 years, during which time the average of well head pressures has declined to approximately 385 P.S.I. gauge from an initial field pressure of approximately 585 P.S.I. gauge, the difference representing the substantial quantities of gas produced during such period;

3. That by reason of rules of this Commission previously applicable to the area, of the general practices of certain operators in the area and of policies of the U. S. Geological Survey (having jurisdiction over oil and gas practices affecting the substantial federal acreage involved,) a fairly uniform spacing pattern of one well to 160 acres has heretofore prevailed in the area;

4. That one well will, except in unusual instances, economically and effectively drain the recoverable gas in an orderly manner from at least 160 acres of the Pictured Cliff and, accordingly that more dense spacing will, as a general rule, result in waste or in unnecessary hazards conducive to waste and unnecessarily increase the costs of development and production;

5. That, except in unusual instances, the volume of recoverable gas in the Pictured Cliff reservoir does not under existing conditions afford economic justification for the drilling of wells on units of less than 160 acres, more dense spacing being, therefore, likely to result in retardation of development, premature abandonment of wells and in other conditions wasteful or conducive to waste;

6. That for wells hereafter drilled a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160 acre tracts, for which purpose the pooling of properties should be encouraged when necessary; and

7. That waste will result in the drilling of wells in the Kutz Canon-Fulcher Basin area, as hereinafter defined, unless special rules and regulations are adopted for the prevention thereof, and that the special rules and regulations provided below are necessary to prevent such waste, to protect present equities and to provide for the orderly development and operation of such area;

THEREFORE, IT IS ORDERED that, effective immediately, the following rules and regulations shall apply to wells hereafter drilled or completed or recompleted to the Pictured Cliff in the Kutz Canon-Fulcher Basin area, defined below, in addition to the Commission's rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

1. No well shall be drilled or completed or recompleted, and no drilling permit shall be granted or drilling location otherwise permitted to become effective, unless

(a) such well be located on a drilling unit of one hundred sixty (160) acres of land, more or less, according to official government survey, in which all the interests are consolidated by pooling agreement or otherwise and on which no other Picture Cliff well is located or drilling;

(b) such well be located at the center of its drilling unit or at a distance from the center not greater than one-eighth (1/8) the width of such unit at its narrowest part; and

(c) such drilling unit be in the shape of a square except for normal variations in land divisions of the government survey.

2. Any provision to the contrary notwithstanding, the Commission may in proper cases by order entered after notice and hearing, as required by law, grant exceptions and permit drilling locations to become effective, thereby authorizing the drilling or completion of wells to the Pictured Cliff not conforming to the requirements of Section 1 if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce gas in the absence of such exception, and shall also find one or more of the following conditions to exist.

(a) that consolidation of properties through pooling of interests in additional land notwithstanding diligent efforts made in good faith; is impossible or impractical,

(b) that the property sought to be drilled is located within a developed portion of the area and its unorthodox size or shape is due to the adjacent developed properties;

(c) that because of the nature of the terrain, location of the proposed well at a greater distance from the center of its drilling unit should be permitted; or

(d) that by reason of the location of the property sought to be drilled along the southwest or northeast flank of a developed portion of the area; it appears impossible that gas which can be produced in paying quantities will be encountered if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 to the extent it deems necessary; provided, it shall be the general policy of the Commission in any such case to require the pooling of properties to consolidate interests in 160 acres if practical to do so, whether or not in the shape of a square, and to require that the well be located at least thirteen hundred twenty (1320) feet from the nearest well producing from the Pictured Cliff if practical to do so.

The Commission reserves the right to impare reasonable conditions upon the granting of any such exception.

IT IS FURTHER ORDERED, that the Kutz Canon- Fulcher Basin area which is subject to this order, herein sometimes termed the "area", shall be those lands in T.30N, R 12W, T 29N, R. 12W, T 29N, R. 11W, T 28N, R 11W, and T 28N, R. 10W, N.M.P.M., which are commonly known as the Kutz Canon or Fulcher Basin gas field, or as both such fields, and also all land located within one (1) mile of any well in such fields which is capable of producing natural gas from the Pictured Cliff, including wells hereafter drilled which extend the gas productive area of such fields; provided that the term "area" shall not include any lands now or hereafter included by the Commission in some other field or fields.

Entered and adopted by the Oil Conservation Commission this _____ day of _____, 1948.

_____
CHAIRMAN

_____
COMMISSIONER

_____
COMMISSIONER

San Juan County, New Mexico.
February, 1948.

TO.
The New Mexico Oil and Gas Conservation Commission.
Santa Fe, New Mexico.

Gentlemen:-

The undersigned owners of fee lands situated in San Juan County, respectfully su submit their opposition to the granting of the petition of the SOUTHERN UNION PRODUCTION CO MPANY, now pending before the Commission, such petition being entitled.

"In the matter of the petition for an order fixing the " spacing o f wells hereinafter drilled in the Kutz canyon and Fulcher Basin Fields in San Juan County, AS THEY MAY BE EXTENDED and related matters. "

(1) We deem the granting of the petition will result in a disadvantage to operators as a whole, and to the State of New Mexico, and to the fee land owners.

(2) In particular we oppose any rule or regulation whereunder the present Kutz Canyon and Fulcher Basin Fields may be extended

(3) A Major part of the lands in the County (including State lands) are undeveloped, both as to oil and gas.

(4) Numerous oil and gas leases have been secured by Major and Independent operators embracing units less than 160 acres.

(5) The State of New Mexico has issued many oil and gas leases, on state and institutional lands and many of such leases are in smaller units than 160 acres, m any being for 40 acres, 80 acres, and 120 acres.
The Commissioner of Public Lands (and the state) will be in the position of having issued oil and gas leases, accepting money therefore and then not allowing development of such leased lands. (If a 160 acre unit be adopted.)

(6) The petitioner (The Southern Union Production Company) who have heretofore developed certain of the lands now within the area of the Kutz canyon and Fulcher Basin Fields, dispose of natural gas to the Southern Union Gas Company, its associate, under some arrangement unknown to the protestants. The Southern Union Gas Company is the only purchaser of gas produced in these two fields, and therefore the two corporations have a MONOPLY as pertains to the present disposition and transportation of gas, and have been able to (and do) dictate and fix the price of gas produced by independent operators, and it now appears that said two corpo rations have succeeded in getting the gas situation in said two fields in a condition to meet its desires, and now wish an order from the Commission, which would prevent independent operators from drilling, as to units of less than 160 acres.

(7) The limits of the present Kutz Canyon and Fulcher Basin Fields should be definitely determined.
Gas has been discovered in other parts of the County, to-wit: Several wells near Blanco, wells at Bloomfield, at Aztec, and near the state line to the north.
It should be made certain that neither the petitioner, or any one else, might successfully claim that the Kutz Canyon and Fulcher Basin Fields be EXTENDED to embrace other parts of the County.

(8) No rule or regulation should be adopted that would interfere or restrict or retard the development of lands within the County as to exploration, production or development of either oil or gas in any part of the County, insomuch as there are sever sands and formations, above and below the picture cliff formation (from which the petitioner obtains gas)

Wherefore petitioners, as protestants, pray that said petition be denied.

Respectfully submitted.

Name of land owner.	Name of land owner.
[illegible]	J. C. Hargis
[illegible]	Linn Blancett
[illegible]	[illegible]
E. D. Nolan	[illegible]
[illegible]	[illegible]

O. L. McCarty
W. G. Stallings
Reid Copfeinger.
Bert [illegible]
Alton [illegible]
T. L. Finch
[illegible]
Raymond [illegible]
Milton [illegible]
E. R. Thomas
[illegible]
C. M. Crawford
Faye Crawford.
C. Crawford
Minnie [illegible] Crawford
J. D. [illegible]
Mrs J. D. [illegible]
Marine Bailey
Burrel H. Crawford
[illegible] Crawford
J. E. Crawford
Hazel Crawford
E. R. Caldwell
[illegible] Caldwell
Lois E. Doak
[illegible]
[illegible]
[illegible]
Leo Warren
Ann Stallings
Helen Warren
[illegible]
[illegible]
[illegible] C. King
[illegible] C. King

C. R. Irwin
Mrs. [illegible] Irwin
Howard Goodman
R. R. House
Geo. R. House
Winnie House
Claire Patterson
Doris [illegible]
[illegible]
[illegible]
Pete George
Geo Blake
James W. Henry
Mrs John Graham
Lang Wood
Mrs. Lang Wood
John Graham
Howard L. Cooper
Paul H. Boone
[illegible]
[illegible]
Oscar Parker
Jahue Parker
J. B. Smith
[illegible]
Charles D. Smith
Maurice Smith
[illegible]
R. L. Harper.
[illegible]
W. B. Doak
Mrs Bettie Nell Doak.
Robert E. L. Wynne
[illegible]
[illegible]
[illegible]

San Juan County, New Mexico.
February, 1948.

TO.
The New Mexico Oil and Gas Conservation Commission.
Santa Fe, New Mexico.

Gentlemen:-

The undersigned owners of fee lands situated in San Juan County, respectfully sub submit their opposition to the granting of the petition of the SOUTHERN UNION PRODUCTION CO MPANY, now pending before the Commission, such petition being entitled.

"In the matter of the petition for an order fixing the " spacing o f wells hereinafter drilled in the Kutz canyon and Fulcher Basin Fields in San Juan County, AS THEY MAY BE EXTENDED and related matters. "

(1) We deem the granting of the petition will result in a disadvantage to operators as a whole, and to the State of New Mexico, and to the fee land owners.

(2) In particular we oppose any rule or regulation whereunder the present Kutz Canyon and Fulcher Basin Fields may be extended

(3) A Major part of the lands in the County (including State lands) are undeveloped, both as to oil and gas.

(4) Numerous oil and gas leases have been secured by Major and Independent operators embracing units less than 160 acres.

(5) The State of New Mexico has issued many oil and gas leases, on state and institutional lands and many of such leases are in smaller units than 160 acres, m any being for 40 acres, 80 acres, and 120 acres.
The Commissioner of Public Lands (and the state) will be in the position of having issued oil and gas leases, accepting money therefore and then not allowing development of such leased lands. (If a 160 acre unit be adopted.)

(6) The petitioner (The Southern Union Production Company) who have heretofore developed certain of the lands now within the area of the Kutz canyon and Fulcher Basin Fields, dispose of natural gas to the Southern Union Gas Company, its associate, under some arrangement unknown to the protestants. The Southern Union Gas Company is the only purchaser of gas produced in these two fields, and therefore the two corporations have a MONOPLY as pertains to the present disposition and transportation of gas, and have been able to (and do) dictate and fix the price of gas produced by independent operators, and it now appears that said two corpo rations have succeeded in getting the gas situation in said two fields in a condition to meet its desires, and now wish an order from the Commission, which would prevent independent operators from drilling, as to units of less than 160 acres.

(7) The limits of the present Kutz Canyon and Fulcher Basin Fields should be definitely determined.
Gas has been discovered in other parts of the County, to-wit: Several wells near Blanco, wells at Bloomfield, at Aztec, and near the state line to the north.
It should be made certain that neither the petitioner, or any one else, might successfully claim that the Kutz Canyon and Fulcher Basin Fields be EXTENDED to embrace other parts of the County.

(8) No rule or regulation should be adopted that would interfere or restrict or retard the development of lands within the County as to exploration, production or development of either oil or gas in any part of the County, insomuch as there are several sands and formations, above and below the picture cliff formation (from which the petitioner obtains gas)

Wherefore petitioners, as protestants, pray that said petition be denied.

Respectfully submitted.

Name of land owner.	Name of land owner.
George A. Hood	Walter E. Barnes
Floyd H. West	

T. F. [illegible]
B. W. [illegible]
J. A. McCoy
[illegible] Willis
A. J. Cynova
Wm Collins
Mrs Andrew Cynova
Oliver Hardesty
M. T. Williams
Todd Hickman
C. B. Franklin
Fred Langford
N. J. McCarty
[illegible] Schneider
William Quinn
Jane Quinn
Robert Quinn
[illegible]
Florence Goddard
Johnnie Carazza
V. B. Iles
G. E. Hutcheson
W. W. Knudson
K. C. Avery
Ella Walling
C. L. Hutton
O. J. Tucker
Culpepper
F. O. Brothers
J. M. Hen[illegible]
R. Hutton
R. H. [illegible]
John W. Utton
Benito T. Baca

San Juan County, New Mexico.
February, 1948.

TO,
The New Mexico Oil and Gas Conservation
Commission.
Santa Fe, New Mexico.
Gentlemen;

The undersigned owners of fee lands situated in San Juan County, respectfully submit their opposition to the granting of the petition of Southern Union Production Company, now pending before the Commission, such petition being entitled;

"In the matter of the petition for an Order fixing the spacing of wells hereinafter drilled in the Kutz Canyon and Fulcher Basin Fields in San Juan County, AS THEY MAY BE EXTENDED and related matters."

Our opposition includes the following.

1. We deem the granting of the petition will resualt in a disadvantage to operators as a whole, and to the State of New Meeico, and to the fee land owners.

2. In particular we oppose any rule or regulation whereunder the present Kutz Canyon and Fulcher Basin fields may be EXTENDED.

3. A major part of the lands in the county (including State lands) are undeveloped, both as to oil and gas.

4. Numerous oil and gas leases have been secured by Major and Independent operators embracing units less than 160 acres.

5. The State of New Mexico has issued many oil and gas leases, on state and institutional lands and many of such leases are in smaller units than 160 acres, many being for 40 acres, 80 acres and 120 acres.
The Commissioner of Public lands (and the State) will be in a position of having issued oil and gas leases, accepting money therefor, and then not allowing developement of such leased lands. (if a 160 unit be adopted).

6. The petitioner, who have heretofore developed certain of the lands now within the area of the Kutz Canyon and Fulcher Basin fields, dosposed of natural gas to the Southern Union Gas Company, its associate, under some arrangement unknown to protestants.
The Southern Union Gas Company is the only purchaser of gas produced in these two fields, and therefore the two corporations have a MONOPLY as pertains to the present disposition and transportation of gas, and have been able to (and do) dictate and fix the price of gas produced by independent operators, and it now appears that said two corporations have succeeded in getting the gas situation in said two fields in a condition to meet its desires, and now wish an order from the Commission, which would prevent independent operators from drilling, as to units of less than 160 acres.

7. The limits of the present Kutz Canyon and Fulcher Basin fields should be definately determined.
Gas has been discovered in other parts of the county, to-wit, several wells near Blanco, wells at Bloomfield, at Aztec, and near the State line to the north.
It should be made certain that neither the petitioner, or any one else, might successfully claim that the Kutz Canyon and Fulcher Basin fields be EXTENDED to embrace other parts of the county.

8. No rule or regulation should be adopted that would interfere or restrict or retard the developement of lands within the county as to exploration, production or developement of either Oil or Gas in any part of the county, insomuch as there are serveral sands and formations. above and below the Picture Cliff formation (from which petitioner obtains gas).

Wherefore petitionrs, as protestants, pray that said petition be denied.

Respectfully submitted.

Name of land owner.	Name of land owner.
C. A. Ransom	W. H. Cantrell
R. C. Montgomery	Geo. F. Bruington
Chas M. Maddox	C. H. Nye
A. G. McCoy	Glen Devine
[illegible]	C. W. Mayer
R. E. Hubbard	Roy L. Sullivan
L. M. Jaques	H. E. Thomas
E. R. Boettcher	J. A. Rominer
Irvin Fisher	L. A. Stallings
J. L. McWilliams	Bruce Watkins
C. L. Wade.	Robert C. Brewer
C. E. Sipe	Frank J. Sikes
Thos. A. King	Carl Sexton
Joseph S. Hartman	J. C. Townsend
[illegible]	Jake Summer
J. C. McKinzey	G. L. Turner
J. H. M. Martin	James Scott.
Wade W. Townsend	Bruce Walter
Arthur Lawson	T. L. Lewis
Wesley Oliver	
Fred J. Utton	
Robert K. Lewis	
[illegible]	
Lorraine L. Smith	
Walton Hoyle.	

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 997
Roswell, New Mexico
April 29, 1948

Case 126

Mr. R. R. Spurrier
Director, New Mexico Oil Conservation Commission
Box 871
Santa Fe, New Mexico

Dear Dick:

As a result of your comment during our brief visit in the Survey office in Artesia on April 21, regarding the relatively wide distribution that might be given part of the material included in the report entitled "Allocation of Gas Withdrawals Among Wells in the Fulcher Basin Pool", I reviewed the original draft of the paper and found that a few minor changes and revisions would be desirable.

I am enclosing a copy of the report on which the desired changes have been indicated by penciled notation (pages 3, 5, 6 and 7, and figure 1) with a request that the material reproduced for distribution be conformed accordingly.

Submission of the edited copy transmitted herewith does not change or modify in any way restrictions that may have been expressed by the Supervisor regarding the use or distribution of the material contained in the draft of the report handed to you at his direction when you visited this office several weeks ago.

Please call on me if I can assist you in any way.

With sincerest regards.

Very truly yours,

M. A. Schellhardt

M. A. SCHELLHARDT,
Gas Engineer.

OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

IN THE MATTER OF PETITION FOR AN ORDER FIXING THE SPACING OF WELLS HEREAFTER DRILLED IN THE KUTZ CANYON AND FULCHER BASIN GAS FIELDS OF SAN JUAN COUNTY, AS THEY MAY BE EXTENDED, AND RELATED MATTERS.	NO._____
SOUTHERN UNION PRODUCTION COMPANY, Petitioner	

To the Commission and its
Honorable Members:

This is a Petition for an order of the Commission fixing by appropriate rules and regulations the spacing requirements applicable to wells hereafter drilled in the Kutz Canyon gas field and in the Fulcher Basin gas field, San Juan County, and related matters. Your Petitioner, Southern Union Production Company, a corporation authorized to transact business in New Mexico, maintains an office in Santa Fe at the corner of Marcy and Otero Streets and an office in Farmington.

Petitioner would show the Commission as follows:

1.

The Kutz Canyon and Fulcher Basin fields are productive of natural gas in commercial quantities from the Pictured Cliff sandstone formation encountered at depths ranging between 1700 and 2300 feet, approximately. The fields are in close proximity, may be contiguous and may, in fact, be essentially one gas producing area. The term "general area" will be used herein to refer to these fields, as they may be extended from time to time. The lands now known or reasonably regarded as proved to be productive of natural gas in commercial quantities from the Pictured Cliff are those described in Exhibit A annexed.

2.

According to Petitioner's information, there are now a total of approximately 76 wells in the general area which are productive of natural gas from the Pictured Cliff. Except for those very recently completed and in the process of being connected, each such well is connected with and producing into the natural gas transportation system of Southern Union Gas Company extending from gas areas in San Juan County, New Mexico, to existing markets in Santa Fe,

Albuquerque and elsewhere.

3.

Petitioner has been actively engaged for many years in operating its own wells and certain others in the general area. It has accumulated statistics and other information bearing upon the permeability, porosity and producing characteristics of the Pictured Cliff, and from such information believes that a well completed in the Pictured Cliff will in an orderly manner drain gas from not less than 160 acres of that formation; hence, that more dense drilling is unnecessary and uneconomic.

Although there are exceptions, previous drilling in this area has generally conformed to 160-acre spacing, with wells located substantially in the center of a unit. To some extent this spacing pattern is a result of the fact that during World War II the Commission's spacing rule applicable to gas areas provided generally for one well to each 160 acres. To some extent it is due to the current policies of the United States Geological Survey in its exercise of jurisdiction over oil and gas practices affecting the substantial federal acreage in the area. To some extent, moreover, it is a result of Petitioner's own convictions, based on the data accumulated from its own and other wells, and the convictions of certain other operators.

Knowledge of the general area and its characteristics has, of course, increased with extensions of the proven acreage and other developments, particularly in recent years. Much of this pertinent information has not yet been submitted to the Commission in appropriate form.

4.

The present spacing rule applicable in the general area appears to be contained in Section 1 of Order 637 effective March 1, 1946 (the Statewide Order), which provides in part:

> "1. (a) 1. . . . . No well shall be drilled closer to any unit boundary line than 330 feet or less than 660 feet from any other well except upon petition, notice and hearing as provided by law, provided such unorthodox well location will create neither waste nor hazards conducive to waste."

The present spacing provision, therefore, would permit the location, on 40-acre tracts, of proposed wells within 330 feet of any established drilling unit, including those 160-acre units now existing in the general area which are

producing gas from one centrally located well. It is apparent that under present spacing rules the recent marked activity and competition for the limited attractive acreage available will result in 330 foot offset wells in a gas area and, consequently, in competitive offset drilling of unnecessary wells -- on units already established in addition to those to be established in the future. In this connection it is believed significant that Section 12, Chapter 72, Laws of 1935 (Section 69-213, New Mexico Statutes Annotated, '41 Edition), while it is applicable to oil or oil and gas wells, provides in part as follows:

> "The drilling of unnecessary wells creates fire and other hazards conducive to waste, and unnecessarily increases the production cost of oil and gas to the operator, and thus also unnecessarily increases the cost of the products to the ultimate consumer."

It is also significant that by Section 10 of the same enactment (Section 69-211, '41 Edition), the Commission is expressly authorized to make rules, regulations and orders fixing the spacing of wells. Moreover, the Commission possesses, and in several instances has exercised, authority to promulgate special rules and regulations applicable to a particular area of production.

5.

By proper rule, regulation or order of special application to the Kutz Canyon-Fulcher Basin general area, as it may be from time to time extended, the Commission should inaugurate and enforce a spacing program which will economically and effectively permit, without unnecessary drilling costs or operating expenses, the recovery of natural gas reasonably producible from that area. Petitioner is prepared to submit evidence pertinent to a proper spacing program. From the information available to it Petitioner believes that, except in unusual instances, a uniform spacing unit of not less than 160 acres should be provided with respect to wells hereafter drilled in the general area,

Attention is directed to the increasingly common practice of pooling leaseholds for exploration and development, particularly where small tracts in gas areas are involved, and to the expeditious method now provided by applicable statutes and regulations for communitizing federal oil or gas acreage with other lands. Moreover, the Commissioner of Public Lands is authorized in proper cases to approve and consent to unitization programs involving State of New Mexico leases.

WHEREFORE, Petitioner requests that the Commission, after notice and hearing as required by law and applicable regulations, enter its proper order or orders fixing the spacing of wells hereafter drilled in the Kats Canyon-Fulcher Basin general area of production, as it may be from time to time extended, on the basis of one well at approximately the center of a 160-acre drilling unit in substantially the shape of a square, with suitable provisions for any related matters, including special approval, after notice and hearing, of unorthodox well locations necessitated by the size or shape of available units or by the nature of the terrain; and, pending final action on such request, that the Commission, its agents and employees refrain as a matter of policy from approving or permitting to become effective any Notice of Intention to Drill now or hereafter on file with respect to a well in the general area which does not provide for the location of such well at or within a reasonable distance of the center of its drilling unit consisting of 160 acres, more or less, in substantially the shape of a square.

Petitioner hereby offers to supply such information concerning the subject matter of this application as is available to it.

Respectfully submitted,

SOUTHERN UNION PRODUCTION COMPANY

By _____
Vice President

ATTEST:

_____
Assistant Secretary

VERIFICATION

STATE OF TEXAS)
)
COUNTY OF DALLAS)

Before me, a Notary Public in and for Dallas County, Texas, personally appeared J. C. REID, Vice President of SOUTHERN UNION PRODUCTION COMPANY, a corporation, well known to me to be such person and officer, and he upon oath

duly administered stated that he had read the foregoing petition and that the facts therein set forth are true and correct to the best of his information and belief, and that he had executed such petition on behalf of said corporation as its free and voluntary act and deed, pursuant to due authorization.

J C Reid

Sworn to and subscribed before me this 24th day of January, 1948, to certify which witness my hand and seal of office.

Faye Griffin
Notary Public in and for
Dallas County, Texas

My Commission Expires:

FAYE GRIFFIN
Notary Public in and for Dallas County, Texas
My commission expires June 1, 1949.

EXHIBIT A

Description of lands known or reasonably regarded as proved to be productive of natural gas in commercial quantities from the Pictured Cliff.

Township 30 North, Range 12 West

Sections 28, 29, 30, 32, 33, 34: All

Township 29 North, Range 12 West

Sections 1, 2, 3, 11, 12, 13: All
Section 10: E½

Township 29 North, Range 11 West

Sections 18, 19, 20, 28, 29, 33, 34: All
Section 7: W½
Section 21: W½

Township 28 North, Range 11 West

Sections 11, 13, 14, 24: All

Township 28 North, Range 10 West

Section 19, 29: All
Section 18: W½
Section 20: W½
Section 30: E½
Section 32: E½

May 31, 1946

ALLOCATION OF GAS WITHDRAWALS AMONG THE WELLS IN THE FULCHER BASIN POOL

By M. A. Schellhardt

INTRODUCTION

The Fulcher Basin pool is situated in San Juan County, New Mexico. The developed area, at present, includes land in the public and patented categories in T. 30 N., R. 29 W.; T. 29 N., R. 12 W.; and T. 29 N., R. 11 W. Records for April 1946 show that there were 26 productive wells in the pool; 15 of which were on public land and 11 were located on patented land.

The New Mexico conservation statutes pertaining to oil and gas development and recovery operations include no stipulations regarding ratable taking of gas from gas pools. Gas wells, however, are not excepted by the statute authorizing the Conservation Commission to "fix the spacing of wells". Statutory provisions regarding the ratable taking of gas apply only to gas withdrawals from prorated oil pools. The State conservation laws also empower the Commission to require that wells be operated in such manner as to prevent injury to neighboring leases or properties, and to prevent underground and surface waste of oil and gas. Operation of the only pipe line serving the Fulcher Basin pool, however, is subject to the regulations concerning rights-of-way for pipe lines (GLO circular No. 1386, page 16) approved by the Secretary of the Interior May 7, 1936. An excerpt from those regulations follows. "In approving such right-of-way grant it shall be specifically stated that such pipe line shall be constructed, operated, and maintained as a common carrier and that the grantee shall accept, convey, transport, or purchase without discrimination oil or natural gas produced from Government lands in the vicinity of the pipe line in such proportionate amounts as the Secretary of the Interior may, after a full hearing with due notice thereof to interested parties and a proper finding of facts, deem to be reasonable, and in addition [illegible] such pipe line for the transportation of oil or gas [illegible]."

in such proportional amounts as shall be determined reasonable by the Secretary of the Interior. Under the existing circumstances measures developed voluntarily and applied for allocating gas withdrawals from the groups of wells in the respective land categories among the wells in the respective groups may be conformed to principles desired.

Conventional gas proration practices applied throughout the early stages of the development of the natural gas industry in the many states were predicated upon the "law of capture", the principle adhered to by the courts in rendering decisions regarding the ownership of accumulations of oil and gas existing in or recovered from natural reservoirs. Proration methods that conformed to the law-of-capture principle of recovery operations required consideration of only one factor, availability, which generally was expressed in terms of open flow delivery capacity or "potential".

The trend of statutes enacted by state legislative bodies in recent years, however, shows an increasing tendency to regard migratory minerals in place as property susceptible to the precepts of ownership rights accorded to owners of land. The effect of the operation of the revised legal concept regarding property rights and the ownership of oil is evidenced by two commonly occurring examples, namely, (1) participation of the owners of small areas, that often could not be developed individually for economic reasons, in the revenues derived from wells drilled on blocks formed by the pooling of small tracts to conform to established spacing regulations, and (2) compensatory payments made by holders of leasehold rights to royalty interests on undrilled tracts offset by productive units. The changed concept regarding property rights and the ownership of oil now held by a large element of the oil industry was expressed by a statement issued by the Board of Directors of the A.P.I. in 1931, an excerpt from which is quoted as follows, " * * * * * * that it indorses, and believes the petroleum industry indorses, the principle that each owner of the surface is entitled only to his equitable and ratable share of the recoverable oil and gas energy in the common pool in the proportion which the recoverable reserves underlying his land bear to the recoverable reserves in the pool".

The revised concept regarding property rights and the ownership of oil in place was fostered by the restrictions imposed upon rates of oil withdrawal and well spacing by regulatory agencies in several [illegible] to control the condition of over supply that followed [illegible] development of the East Texas field. [illegible] during the early era of oil proration for determining allowables for oil wells in many areas involved the principle of the law of capture, [illegible] allowable practices applied to oil production [illegible]

the intervening period shows increasing consideration for the fundamental principle of property rights and ownership described by the statement quoted in the preceding paragraph. Orders of the State Conservation Commission of New Mexico pertaining to oil prorate pool allowables equally among the wells or oil productive units therein. The delivery capacity factor is considered only if wells are incapable of producing oil at the maximum rate allocated to the respective productive units. Wells not capable of producing maximum allowables are classified as marginal and their allowables ~~is~~ are determined directly by productive capacity.

Progress toward conformation of gas ~~allocation~~ allocation practices to the more recently developed concept regarding the ownership of migratory minerals, which would insure the diverse interests reasonable opportunities to recover (not market) their equitable share of the recoverable gas in a common reservoir, lagged behind the advance made by oil allocation methods toward that objective. Regulatory measures established maximum allowable delivery rates for natural gas wells in several states many years before the application of regulatory measures to oil recovery rates became general. The precedents established by early regulatory practices have materially retarded the development and application of equitable allocation measures to natural gas recovery operations.

GENERAL CONSIDERATIONS

The availability of gas from gas wells, usually expressed as open flow delivery rate, served as a conventional standard for prescribing conservational measures and for prorating market demand among groups of wells throughout the history of gas recovery operations in many fields. Proration measures predicated upon the delivery capacity factor were beneficial to the development of orderly marketing programs in many fields. A knowledge of the delivery capacities of individual wells and of conditions that influence the producing characteristics of individual wells and of pools as a whole is essential to gas transmission and marketing economy. Delivery capacities of gas wells however do not provide a reliable index to the volume of gas in a reservoir or to the volume of gas underlying acreage accredited to individual wells by prevailing well spacing programs. Consequently, the delivery capacity factor is not essential to allocation formulas predicated upon the principle that the owners of productive units developed in conformance to authorized spacing regulations should have a reasonable opportunity to produce the recoverable gas underlaid by the respective units.

Conservation measures likewise based upon delivery capacity were beneficial to ultimate recoveries from many gas reservoirs. Application of conventional proration and conservation measures based on

delivery capacity has not been feasible physically or economically, however, throughout the operative lives of many shallow gas wells. Difficulties that beset evaluating delivery capacities of the deep, high-pressure gas wells that represent an increasing element of overall source of supply were discussed in Bureau of Mines R.I. 3767. 1/ Moreover, operation of deep gas wells will be considerably more difficult than shallow wells as reservoir pressures decline and the inadequacy of conventional delivery restrictions, as a conservation measure, will be manifest at considerably higher pressures. Inasmuch as the beneficial effect of restricted delivery rates on ultimate recoveries from gas wells probably is a direct result of the corresponding limitation effected thereby on pressure differentials in the reservoir, it is logical to conclude that pressure could be used advantageously for prescribing conservative operating practices.

Conventional proration measures reduced delivery rates from gas wells progressively as open flow delivery rates declined. The decreased pressure differentials that prevailed in the reservoirs about the wells under the decreased rates of gas withdrawal probably were beneficial to efficiency of well operation and to ultimate recoveries in reservoirs subject to active water encroachment. Conditions observed in some pools in which there was no evidence of water encroachment, however, indicated that well performance was improved materially by maintenance of relatively high rates of withdrawal during the latter stages of their operative lives.

RELATIONSHIPS BETWEEN PRESSURES AND GAS DELIVERY RATES FOR GAS WELLS

Generalized relationships between back pressures at the face of the producing sand, expressed as percentages of the closed-in pressures, and rates of gas delivery, expressed as percentages of the absolute open-flow deliveries, for gas wells are shown by the graphs on figure 1.

1/ Rebel Ihardt, W. A., Application of the Back-Pressure Method for Determining Absolute Open Flows of Large Gas Wells: Bureau of Mines Rept. of Investigations 3767, 1944, 43 pp.

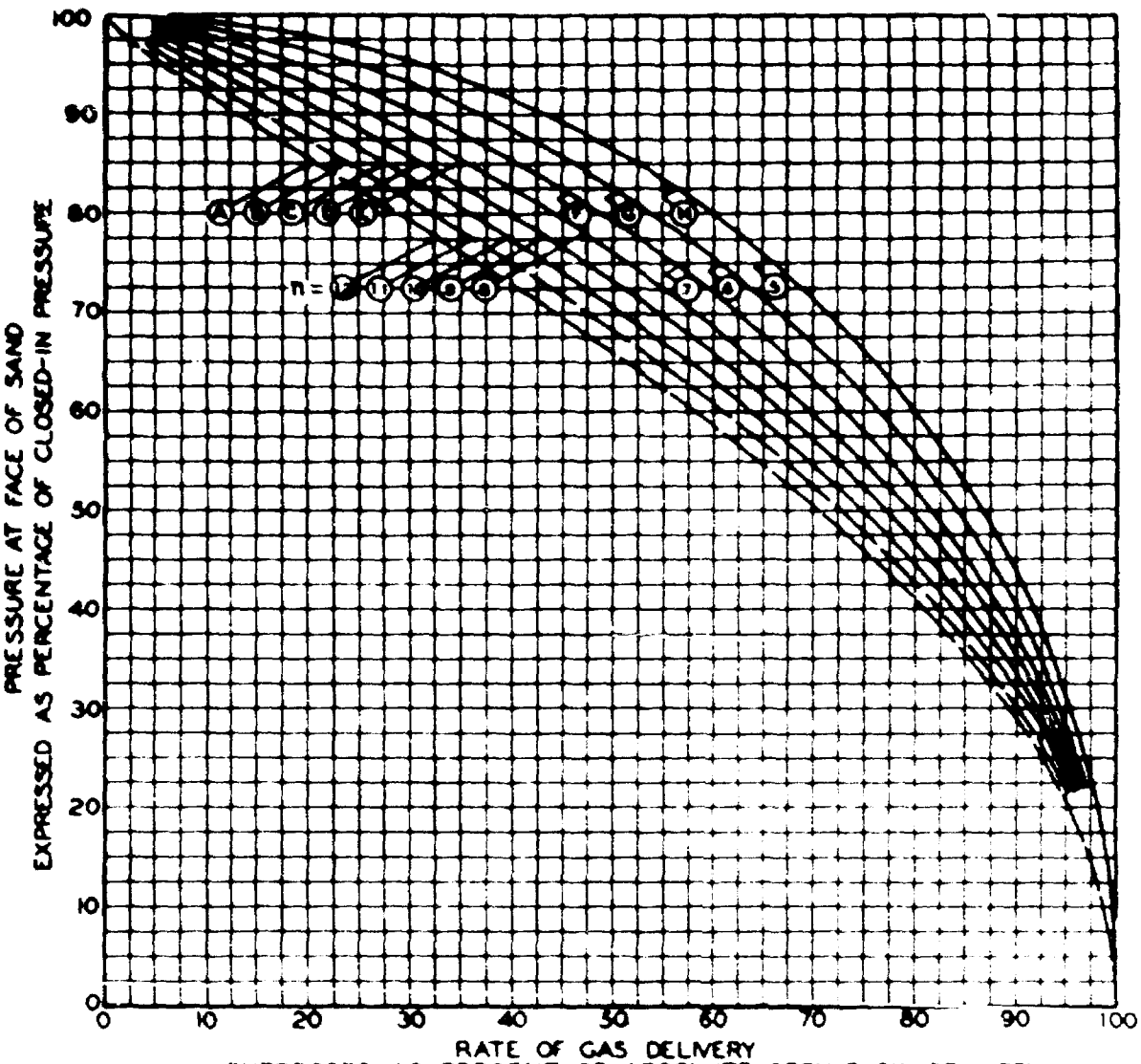


FIGURE 1 - GENERALIZED RELATIONSHIPS BETWEEN PRESSURE AT FACE OF SAND AND RATE OF GAS DELIVERY FOR GAS WELLS.

An empirical equation expressing a fundamental relationship between rate of flow of gas through reservoirs into wells and well pressures[2] follows:

$$Q = C\ (P_f^2 - P_s^2)^n$$

where

- Q = rate of low of gas in cubic feet per 24 hours,
- C = a coefficient,
- P_f = shut-in formation pressure, pounds per square inch absolute,
- P_s = back pressure at the sand face in the well bore in pounds per square inch absolute,
- n = an exponent corresponding to the slope of the straight-line relationship between Q and $(P_f^2 - P_s^2)$ plotted on logarithmic paper.

Limits of the range of values for the exponent, n, of the equation were discussed in Bureau of Mines Monograph 7[3] and in Bureau of Mines R.I. 3767.[4] Graphs A to G, figure 1, represent generalized relationships between pressures at the face of the sand and rates of gas delivery corresponding to values ranging from 1.2 to 0.6 for the slopes of the relationships determined by plotting rate of gas delivery, Q, against corresponding values of the pressure factor, $(P_f^2 - P_s^2)$, on logarithmic paper.

The graphs on figure 1 indicate that if values of the slopes of the relationships between Q and $(P_f^2 - P_s^2)$, or values of n of the equation for flow, $Q = C(P_f^2 - P_s^2)^n$, determined by back-pressure data range from 1.2 to 0.6, back pressures at the face of the sand corresponding to deliveries equivalent to 25 per cent of the absolute open flows of the wells range from [redacted] 83 to 95 per cent of the closed-in pressure. The graphs on figure 1 show also that if values of n range from 1.2 to 0.6, rates of gas delivery at back pressures equivalent to 90 per cent of the closed-in pressures range from [redacted] 13 to 37 per cent of the absolute open-flow deliveries of the wells. Hence, the absolute open-flow delivery of a well provides only an approximate index to rates of gas delivery that may be produced at elevated back

---

2/ Pierce, H. R., and Rawlins, E. L., The Study of a Fundamental Basis for Controlling and Gauging Natural-Gas Wells. Part 1: Bureau of Mines Rept. of Investigations [illegible], [illegible], [illegible] pp.

3/ Rawlins, E. L., and Schellhardt, M. A., Back-Pressure Data on Natural-Gas Wells and Their Application to Production Practices: Bureau of Mines Monograph 7, 1936, pp. [illegible] and [illegible].

4/ Footnote 1.

July 8, 1946

APPENDIX

to report entitled

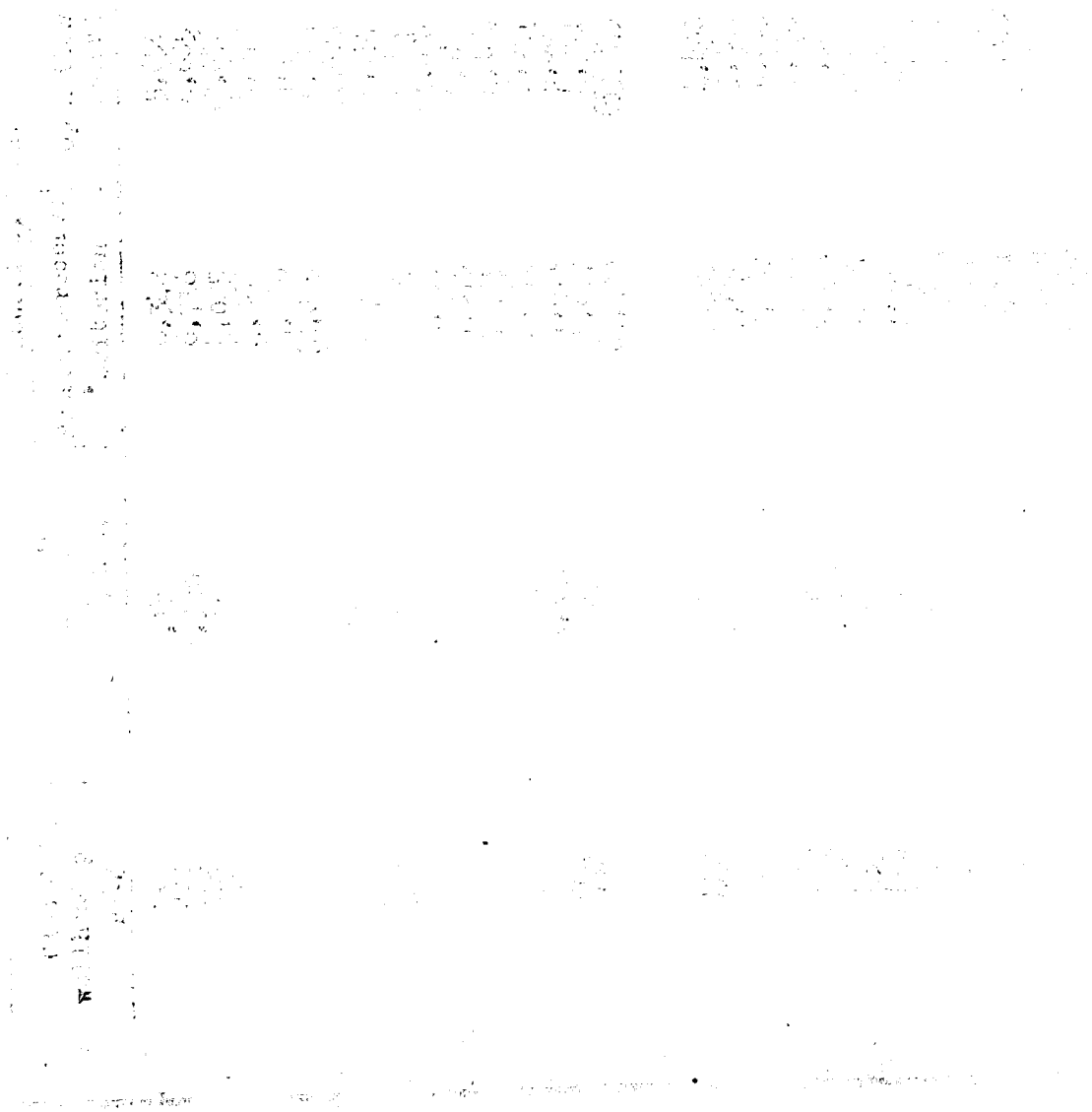
ALLOCATION OF GAS WITHDRAWALS AMONG WELLS IN
THE FULCHER BASIN POOL

The most recent closed-in pressure data available for the wells in the Fulcher Basin pool were gauged in April 1946. Production reports show that the volume of gas withdrawn from this pool in April was 166,034,000 cubic feet, which represents an average withdrawal rate of 5,535,000 cubic feet per 24 hours. The average daily withdrawal rate for April 1946, closely approximated the average daily rate of withdrawal for 1945, which was 5,452,000 cubic feet.

Comparison between actual withdrawals for April 1946 and corresponding well allowables determined by the pressure-reserve criterion is shown by the data in table 1. Comparison of well allowables determined by the open flow standard and allowables determined by the pressure-reserve criterion is shown by the data in table 2. Information regarding the reserves underlying the various developed tracts in the pool was not available and the acreage allocated to the respective wells by Foster Morrell, Supervisor of Oil and Gas Operations, was used instead of reserves for computing allowables by the pressure-reserve criterion. Although reservoir pressure data are essential to accurate evaluation of reserves and the solution of many gas recovery problems, the relationship between the allowables computed by the pressure-reserve criterion is not influenced materially by the substitution of well-head pressures for the values of the corresponding pressures at the productive zone. Wellhead pressure data were used for computing the pressure-reserve criterion allowables shown in tables 1 and 2. The open flow delivery data shown in table 2 represent the initial delivery capacities of the wells, and the corresponding allowables (table 2) were based on the initial open flow delivery data.

Withdrawal data shown in table 1 represent the maximum delivery rates obtainable under the pressures prevailing in the gathering system in April 1946. Consequently, any adjustment of delivery rates that might be required to conform withdrawals to a different schedule of production would require either that pool withdrawal rates be reduced or that the gathering system pressures be decreased.

W. A. SCHILLING
Gas Engineer



(relative differentials)

[illegible] ~~[illegible]~~ [illegible] developed [illegible] [illegible] [illegible] [illegible] with [illegible] [illegible] their absolute open flow ~~differ~~ ~~[illegible]~~ (differ widely). The data presented show that well pressure [illegible] for prevailing limiting operating conditions [illegible] gas wells. Application of conservation measures predicated upon well pressure instead of delivery rate would [illegible] need for calculation of open flow delivery rates, for that purpose, would be eliminated.

A [illegible] FOR DETERMINING [illegible]

Responsibility [illegible] of gas available from individual wells in many fields [illegible] approved by regulatory authorities rests upon the operator. [illegible], an allocation or proration system [illegible] distributes overall withdrawals authorized by regulatory authorities or required to supply existing market demand among connected wells and establish allowables on a common equitable basis for any additional wells that pool development might include.

Reserves and [illegible] pressures are factors most essential to the development of a system for allocating gas withdrawals from a pool among the wells [illegible] in. The reservoir structure in some gas pools is very permeable and the variation of rates of withdrawal from different areas creates only moderate regional pressure differentials which equalize quickly when the wells are closed in. The pressure factor is relatively unimportant to an allocation formula for application to pools of that type inasmuch as rapid [illegible] of [illegible] pressures, [illegible] the [illegible] of [illegible]. [illegible] of the productive strata [illegible] pools, [illegible] rapid equalization of pressure and [illegible] differences are created in the pressures prevailing in different [illegible] of the pool by the [illegible] withdrawals [illegible] delivery capacity. The pressure [illegible] the equitable allocation of withdrawals [illegible] [illegible] [illegible] [illegible]

Where

a = maximum allowable rate of gas withdrawal from a well, M cubic feet per 24 hours,

P_f = closed-in pressure at the productive zone in the well, pounds per square inch absolute,

Rw = gas reserve under the acreage allotted to the well, same standard units,

A = volume of gas to be supplied from the common reservoir during a specified period, expressed as M cubic feet per 24 hours,

$\sum (P_f^2 \times Rw)$ = sum of the products of $P_f^2 \times Rw$ for all of the wells in a pool.

The square of the value of reservoir pressure is used in the formula because ~~the significance of~~ the dynamic property of ~~the~~ pressure ~~factor~~ is more important to the allocation formula than static property of pressure; irrespective of whether the reserve factor is expressed in terms of gas volume or land area. Under normal conditions the rate of flow of gas through reservoir strata, either into wells or from one area to another, is a function of the difference between the values of the squares of the prevailing terminal pressures. The absolute open flow delivery rate of a gas well is a function of the square of the effective reservoir pressure. Values of reservoir pressures determined for different wells in a gas pool by tests of brief duration often differ widely. Percentage recovery of gas in place usually will be lower for productive units characterized by higher pressures than for units having lower reservoir pressures. Although the relative values of the pressures do not always provide a reliable standard for evaluating the proportion of the recoverable gas remaining in or produced from the various productive units, existence of pressure differential in a gas reservoir is a positive indication of fluid migration either within the respective units or across unit boundaries.

2/

[illegible] permeability [illegible] wells [illegible] characterized by [illegible] serves ~~per acre~~ initially and by above-average reservoir per[illegible]bilities usually are characterized by reservoir pressures lower than those prevailing either in areas having larger reserves and average permeabilities or in areas having [illegible] small reserves and low permeabilities.

In applying [illegible] However, substitution of average for reserves will increase the proportion of the pool allowable [illegible] permeability [illegible] characterized by relatively [illegible] areas having relatively small reserves usually [illegible] by relatively low reservoir pressures, [illegible] materially reduce the inequity introduced by substitution [illegible] reserves where these conditions prevail [illegible] small reserves and low permeabilities [illegible] too high and a marginal factor should be applied [illegible] excess [illegible] allowables resulting from the substitution of average for reserves, to prevent [illegible] prohibiting the distribution of the excess [illegible] would have been allocated to the [illegible] pool either during [illegible]

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

1220

JOSEPH L. EGAN
PRESIDENT

SYMBOLS

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VA179 NL PD=DALLAS TEX 24 JUN 24 PM 7 57

GEORGE GRAHAM=ATTORNEY OR R R SPURRIER, SECRETARY= 1/26

OIL CONSERVATION COMMISSION SF=

APPLICATION FOR SPACING ORDER KUTZ CANYON-FULCHER BASIN FIELDS OF SAN JUAN COUNTY AIR MAILED TODAY WITH PARAGRAPH SUGGESTED FOR INCLUSION IN NOTICE AS FOLLOWS: IN THE MATTER OF THE PETITION OF SOUTHERN UNION PRODUCTION COMPANY FOR AN ORDER FIXING THE SPACING OF WELLS IN THE KUTZ CANYON AND FULCHER BASIN GAS FIELDS OF SAN JUAN COUNTY (AS THEY MAY BE EXTENDED) ON THE BASIS OF ONE WELL TO A DRILLING UNIT OF APPROXIMATELY 160 ACRES WITH SUITABLE PROVISIONS FOR ANY RELATED MATTERS INCLUDING SPECIAL APPROVAL OF UNORTHODOX WELL LOCATIONS WHERE NECESSARY=

SOUTHERN UNION PRODUCTION CO WILLIS L LEA JR=

160=

CONFIRMATION

DOMESTIC SERVICE

Check the class of service desired; otherwise this message will be sent as a full rate telegram

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WESTERN UNION

1206

JOSEPH L. EGAN, PRESIDENT

INTERNATIONAL SERVICE

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CODE		NIGHT LETTER	

NO. WDS.-CL. OF SVC.	PD. OR COLL.	CASH NO.	CHARGE TO THE ACCOUNT OF	TIME FILED
			SOUTHERN UNION PRODUCTION COMPANY	

Send the following message, subject to the terms on back hereof, which are hereby agreed to

DALLAS TEXAS JANUARY 24, 1948

MR. GEORGE GRAHAM, ATTORNEY OR
MR. R. R. SPURRIER, SECRETARY
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

APPLICATION FOR SPACING UNDER KUTZ CANYON-PULCHER BASIN FIELDS OF SAN JUAN

COUNTY AIR MAILED TODAY FIVE PHOTOSTATS DESIGNED FOR INCLUSION IN DOCKET AS FOLLOWS: IN THE MATTER OF THE PETITION OF SOUTHERN UNION PRODUCTION COMPANY FOR AN ORDER FIXING THE SPACING OF WELLS IN THE KUTZ CANYON AND PULCHER BASIN GAS FIELDS OF SAN JUAN COUNTY (AS THEY MAY BE EXTENDED) ON THE BASIS OF ONE WELL TO A DRILLING UNIT OF APPROXIMATELY 160 ACRES WITH SUITABLE EXCEPTIONS FOR ANY RELATED MATTERS INCLUDING SPECIAL APPROVAL OF UNORTHODOX WELL LOCATIONS WHERE NECESSARY.

SOUTHERN UNION PRODUCTION COMPANY
By Willis L. Lee, Jr.

ILLEGIBLE

SOUTHERN UNION PRODUCTION COMPANY
BURT BUILDING
DALLAS, TEXAS

AIR MAIL

January 24, 1948

Mr. George Graham, Attorney or
Mr. R. R. Spurrier, Secretary
Oil Conservation Commission
Santa Fe, New Mexico

Dear Sir:

As we discussed the other day on the telephone, there is enclosed the petition of Southern Union Production Company for the Commission's order fixing spacing rules of special application to the Kutz Canyon-Fulcher Basin gas fields, San Juan County, as they may be hereafter extended. Also enclosed is a form suggesting the pertinent statement concerning this petition which might be included in your proposed notice of hearing,and a confirmation copy of our telegram dispatched today.

Please let us hear from you should there be any particular incidental subject on which you would like us to be prepared at the February 17 hearing. It is expected that Mr. Van Thompson, our engineer, and I will attend with Mr. J. R. Cole. Because of the interest which has been indicated in this subject by other operators, it is not unlikely that several of them will be in attendance, possibly for the purpose of introducing evidence.

Please arrange for us to receive in due course a copy of each publisher's affidavit with respect to the pertinent notice of hearing.

With thanks, we are

Yours very truly,

Willis L. Lea, Jr.
General Attorney

WLL:FG
Encls.

cc: Mr. J. R. Cole, Santa Fe
Mr. Van Thompson, Dallas

OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

IN THE MATTER OF PETITION FOR AN ORDER FIXING THE SPACING OF WELLS HEREAFTER DRILLED IN THE KUTZ CANYON AND FULCHER BASIN GAS FIELDS OF SAN JUAN COUNTY, AS THEY MAY BE EXTENDED, AND RELATED MATTERS.	)	NO._____
SOUTHERN UNION PRODUCTION COMPANY, Petitioner	)	

To the Commission and its
Honorable Members:

This is a Petition for an order of the Commission fixing by appropriate rules and regulations the spacing requirements applicable to wells hereafter drilled in the Kutz Canyon gas field and in the Fulcher Basin gas field, San Juan County, and related matters. Your Petitioner, Southern Union Production Company, a corporation authorized to transact business in New Mexico, maintains an office in Santa Fe at the corner of Marcy and Otero Streets and an office in Farmington.

Petitioner would show the Commission as follows:

1.

The Kutz Canyon and Fulcher Basin fields are productive of natural gas in commercial quantities from the Pictured Cliff sandstone formation encountered at depths ranging between 1700 and 2300 feet, approximately. The fields are in close proximity, may be contiguous and may, in fact, be essentially one gas producing area. The term "general area" will be used herein to refer to these fields, as they may be extended from time to time. The lands now known or reasonably regarded as proved to be productive of natural gas in commercial quantities from the Pictured Cliff are those described in Exhibit A annexed.

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According to Petitioner's information, there are now a total of approximately 76 wells in the general area which are productive of natural gas from the Pictured Cliff. Except for those very recently completed and in the process of being connected, each such well is connected with and producing into the natural gas transportation system of Southern Union Gas Company extending from gas areas in San Juan County, New Mexico, to existing markets in Santa Fe,

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Petitioner has been actively engaged for many years in operating its own wells and certain others in the general area. It has accumulated statistics and other information bearing upon the permeability, porosity and producing characteristics of the Pictured Cliff, and from such information believes that a well completed in the Pictured Cliff will in an orderly manner drain gas from not less than 160 acres of that formation; hence, that more dense drilling is unnecessary and uneconomic.

Although there are exceptions, previous drilling in this area has generally conformed to 160-acre spacing, with wells located substantially in the center of a unit. To some extent this spacing pattern is a result of the fact that during World War II the Commission's spacing rule applicable to gas areas provided generally for one well to each 160 acres. To some extent it is due to the current policies of the United States Geological Survey in its exercise of jurisdiction over oil and gas practices affecting the substantial federal acreage in the area. To some extent, moreover, it is a result of Petitioner's own convictions, based on the data accumulated from its own and other wells, and the convictions of certain other operators.

Knowledge of the general area and its characteristics has, of course, increased with extensions of the proven acreage and other developments, particularly in recent years. Much of this pertinent information has not yet been submitted to the Commission in appropriate form.

4.

The present spacing rule applicable in the general area appears to be contained in Section 1 of Order 637 effective March 1, 1946 (the Statewide Order), which provides in part:

> "1. (a) i. . . . . No well shall be drilled closer to any unit boundary line than 330 feet or less than 660 feet from any other well except upon petition, notice and hearing as provided by law, provided such unorthodox well location will create neither waste nor hazards conducive to waste."

The present spacing provision, therefore, would permit the location, on 40-acre tracts, of proposed wells within 330 feet of any established drilling unit, including those 160-acre units now existing in the general area which are

producing gas from one centrally located well. It is apparent that under present spacing rules the recent marked activity and competition for the limited attractive acreage available will result in 330 foot offset wells in a gas area and, consequently, in competitive offset drilling of unnecessary wells -- on units already established in addition to those to be established in the future. In this connection it is believed significant that Section 12, Chapter 72, Laws of 1935 (Section 69-213, New Mexico Statutes Annotated, '41 Edition), while it is applicable to oil or oil and gas wells, provides in part as follows:

> "The drilling of unnecessary wells creates fire and other hazards conducive to waste, and unnecessarily increases the production cost of oil and gas to the operator, and thus also unnecessarily increases the cost of the products to the ultimate consumer."

It is also significant that by Section 10 of the same enactment (Section 69-211, '41 Edition), the Commission is expressly authorized to make rules, regulations and orders fixing the spacing of wells. Moreover, the Commission possesses, and in several instances has exercised, authority to promulgate special rules and regulations applicable to a particular area of production.

By proper rule, regulation or order of special application to the Kutz Canyon-Fulcher Basin general area, as it may be from time to time extended, the Commission should inaugurate and enforce a spacing program which will economically and effectively permit, without unnecessary drilling costs or operating expenses, the recovery of natural gas reasonably producible from that area. Petitioner is prepared to submit evidence pertinent to a proper spacing program. From the information available to it Petitioner believes that, except in unusual instances, a uniform spacing unit of not less than 160 acres should be provided with respect to wells hereafter drilled in the general area,

Attention is directed to the increasingly common practice of pooling leaseholds for exploration and development, particularly where small tracts in gas areas are involved, and to the expeditious method now provided by applicable statutes and regulations for communitizing federal oil or gas acreage with other lands. Moreover, the Commissioner of Public Lands is authorized in proper cases to approve and consent to unitization programs involving State of New Mexico leases.

WHEREFORE, Petitioner requests that the Commission, after notice and hearing as required by law and applicable regulations, enter its proper order or orders fixing the spacing of wells hereafter drilled in the Kutz Canyon-Fulcher Basin general area of production, as it may be from time to time extended, on the basis of one well at approximately the center of a 160-acre drilling unit in substantially the shape of a square, with suitable provisions for any related matters, including special approval, after notice and hearing, of unorthodox well locations necessitated by the size or shape of available units or by the nature of the terrain; and, pending final action on such request, that the Commission, its agents and employees refrain as a matter of policy from approving or permitting to become effective any Notice of Intention to Drill now or hereafter on file with respect to a well in the general area which does not provide for the location of such well at or within a reasonable distance of the center of its drilling unit consisting of 160 acres, more or less, in substantially the shape of a square.

Petitioner hereby offers to supply such information concerning the subject matter of this application as is available to it.

Respectfully submitted,

SOUTHERN UNION PRODUCTION COMPANY

By _____
Vice President

ATTEST:

_____
Assistant Secretary

VERIFICATION

STATE OF TEXAS)
)
COUNTY OF DALLAS)

Before me, a Notary Public in and for Dallas County, Texas, personally appeared J. C. REID, Vice President of SOUTHERN UNION PRODUCTION COMPANY, a corporation, well known to me to be such person and officer, and he upon oath

duly administered stated that he had read the foregoing petition and that the facts therein set forth are true and correct to the best of his information and belief, and that he had executed such petition on behalf of said corporation as its free and voluntary act and deed, pursuant to due authorization.

J C [illegible]

Sworn to and subscribed before me this 24th day of January, 1948, to certify which witness my hand and seal of office.

Faye Griffin
Notary Public in and for
Dallas County, Texas

My Commission Expires:

FAYE GRIFFIN
Notary Public, Dallas County, Texas
My Commission Expires June 1, 19..49

EXHIBIT A

Description of lands known or reasonably regarded as proved to be productive of natural gas in commercial quantities from the Pictured Cliff.

Township 30 North, Range 12 West

Sections 28, 29, 30,
32, 33, 34: All

Township 29 North, Range 12 West

Sections 1, 2, 3, 11, 12, 13: All
Section 10: $E\frac{1}{2}$

Township 29 North, Range 11 West

Sections 18, 19, 20,
28, 29, 33, 34: All
Section 7: $W\frac{1}{2}$
Section 21: $W\frac{1}{2}$

Township 28 North, Range 11 West

Sections 11, 13, 14, 24: All

Township 28 North, Range 10 West

Section 19, 29: All
Section 18: $W\frac{1}{2}$
Section 20: $W\frac{1}{2}$
Section 30: $E\frac{1}{2}$
Section 32: $E\frac{1}{2}$

AIR MAIL

January 24, 1948

Mr. George Graham, Attorney or
Mr. R. R. Spurrier, Secretary
Oil Conservation Commission
Santa Fe, New Mexico

Dear Sir:

As we discussed the other day on the telephone, there is enclosed the petition of Southern Union Production Company for the Commission's order fixing spacing rules of special application to the Kutz Canyon-Fulcher Basin gas fields, San Juan County, as they may be hereafter extended. Also enclosed is a form suggesting the pertinent statement concerning this petition which might be included in your proposed notice of hearing and a confirmation copy of our telegram dispatched today.

Please let us hear from you should there be any particular incidental subject on which you would like us to be prepared at the February 17 hearing. It is expected that Mr. Van Thompson, our engineer, and I will attend with Mr. J. R. Cole. Because of the interest which has been indicated in this subject by other operators, it is not unlikely that several of them will be in attendance, possibly for the purpose of introducing evidence.

Please arrange for us to receive in due course a copy of each publisher's affidavit with respect to the pertinent notice of hearing.

With thanks, we are

Yours very truly,

Willis L. Lea, Jr.
General Attorney

WLL:FC
Encls.

cc: Mr. J. R. Cole, Santa Fe
Mr. Van Thompson, Dallas

ILLEGIBLE

NOTICE FOR PUBLICATION

STATE OF NEW MEXICO

OIL CONSERVATION COMMISSION

The State of New Mexico, by its Oil Conservation Commission, hereby gives notice, pursuant to law, of the following public hearings to be held February 17, 1948, beginning at 10:00 o'clock A.M. on that day, in the City of Santa Fe, New Mexico:

Case No._____

In the matter of the petition of Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canyon and Fulcher Basin gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters including special approval of unorthodox well locations where necessary.

Given under the seal of the Oil Conservation Commission of New Mexico, at Santa Fe, New Mexico, on January _____, 1948.

THE STATE OF NEW MEXICO acting by
and through its Oil Conservation
Commission

By: R. R. Spurrier,
Secretary

(SEAL)

Case No.

1026 Fik #2

Application, Transcript,
Small Exhibits, Etc.

NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

In the matter of the petition of the Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canon-Fulcher Basin Gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters, including special approval of non-conforming well locations where necessary.

ORDER NO. ____

CASE NO. 126

ILLEGIBLE

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canon-Fulcher Basin gas fields, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing,

FINDS, from the evidence adduced:

A. That the Kutz Canon and Fulcher Basin gas fields are productive of natural gas from the Pictured Cliff sandstone formation, that such fields are contiguous and from all information available to date appear to be one continuous gas producing area or pool in the Pictured Cliff, with a total of over [illegible] producing gas wells at the present time;

B. That such pool has produced natural gas [illegible] years, during which time the average of well-head pressures has declined to approximately [illegible] P.S.I. gauge from an initial field pressure of approximately [illegible] P.S.I. gauge, the difference indicating the substantial [illegible] produced from the pool;

C. That [illegible] applicable to the pool, of the general practices of certain operators in the area and of policies of the U. S. Geological Survey (having jurisdiction over oil and gas practices

affecting the substantial federal acreage involved), a fairly uniform spacing of one well to 160 acres has heretofore prevailed in the pool;

D. That one well will, except in unusual instances, economically and effectively drain the recoverable gas in an orderly manner from at least 160 acres of the Pictured Cliff pool and, accordingly, that more dense spacing in the pool will, as a general rule, result in waste or in unnecessary hazards conducive to waste and unnecessarily increase the costs of development and production;

E. That, except in unusual instances, the volume of recoverable gas in the pool does not under existing conditions afford economic justification for the drilling of wells on units of less than 160 acres, more dense spacing being, therefore, likely to result in retardation of development, premature abandonment of wells and in other conditions wasteful or conducive to waste;

F. That for wells hereafter drilled a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160-acre tracts, for which general spacing pattern the pooling of properties should be encouraged when necessary;

G. That the gas productive area of the pool is likely to be substantially more extensive, in one or more directions, than the presently developed portion thereof;

H. That the definition of the pool, contained herein, is reasonable and is necessary to the efficacy of this spacing order; and

I. That waste will result in the drilling of wells in the pool, as hereinafter defined, unless special rules and regulations are adopted for the prevention thereof, and that the special rules and regulations provided below are necessary to prevent such waste and hazards conducive to waste, to protect present equities and to provide for the orderly development and operation of such pool, as it may be extended.

IT IS THEREFORE ORDERED that, effective immediately, the following rules and regulations shall apply to wells hereafter completed or recompleted to be drilled or completed or recompleted to the Pictured Cliff pool in San Juan

EXHIBIT

Canon-Fulcher Basin area, defined below, in addition to the Commission's applicable rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

<u>Section 1.</u> No well shall be drilled or completed or recompleted, and no Notice of Intention to Drill or drilling permit with respect to a well shall be granted or drilling location otherwise permitted to become effective, unless

(a) such well be located on a designated drilling unit of not less than one hundred sixty (160) acres of land, more or less, according to legal subdivisions of the United States Land Surveys, in which unit all the interests are consolidated by pooling agreement or otherwise and on which no other well is completed, or authorized for completion, in the pool;

(b) such drilling unit be in the shape of a square except for normal variations in legal subdivisions of the United States Lands Surveys; and

(c) such well be located on its drilling unit at a distance from the outside unit boundaries of not less than seven hundred fifty feet (750'); provided, if such proposed new well is to be an offset to any then producing gas well completed in the pool, or the drilling of which was authorized, prior to the effective date of this order, located on an adjoining unit in which the interests are not identical with those in the unit proposed to be drilled, such proposed well may be located and drilled offsetting the existing well and as close to the common unit boundary line as the well to be so offset.

<u>Section 2.</u> Any provision herein to the contrary notwithstanding, the Commission may, and in proper cases will, on petition or on its [illegible], by order entered after notice and hearing [illegible] by law, grant exceptions and permit drilling locations to become effective, thereby [illegible] the drilling [illegible] pool and [illegible]

ILLEGIBLE

ing to the requirements of Section 1 above if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce gas from the pool in the absence of such exception, and shall also find one or more of the following conditions to exist:

(a) that consolidation or pooling of the property sought to be drilled with necessary adjoining land, notwithstanding diligent efforts made in good faith, is impossible or impractical;

(b) that the property sought to be drilled is located within a then developed portion of the pool and its non-conforming size or shape is due to the adjoining developed properties in the pool;

(c) that because of the nature of the terrain, location of the proposed well at a lesser distance from one of the outer boundaries of its drilling unit should be permitted; or

(d) that by reason of the location of the property sought to be drilled along the southwest or northeast flank of a developed portion of the area, it appears improbable that gas which can be produced in paying quantities will be encountered if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 as to such well to the extent it deems necessary; provided, it shall be the general policy of the Commission in any such case to require the pooling of properties to consolidate interests in at least 160 acres if practical to do so, whether or not in the shape of a square, and to require that the well be located, if practical to do so, at least thirteen hundred twenty [illegible] (1320') [illegible] well completed, or [illegible];

or, irrespective of such finding, if the Commission shall find that by reason of all [illegible] in the prevention of waste, [illegible] or otherwise in the exercise by the Commission of its jurisdiction over the spacing of wells or [illegible] by law, [illegible] pliced.

ILLEGIBLE

The Commission reserves the right to impose any and all reasonable conditions upon the granting of any such exception, and to take all other proper actions in the exercise of its jurisdiction over the spacing of wells or its other powers conferred by law, express or implied.

IT IS FURTHER ORDERED that, in accordance with recommendations of the New Mexico Nomenclature Committee approved and adopted by this Commission, the Pictured Cliff gas producing pool in the Kutz Canon-Fulcher Basin area, to which this order applies, is defined to include initially the following described land in San Juan County, New Mexico:

Township 30 North, Range 12 West		
Sections	28, 29, 30, 32, 33, 34:	All
Sections	19 & 20 :	S½
Section	31 :	N½ & SE¼
Section	35 :	S½ & NW¼
Section	36 :	S½
Section	27 :	S½ & NW¼
Township 29 North, Range 12 West		
Sections	1, 2, 3, 10, 11, 12, 13:	All
Sections	4 & 24 :	N½ & SE¼
Section	14 :	N½
Section	15 :	N½
Township 29 North, Range 11 West		
Sections	7, 18, 19, 20, 21, 28, 29, 33, 34:	All
Section	6 :	SW¼
Sections	16 & 26 :	SW¼
Section	27 :	S½ & NW¼
Section	35 :	W½ & SE¼
Section	17 :	S½
Sections	30 & 32 :	E½ & NW¼
Township 28 North, Range 11 West		
Sections	11, 12, 13, 14, 24 :	All
Sections	10 & 15 :	N½
Section	22 :	NE¼
Section	23 :	W½ & SE¼
Section	25 :	W½
Township 28 North, Range 10 West		
Sections	7, 18, 19, 30, 31, 32, 33, 34:	All
Section	6 :	SW¼
Section	24 :	W½

Township 27 North, Range 10 West		
Section 4	:	All
Section 3	:	W½

and also to include, without the necessity of further action by the Committee or this Commission, all additional lands located within three-fourths (3/4) mile of any part of a drilling unit established hereunder which includes land in the pool as it is initially defined or as it may be extended by the application of this provision; provided, however, that such pool shall in no event be automatically extended so as to include any lands now or hereafter included by the Commission in some other producing area formally designated as an oil or gas pool or field in the Pictured Cliff; provided, further, by order of this Commission the pool may be redesignated from time to time so as to embrace other lands in the vicinity which are believed, on the basis of additional developments, to be capable of producing gas from the Kutz Canon-Fulcher Basin pool, whether or not such other lands shall have been at one time included in another designated field or pool producing from the Pictured Cliff.

Entered and adopted by the Oil Conservation Commission this _____ day of _____, 1948.

_____
Chairman

_____
Member

_____
Member

TABLE

El Fidel Hotel
Albuquerque, New Mexico

February 13, 1948

Oil Conservation Commission
Santa Fe, New Mexico

Gentlemen:

The writer has made a study of the petition of Southern Union Production Company for a spacing order fixing the spacing of wells hereafter drilled in the Kutz-Canyon-Fulcher Basin gas fields, looking towards the best interest of the United States, the State of New Mexico and the development of potential areas involved. It is my opinion that this proposed program is sound. No doubt, there will be instances where exceptions are warranted, which would come under the wise discretion of the New Mexico Oil Conservation Commission.

Respectfully,

J. J. Hudson

JJH:fr

cc - Southern Union Production Company
Burt Building
Dallas 1, Texas

San Juan County, New Mexico.
February, 1948.

To,

The New Mexico Oil and Gas Conservation Commission.
Santa Fe, New Mexico.
Gentlemen;

Case #126

The undersigned owners of fee lands situated in San Juan County, respectfully submit their opposition to the granting of the petition of Southern Union Production Company, now pending before the Commission, such petition being entitled;

"In the matter of the petition for an order fixing the spacing of wells hereinafter drilled in the Kutz Canyon and Fulcher Basin Fields in San Juan County, AS THEY MAY BE EXTENDED and related matters."

Our opposition includes the following.

1. We deem the granting of the petition will result in a disadvantage to operators as a whole, and to the State of New Mexico, and to the fee land owners.

2. In particular we oppose any rule or regulation whereunder the present Kutz Canyon and Fulcher Basin fields may be EXTENDED.

3. A major part of the lands in the county (including State lands) are undeveloped, both as to oil and gas.

4. Numerous oil and gas leases have been secured by major and independent operators embracing units less than 160 acres.

5. The State of New Mexico has issued many oil and gas leases, on state and institutional lands and many of such leases are in smaller units than 160 acres, many being for 40 acres, 80 acres and 120 acres.
The Commissioner of Public lands (and the State) will be in a position of having issued oil and gas leases, accepting money therefor, and then not allowing developement of such leased lands. (If a 160 unit be adopted). [illegible]

6. The petitioner, who have heretofore developed certain of the lands now within the area of the Kutz Canyon and Fulcher Basin fields, disposed of natural gas to the Southern Union Gas Company, its associate, under some arrangement unknown to protestants.
The Southern Union Gas Company is the only purchaser of gas produced in these two fields, and therefore the two corporations have a MONOPOLY as pertains to the present disposition and transportation of gas, and have been able to (and do) dictate and fix the price of gas produced by independent operators, and it now appears that said two corporations have succeeded in getting the gas situation in said two fields in a condition to suit its desires, and now wish an order from the Commission, which would prevent independent operators from drilling, on units of less than 160 acres.

7. The limits of the present Kutz Canyon and Fulcher Basin fields should be definitely determined.
Gas has been discovered in other parts of the county, [illegible] [illegible] near the State line to the north.
It should be made certain that neither the petitioner, or any one else, shall successfully claim that the Kutz Canyon and Fulcher Basin fields be [illegible] to embrace other parts of the county.

ILLEGIBLE

8. No rule or regulation should be adopted that would interfere or restrict or retard the developement of lands within the county as to exploration, production or developement of either Oil or Gas in any part of the county, inasmuch as there are serveral sands and for ations. above and below the icture Cliff formation (fro which petitioner obtains gas).

Wherefore peti ioners, as protestants, pray that said petition be denied.

Respectfully submitted.

Name of land owner.	Name of land owner.

Case #126

NEW MEXICO OIL CONSERVATION COMMISSION

SANTA FE, NEW MEXICO

Case #126

In the matter of the petition of the Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canon and Fulcher Basin Gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters including special approval of unorthodox well locations where necessary.

ORDER NO._____

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canon-Fulcher Basin gas fields, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing,

FINDS, from the evidence adduced:

1. That the Kutz Canon and Fulcher Basin gas fields are productive of natural gas from the Pictured Cliff sandstone formation encountered at depths ranging between 1700 and 2300 feet, approximately; that such fields are contiguous and from all information available to date appear to be one continuous gas producing area;

2. That such area has produced natural gas for more than 15 years, during which time the average of well head pressures has declined to approximately 385 P.S.I. gauge from an initial field pressure of approximately 585 P.S.I. gauge, the difference representing the substantial quantities of gas produced during such period;

3. That by reason of rules of this Commission previously applicable to the area, of the general practices of certain operators in the area and of policies of the U. S. Geological Survey (having jurisdiction over oil and gas practices affecting the substantial federal acreage involved,) a fairly uniform spacing pattern of one well to 160 acres has heretofore prevailed in the area;

4. That one well will, except in unusual instances, economically and effectively drain the recoverable gas in an orderly manner from at least 160 acres of the Pictured Cliff and, accordingly that more dense spacing will, as a general rule, result in waste or in unnecessary hazards conducive to waste and unnecessarily increase the costs of development and production;

5. That, except in unusual instances, the volume of recoverable gas in the Pictured Cliff reservoir does not under existing conditions afford economic justification for the drilling of wells on units of less than 160 acres, more dense spacing being, therefore, likely to result in retardation of development, premature abandonment of wells and in other conditions wasteful or conducive to waste;

6. That for wells hereafter drilled a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160 acre tracts, for which purpose the pooling of properties should be encouraged when necessary; and

7. That waste will result in the drilling of wells in the Kutz Canon-Fulcher Basin area, as hereinafter defined, unless special rules and regulations are adopted for the prevention thereof, and that the special rules and regulations provided below are necessary to prevent such waste, to protect present equities and to provide for the orderly development and operation of such area;

THEREFORE, IT IS ORDERED that, effective immediately, the following rules and regulations shall apply to wells hereafter drilled or completed or recompleted to the Pictured Cliff in the Kutz Canon-Fulcher Basin area, defined below, in addition to the Commission's rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

1. No well shall be drilled or completed or recompleted, and no drilling permit shall be granted or drilling location otherwise permitted to become effective, unless

(a) such well be located on a drilling unit of one hundred sixty (160) acres of land, more or less, according to official government survey, in which all the interests are consolidated by pooling agreement or otherwise and on which no other Picture Cliff well is located or drilling;

(b) such well be located at the center of its drilling unit or at a distance from the center not greater than one-eighth (1/8) the width of such unit at its narrowest part; and

(c) such drilling unit be in the shape of a square except for normal variations in land divisions of the government survey.

2. Any provision to the contrary notwithstanding, the Commission may in proper cases by order entered after notice and hearing, as required by law, grant exceptions and permit drilling locations to become effective, thereby authorizing the drilling or completion of wells to the Pictured Cliff not conforming to the requirements of Section 1 if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce gas in the absence of such exception, and shall also find one or more of the following conditions to exist.

(a) that consolidation of properties through pooling of interests in additional land notwithstanding diligent efforts made in good faith; is impossible or impractical,

(b) that the property sought to be drilled is located within a developed portion of the area and its unorthodox size or shape is due to the adjacent developed properties;

(c) that because of the nature of the terrain, location of the proposed well at a greater distance from the center of its drilling unit should be permitted; or

(d) that by reason of the location of the property sought to be drilled along the southwest or northeast flank of a developed portion of the area; it appears impossible that gas which can be produced in paying quantities will be encountered if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 to the extent it deems necessary; provided, it shall be the general policy of the Commission in any such case to require the pooling of properties to consolidate interests in 160 acres if practical to do so, whether or not in the shape of a square, and to require that the well be located at least thirteen hundred twenty (1320) feet from the nearest well producing from the Pictured Cliff if practical to do so.

The Commission reserves the right to impare reasonable conditions upon the granting of any such exception.

IT IS FURTHER ORDERED, that the Kutz Canon- Fulcher Basin area which is subject to this order, herein sometimes termed the "area", shall be those lands in T.30N, R 12W, T 29N, R. 12W, T 29N, R. 11W, T 28N, R 11W, and T 28N, R. 10W, N.M.P.M., which are commonly known as the Kutz Canon or Fulcher Basin gas field, or as both such fields, and also all land located within one (1) mile of any well in such fields which is capable of producing natural gas from the Pictured Cliff, including wells hereafter drilled which extend the gas productive area of such fields; provided that the term "area" shall not include any lands now or hereafter included by the Commission in some other field or fields.

Entered and adopted by the Oil Conservation Commission this _____ day of _____, 1948.

_____
CHAIRMAN

_____
COMMISSIONER

_____
COMMISSIONER

SEL

Suite 17, Radio Plaza
Telephone 3003

John J. Dempsey
President

Dempsey Realty Company

Santa Fe, New Mexico

March 3, 1948

file
Case

Mr. Dick Spurrier
State Geologist
Santa Fe, N. M.

Dear Mr. Spurrier:

I wrote you requesting before a decision was made by the State Oil Conservation Commission in connection with the spacing request in an area of San Juan County by the Southern Union Gas Company, that I would be permitted to incorporate a statement in the proceedings. I now find that the lands I am developing are not in the area embraced by the hearing. Therefore, I have no further interest in the matter.

Thank you very kindly.

John J. Dempsey

JJD:jw

C
O
P
Y

ALBERT R. GREER
Registered Petroleum Engineer
State of New Mexico

1020 North Shipp
Hobbs, New Mexico
February 21, 1948

The New Mexico Oil Conservation Commission

Santa Fe, New Mexico

Concerning: Brief submitted on behalf of some of the independent operators and small land owners of San Juan County in regard to:

Case Number 126, relative to the request of the Southern Union Gas Company for a spacing ruling for the Fulcher Basin-Kutz Canyon Gas Fields, San Juan County.

Gentlemen:

I wish to submit herewith for your consideration in this matter a few written statements summarizing this case and testimony pertaining thereto, as I have analyzed it.

1. The general problem of optimum spacing in any field requires careful study and a large amount of carefully gathered and compiled information.

2. Until approximately two weeks prior to this hearing, all of the necessary information has been available only to the Southern Union Gas Company. At that time a part of this necessary information has been compiled by [illegible] and made available to interested parties. [illegible] sufficient time, however, to permit a study of this matter by an outside company or individual. Moreover, the information [illegible] not adequate to provide a definite solution.

ILLEGIBLE

3. A spacing ruling in an old field without regard to proration--or without a proration ruling--would, in effect, be a direct contradiction to the conception of correlative rights as understood in the petroleum industry.

> For, just as new 40-acre wells offsetting old wells on 160 acres would unfairly drain the 160-acre tract; so would new 160-acre units be drained by old wells on 40-acre tracts.

4. The problem of increased wells without an unlimited market, and resulting smaller per well production rate as brought out by Mr. Foster Morrell of the USGS would, in my opinion, be more likely aggravated by 160-acre units than relieved; due to the increased number of forced offsets.

5. In regard to the evidence presented at the hearing, February 17, 1948 it was shown that old wells had a drainage influence over extended distances in some areas, and in interference test conducted on adjoining wells established communication between them: but the evidence presented did not show how much gas will be left unrecovered in the reservoir at abandonment for various well spacings; nor did the testimony [illegible] in which wells would be located on 160-acre units in order that wells could later [illegible] feasibl.

[illegible] point out:

> (a) That, [illegible] extended [illegible] been established [illegible] [illegible] in this reservoir. [illegible] calculated.

> (b) In view of this, a decision on a spacing ruling [illegible] of communication and some drainage alone--but also [illegible] consideration of the value of the ultimately unrecoverable gas left

ILLEGIBLE

in the reservoir for various well spacings; for which subject inadequate testimony was presented.

(c) A provision should be made, if a spacing of 160 acres per well is contemplated, to permit later infilled drilling on a closer spacing, if ever proven economically feasible. It should be recognized that the next smallest, practical spacing from 160-acre units is 80 acres per well; and this is possible only if the wells on the initial 160-acre tracts are spotted on 80-acre patterns. If a rigid center-spot location on 160 acres is required, the only uniform spacing on infilled drilling for each 160-acre tract, would require 4 more wells, or an average of 32 acres per well.

From the testimony presented at the hearing it can be seen that an increase in the price of gas, plus a decrease in the cost of drilling the wells (both of which are normal trends*) would justify infilled drilling on 80-acre locations if it is found later that as much as approximately 25% more gas can be recovered on the closer spacing. This same information indicates that infilled drilling of 32 acres per well would probably never be economically feasible. Hence, 160-acre center-spot locations would make later infilled drilling on individual 160-acre tracts forever impossible.

Moreover, a study of the field indicates that a large number of the drilling units can be more effectively drained by locating the wells in the most permeable part of the unit; and this permeable part is not necessarily in the center of 160-acre tracts. For the same number of wells, the field can be more effectively drained by placing the wells in the most permeable parts of units rather than in rigid centerspot locations.

It is therefore requested, that in the event the Commission decides to set a spacing rule requiring 160-acres per well, that consideration be given to flexibility of locating each well on its unit; in order that maximum advantage may be realized from the continuously developed geological information; and in order that operators may have the opportunity to locate their wells on 80-acre patterns if they so choose, so that they would be in position in the future to infill wells if proven to

ILLEGIBLE

PROPOSED ORDER

BEFORE THE OIL CONSERVATION COMMISSION OF THE
STATE OF NEW MEXICO

IN THE MATTER OF A HEARING CALLED
BY THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO FOR THE
PURPOSE OF CONSIDERING:

CASE NO. 126
ORDER NO. 748

IN THE MATTER OF THE PETITION OF THE
SOUTHERN UNION PRODUCTION COMPANY FOR AN
ORDER FIXING THE SPACING OF WELLS IN THE
KUTZ CANYON-FULCHER BASIN GAS FIELDS OF SAN
JUAN COUNTY (AS THEY MAY BE EXTENDED) ON THE
BASIS OF ONE WELL TO A DRILLING UNIT OF AP-
PROXIMATELY 160 ACRES WITH SUITABLE PROVIS-
IONS FOR ANY RELATED MATTERS, INCLUDING
SPECIAL APPROVAL OF NONCONFORMING WELL LO-
CATIONS WERE NECESSARY.

PROPOSED ORDER OF THE COMMISSION

BY THE COMMISSION:

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canyon-Fulcher Basin gas field, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing,

FINDS, from the evidence adduced:

A. That the Kutz Canyon and Fulcher Basin gas pools are productive of natural gas from the Pictured Cliffs sandstone formation, that such pools are contiguous and from all information available to date appear to be one continuous gas producing area or pool in the Pictured Cliffs sandstone;

B. That such pool has produced natural gas for more than 15 years, during which time the average of well-head pressures has declined approximately 200 P.S.I. gauge.

C. That by reason of rules of this Commission previously applicable to the pool, of the general practices of certain operators in the area and of policies of the U.S. Geological Survey, a fairly uniform spacing of one well to 160 acres has heretofore prevailed throughout most of the pool;

D. That one well will, in view of present evidence, economically and effectively drain the recoverable gas from at least 160 acres of the pool and, accordingly, that more dense spacing in the pool may be conducive to waste and will unnecessarily increase the costs of development and productions under present economic conditions;

E. That for wells hereafter drilled, a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160-acre tracts, for which general spacing pattern the pooling of properties should be encouraged when necessary;

F. That the gas productive area of the pool is likely to be substantially more extensive than the presently developed portion thereof;

G. That waste will result in the drilling of wells in the pool, unless special rules and regulations are adopted for the prevention thereof; and

H. That, while the Kutz Canyon-Fulcher Basin gas field has been commercially productive for more than 15 years, it has not been subject to cooperatore action representative of the interest of all the operatores or lease-holders within the area during that period. In addition, properties, holdings and/or leases of any undetermined number of small landowners or lease-holders, whose total acreage is either less than 160 acres or includes portions of 160-acre tracts, still exist within the pool boundaries, as herein defined. Furthermore, the number of such holdings will increase as the pool boundaries are extended by subsequent drilling. In recognition of these facts, the Commission hereby serves notice that in order to equally protect the interest of all property owners and leaseholders within the Kutz Canyon-Fulcher Basin pool, exception to the following rules will be granted in cases where it can be demonstrated, by petition and hearing, as provided by law, that compliance would cause undue hardship, loss, or expense.

THEREFORE, IT IS ORDERED that, effective on the date of this order, the following rules and regulations shall apply to wells hereafter drilled or completed or recompleted to the Pictured Cliff pool in the Kutz Canyon-Fulcher Basin area, defined below, in addition to the Commission's applicable rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

Section 1. No well shall be drilled or completed or recompleted, and no Notice of Intention to Drill or drilling permit shall be approved, unless

(a) such well be located on a designated drilling unit of not less than one hundred sixty (160) acres of land, more or less, according to legal subdivisions of the United States Land Surveys, in which unit all the interests are consolidated by pooling agreement or otherwise and on which no other well is completed, or approved for completion, in the pool;

(b) such drilling unit be in the shape of a square except for normal variations in legal subdivisions of the United States Lands Surveys; and

(c) such well be located on its drilling unit at a distance from the unit boundaries of not less than nine hundred ninety feet (990); provided, if such proposed new well is to be an offset to any then producing gas well completed in the pool, or the drilling of which was authorized prior to the effective date of this order, located on an adjoining unit in which the interests are not identical with those in the unit proposed to be drilled, such proposed well may be located and drilled offsetting the existing well and as close to the common unit boundary line as the well to be so offset.

Section 2. Any provision herein to the contrary notwithstanding, the Commission may, and in proper cases will, on petition or on its own motion, by order entered after notice and hearing to the extent required by law, grant exceptions and permit drilling locations to become effective, thereby authorizing the drilling or completion of wells in the pool not conforming to the requirements of Section 1 above if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce gas from the pool in the absence of such exception, and shall also find one or more of the following conditions to exist:

(a) that consolidation or pooling of the property sought to be drilled with necessary adjoining land, notwithstanding diligent efforts made in good faith, is impossible or impractical;

(b) that the property sought to be drilled is located within a then developed portion of the pool and its non-conforming size or shape is due to the adjoining developed properties in the pool;

(c) that because of the nature of the terrain, location of the proposed well at a lesser distance from one of the outer boundaries of its drilling unit should be permitted; or

(d) that by reason of the location of the property to be drilled along the southwest or northeast flank of a developed portion of the area, it appears improbable that gas can be produced in paying quantities if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 as to such well to the extent it deems necessary;

or irrespective of such findings, if the Commission shall find that by reason of all circumstances an exception is proper in the prevention of waste, or undue drainage between properties, or otherwise in the exercise by the Commission of its jurisdiction over the spacing of wells or its other powers conferred by law, express or implied.

IT IS FURTHER ORDERED that, in accordance with recommendations of the New Mexico Nomenclature Committee approved and adopted by this Commission, the Pictured Cliff gas producing pool in the Kutz Canyon-Fulcher Basin area, to which this order applies, is defined to include the following described land in San Juan County, New Mexico:

Township 27 North,	Range 10 West
Sec. 4	All
Sec. 3	W/2

Township 28 North,	Range 10 West
Sec. 15	SW/4
Sec. 16	S/2
Sec. 17	SW/4, W/2
Secs. 18,19	
20, 21	All

Township 28 North, Range 10 West	
Sec. 22	W/2
Sec. 27	NW/4
Sec. 28, 29	All
Sec. 30	N/2
Sec. 32, 33	All

Township 28 North, Range 11 West	
Secs. 10,11,12,13 14,15 and 24	All
Sec. 22	NE/4
Sec. 23	N/2 SE/4

Township 29 North, Range 11 West	
Sec. 6	SW/4
Sec. 7	W/2
Sec. 17	S/2 SW
Secs. 18,19,20 21	All
Sec. 27	S/2
Secs. 28,29 & 30	All
Sec. 32	NW/4
Sec. 33,34	All
Sec. 35	W/2

Township 29 North, Range 12 West	
Secs. 1,2 & 3	All
Sec. 4	NE/4
Secs. 10,11,12 13 & 14	All
Sec. 15	N/2
Secs. 23 & 24	All

Township 30 North, Range 12 West	
Secs. 28,29,30,32 33, 34	All
Sec. 35	W/2, SE/4
Sec. 36	SW/4

All additional lands located within one-half (1/2) mile of any part of a drilling unit established hereunder which included land in the pool as defined or as it may be extended shall conform to these rules and regulations; provided, however, that such pool shall in no event be automatically extended so as to include any lands now or hereafter included by the Commission in some other producing area formally designated as an oil or gas pool in the Pictured Cliffs, provided, further, by order of this Commission the pool may be redesignated from time to time so as to embrace other lands in the vicinty which are believed, on the basis of additional developments, to be capable of producing gas from the Kutz Canyon-Fulcher Basin pool, whether or not such other lands shall have been at one time included in another designated field or pool producing from the Pictured Cliffs.

Entered and adopted by the Oil Conservation Commission this 14 day of May, 1948.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

CHAIRMAN

LEA COUNTY OPERATORS COMMITTEE
MAY 17, 1948
HOBBS, NEW MEXICO

PROPOSED ORDER

BEFORE THE OIL CONSERVATION COMMISSION OF THE
STATE OF NEW MEXICO

IN THE MATTER OF A HEARING CALLED
BY THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO FOR THE
PURPOSE OF CONSIDERING:

CASE NO. 126
ORDER NO. 748

IN THE MATTER OF THE PETITION OF THE
SOUTHERN UNION PRODUCTION COMPANY FOR AN
ORDER FIXING THE SPACING OF WELLS IN THE
KUTZ CANYON-FULCHER BASIN GAS FIELDS OF SAN
JUAN COUNTY (AS THEY MAY BE EXTENDED) ON THE
BASIS OF ONE WELL TO A DRILLING UNIT OF AP-
PROXIMATELY 160 ACRES WITH SUITABLE PROVIS-
IONS FOR ANY RELATED MATTERS, INCLUDING
SPECIAL APPROVAL OF NONCONFORMING WELL LO-
CATIONS WERE NECESSARY.

PROPOSED ORDER OF THE COMMISSION

BY THE COMMISSION:

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canyon-Fulcher Basin gas field, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing,

FINDS, from the evidence adduced:

A. That the Kutz Canyon and Fulcher Basin gas pools are productive of natural gas from the Pictured Cliffs sandstone formation, that such pools are contiguous and from all information available to date appear to be one continuous gas producing area or pool in the Pictured Cliffs sandstone;

B. That such pool has produced natural gas for more than 15 years, during which time the average of well-head pressures has declined approximately 200 P.S.I. gauge.

C. That by reason of rules of this Commission previously applicable to the pool, of the general practices of certain operators in the area and of policies of the U.S. Geological Survey, a fairly uniform spacing of one well to 160 acres has heretofore prevailed throughout most of the pool;

D. That one well will, in view of present evidence, economically and effectively drain the recoverable gas from at least 160 acres of the pool and, accordingly, that more dense spacing in the pool may be conducive to waste and will unnecessarily increase the costs of development and productions under present economic conditions;

E. That for wells hereafter drilled, a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160-acre tracts, for which general spacing pattern the pooling of properties should be encouraged when necessary;

F. That the gas productive area of the pool is likely to be substantially more extensive than the presently developed portion thereof;

G. That waste will result in the drilling of wells in the pool, unless special rules and regulations are adopted for the prevention thereof; and

H. That, while the Kutz Canyon-Fulcher Basin gas field has been commercially productive for more than 15 years, it has not been subject to cooperatore action representative of the interest of all the operatores or lease-holders within the area during that period. In addition, properties, holdings and/or leases of any undetermined number of small landowners or lease-holders, whose total acreage is either less than 160 acres or includes portions of 160-acre tracts, still exist within the pool boundaries, as herein defined. Furthermore, the number of such holdings will increase as the pool boundaries are extended by subsequent drilling. In recognition of these facts, the Commission hereby serves notice that in order to equally protect the interest of all property owners and leaseholders within the Kutz Canyon-Fulcher Basin pool, exception to the following rules will be granted in cases where it can be demonstrated, by petition and hearing, as provided by law, that compliance would cause undue hardship, loss, or expense.

THEREFORE, IT IS ORDERED that, effective on the date of this order, the following rules and regulations shall apply to wells hereafter drilled or completed or recompleted to the Pictured Cliff pool in the Kutz Canyon-Fulcher Basin area, defined below, in addition to the Commission's applicable rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

Section 1. No well shall be drilled or completed or recompleted, and no Notice of Intention to Drill or drilling permit shall be approved, unless

(a) such well be located on a designated drilling unit of not less than one hundred sixty (160) acres of land, more or less, according to legal subdivisions of the United States Land Surveys, in which unit all the interests are consolidated by pooling agreement or otherwise and on which no other well is completed, or approved for completion, in the pool;

(b) such drilling unit be in the shape of a square except for normal variations in legal subdivisions of the United States Lands Surveys; and

(c) such well be located on its drilling unit at a distance from the unit boundaries of not less than nine hundred ninety feet (990); provided, if such proposed new well is to be an offset to any then producing gas well completed in the pool, or the drilling of which has authorized prior to the effective date of this order, located on an adjoining unit in which the interests are not identical with those in the unit proposed to be drilled, such proposed well may be located and drilled offsetting the existing well and as close to the common unit boundary line as the well to be so offset.

Section 2. Any provision herein to the contrary notwithstanding, the Commission may, and in proper cases will, on petition or on its own motion, by order entered after notice and hearing to the extent required by law, grant exceptions and permit drilling locations to become effective, thereby authorizing the drilling or completion of wells in the pool not conforming to the requirements of Section 1 above if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce gas from the pool in the absence of such exception, and shall also find one or more of the following conditions to exist:

(a) that consolidation or pooling of the property sought to be drilled with necessary adjoining land, notwithstanding diligent efforts made in good faith, is impossible or impractical;

(b) that the property sought to be drilled is located within a then developed portion of the pool and its non-conforming size or shape is due to the adjoining developed properties in the pool;

(c) that because of the nature of the terrain, location of the proposed well at a lesser distance from one of the outer boundaries of its drilling unit should be permitted; or

(d) that by reason of the location of the property to be drilled along the southwest or northeast flank of a developed portion of the area, it appears improbable that gas can be produced in paying quantities if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 as to such well to the extent it deems necessary;

or irrespective of such findings, if the Commission shall find that by reason of all circumstances an exception is proper in the prevention of waste, or undue drainage between properties, or otherwise in the exercise by the Commission of its jurisdiction over the spacing of wells or its other powers conferred by law, express or implied.

IT IS FURTHER ORDERED that, in accordance with recommendations of the ~~New Mexico~~ Nomenclature Committee approved and adopted by this Commission, the Pictured Cliff gas producing pool in the Kutz Canyon-Fulcher Basin area, to which this order applies, is defined to include the following described land in San Juan County, New Mexico:

Township 27 North,	Range 10 West
Sec. 4	All
Sec. 3	W/2

Township 28 North,	Range 10 West
Sec. 15	SW/4
Sec. 16	S/2
Sec. 17	SW/4, W/2
Secs. 18,19	
20, 21	All

Township 28 North, Range 10 West	
Sec. 22	W/2
Sec. 27	NW/4
Sec. 28, 29	All
Sec. 30	N/2
Sec. 32, 33	All

Township 28 North, Range 11 West	
Secs. 10,11,12,13 14,15 and 24	All
Sec. 22	NE/4
Sec. 23	N/2 SE/4

Township 29 North, Range 11 West	
Sec. 6	SW/4
Sec. 7	W/2
Sec. 17	S/2 SW
Secs. 18,19,20 21	All
Sec. 27	S/2
Secs. 28,29 & 30	All
Sec. 32	NW/4
Sec. 33,34	All
Sec. 35	W/2

Township 29 North, Range 12 West	
Secs. 1,2 & 3	All
Sec. 4	NE/4
Secs. 10,11,12 13 & 14	All
Sec. 15	N/2
Secs. 23 & 24	All

Township 30 North, Range 12 West	
Secs. 28,29,30,32 33, 34	All
Sec. 35	W/2, SE/4
Sec. 36	SW/4

All additional lands located within one-half (1/2) mile of any part of a drilling unit established hereunder which included land in the pool as defined or as it may be extended shall conform to these rules and regulations; provided, however, that such pool shall in no event be automatically extended so as to include any lands now or hereafter included by the Commission in some other producing area formally designated as an oil or gas pool in the Pictured Cliffs, provided, further, by order of this Commission the pool may be redesignated from time to time so as to embrace other lands in the vicinty which are believed, on the basis of additional developments, to be capable of producing gas from the Kutz Canyon-Pulcher Basin pool, whether or not such other lands shall have been at one time included in another designated field or pool producing from the Pictured Cliffs.

Entered and adopted by the Oil Conservation Commission this 14 day of May, 1948.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

CHAIRMAN

LEA COUNTY OPERATORS COMMITTEE
MAY 17, 1948
HOBBS, NEW MEXICO

Form C-101

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

NOTICE OF INTENTION TO DRILL

Notice must be given to the Oil Conservation Commission or its proper agent and approval obtained before drilling begins. If changes in the proposed plan are considered advisable, a copy of this notice showing such changes will be returned to the sender. Submit this notice in triplicate. One copy will be returned following approval. See additional instructions in Rules and Regulations of the Commission.

Place Date

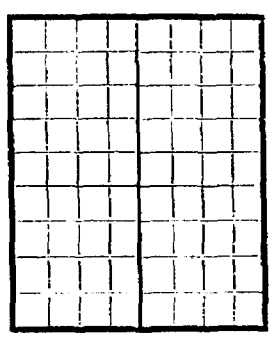
OIL CONSERVATION COMMISSION,
Santa Fe, New Mexico,

Gentlemen:

You are hereby notified that it is our intention to commence the drilling of a well to be known as

Company or Operator Lease Well No. in

of Sec., T, R, N. M., P. M., Field, County.



AREA 640 ACRES

LOCATE WELL CORRECTLY

The well is feet (N.) (S.) of the line and feet (E.) (W.) of the line of

(Give location from section or other legal subdivision lines. Cross out wrong directions.)

If state land the oil and gas lease is No. Assignment No.

If patented land the owner is

Address

If government land the permittee is

Address

The lessee is

Address

We propose to drill well with drilling equipment as follows:

The status of a bond for this well in conformance with Rule 39 of the General Rules and Regulations of the Commission is as follows:

We propose to use the following strings of casing and to land or cement them as indicated:

Size of Hole	Size of Casing	Weight Per Foot	New or Second Hand	Depth	Landed or Cemented	Sacks Cement

If changes in the above plan become advisable we will notify you before cementing or landing casing. We estimate that the first productive oil or gas sand should occur at a depth of about feet.

Additional information: Pursuant to the Commission's Order No. ___, the drilling unit for this well is _____ acres, more or less, being the _____ _____, N.M.P.M.

Approved, 19

except as follows:

Sincerely yours,

Company or Operator

By

Position

OIL CONSERVATION COMMISSION,

Send communications regarding well to

By

Name

Title

Address

SOUTHERN UNION PRODUCTION COMPANY
BURT BUILDING
DALLAS, TEXAS

May 29, 1948

Mr. R. R. Spurrier, Secretary
Oil Conservation Commission
Santa Fe, New Mexico

Dear Dick:

I will make an effort to cover the points we discussed on the telephone with respect to the proposed form of order in Case No. 126, Southern Union Production Company's application for a spacing order in the Kutz Canon-Fulcher Basin area.

Most important, of course, is the definition of the pool. In some instances the proposed order expands the acreage over that we suggested. While the reason for this expansion is not immediately apparent to us it does not seem to be too important. On the other hand, certain contractions were made, presumably on the theory that by the last paragraph of the proposed order it would be made applicable also to lands within one-half mile of those specifically described. A close reading of the last paragraph convinces me that the order, as proposed, would not apply to any land not specifically described.

The language is "All additional lands located within one-half (1/2) mile of any part of a drilling unit established hereunder which includes land in the pool as defined or as it may be extended shall conform to these rules and regulations; . . ." Notice that to be a "drilling unit established hereunder" the unit would have to be composed of lands specifically described. The order does not say "All additional lands located within one-half (1/2) mile of any part of the above described lands". For this reason the suggested area we described was determined by including each quarter section offsetting a producing quarter section either directly or diagonally; hence, in order to avoid effect of the order anyone proposing to drill a new well would have to jump entirely a 160-acre tract flanking the nonproducing area.

On the contrary, your description of acreage would permit direct offset drilling in some instances, particularly noticeable in the northwestern part. Surely if the order is to accomplish its result it must apply to lands adjoining those which are now developed. While there may be some instances in which it is not necessary to include acreage offsetting very small wells, it seems to us that in general the acreage should be expanded to include all quarter sections offsetting producing quarter sections in any direction.

The last paragraph as suggested by us was intended to accomplish automatic extension of the area to which the order is applicable. For example, both forms of order describe the $SW\frac{1}{4}$ of Section 6, T. 29 N., R. 11 W. Suppose that this is established as a drilling unit under the order (as contemplated by Section 1(a)) so as to come within the intention of the last paragraph. Clearly it would include "lands in the pool as defined" since all the unit is initially defined. Then by application of the last paragraph the remainder of Section 6 would be subject to the order since all the rest of the section is within one-half mile of a "drilling unit" established under the order. Thereafter, if the $SE\frac{1}{4}$ of Section 6 should be designated as a drilling unit, then the pool would be automatically extended and the order automatically applicable to the $W\frac{1}{2}$ of Section 5 and the $NW\frac{1}{4}$ of Section 8. The intention here, of course, is to make the order automatically cover extensions resulting from regular outward development. On the other hand, if before the $SW\frac{1}{4}$ of Section 6 should be designated as a unit the $SE\frac{1}{4}$ of that section should be drilled, the order would not automatically apply so that its provisions need not be observed unless and until the Commission should see fit to extend it by supplemental order, redesignating the pool.

(*) and the NE¼ of Section 7

Under your proposed form it appears that anyone could drill, for example, the $NE\frac{1}{4}$ of Section 31, T. 30 N., R. 12 W., without complying with the spacing or density requirements of the order. Conceivably, several wells could be drilled simultaneously or consecutively before a supplemental order might be entered. Yet, this particular land is offset by production three ways. A similar situation prevails with respect to the $SW\frac{1}{4}$ of Section 20 and the $SE\frac{1}{4}$ of Section 19.

Going now to page 1 in finding D, it strikes us that the word "may" in the third line should be "will" since the word "conducive" provides sufficient latitude; moreover, in this same finding that the words "under present economic conditions" at the last should be deleted since the statement is true under any conditions.

In finding H the sentence beginning "Furthermore" seems more of a forecast than a fact. I believe the Commission could probably say as a fact that the number of such holdings will be likely to increase etc.

In the same finding we think that the last sentence should be deleted entirely since it is not a fact and since it can be construed as an invitation to request exceptions. In this connection it seems significant that everyone known to have any substantial interest in this area is apparently satisfied that the spacing rules proposed are proper and economically sound; in other words, that any opposition to the program has been abandoned. I believe Van told you of the expression we received from Al Greer, Jr. Therefore, if anything along this line is appropriate, it definitely seems to us that it should be de-emphasized and considered for what it is, i.e., an exception to the rule to be granted only in special situations.

The fact is that by express provisions of Section 2 a great majority of nonconforming situations are expressly identified and provided for; hence, other exceptions should be few and carefully scrutinized --- certainly not invited. Let's delete the last sentence of H.

In part (d) under Section 2 we suggest that the last three words of the second line be changed to "of the developed," and that the semicolon in the next line be changed to a comma so as to preserve the continuity. At the end of (d) you dropped a proviso we had suggested which seems worthwhile since it affords notice that the Commission does not intend to throw down the bars to anyone desiring to drill on the flanks. The proviso gives notice of a sound policy of the Commission, particularly with respect to location of a well at least 1,320 feet from other wells. These seem to be minimum requirements of which the operators are entitled to be notified.

In the last paragraph of Section 2, beginning "or, irrespective of such findings," you may want to add back, perhaps as a new sentence, the idea now expressed under finding H that the Commission will take such action as is necessary "in order to equally protect the interests of all property owners and leaseholders within the Kutz Canon-Fulcher Basin pool" by granting of exceptions in cases where it can be demonstrated, by petition and hearing, as provided by law, that compliance would cause undue hardship, loss or expense. Personally, I think addition of this would be surplus, but it is a matter of preference. We do feel that exceptions should not be emphasized or invited.

In the next paragraph beginning "It is further ordered" the word "initially" is omitted after the word "include" in the fourth line. This should be replaced since it furthers the idea of automatic extension provided for in the last paragraph. Referring again to the last paragraph of the order, it seems to us that the saving of a few words sacrifices definiteness and clarity in the provisions for automatic extensions to cover orderly flank development, and that the last paragraph we suggested should be reinstated with the substitution of 1/2 for 3/4.

To comply with the theory of Section 1(a), wherein it is provided that the drilling unit be designated, and to avoid any confusion on an operator's part, we suggest addition of a new Section 2 (changing present Section 2 to Section 3), as follows:

> * (Section 2.) In connection with wells hereafter proposed to be drilled or completed or recompleted in the pool, as initially defined or as it may be extended, there shall be included on the form C-101, "Notice of Intention to Drill", in addition to the other required information, a designation of the drilling unit established hereunder for such well, by legal subdivisions of the United States Land Surveys, in substantially the following manner: "Pursuant to the Commission's Order No. 748, the drilling unit for this well is _____ acres, more or less, being the (here describe lands constituting the unit) _____, N.M.P.M." *

Should you want to discuss any of these ideas by telephone during my absence from town next week, please call Mr. Van Thompson collect.

With best regards and thanks, I am

Yours very truly,

Willis L. Lea, Jr.
bj

WLL:FG
Encl.

cc: Mr. J. R. Cole, Santa Fe

SOUTHERN UNION PRODUCTION COMPANY
BURT BUILDING
DALLAS, TEXAS

April 12, 1948

Air Mail

Case 126

Mr. R. R. Spurrier
State Geologist
Oil Conservation Commission
Santa Fe, New Mexico

Dear Mr. Spurrier:

As previously arranged, I am glad to enclose several copies of the form of a suggested order which may be acceptable in connection with the Kutz Canon-Fulcher Basin spacing matter. This incorporates some revision from the tentative draft previously submitted. For example, provision is now made in Section 1(c) for the continuation of offset rights.

I was prepared to write you at considerable length about the form of this order or come back out to Santa Fe for a discussion; however, it developed that Mr. Van Thompson was required to be in San Juan County during the early part of this week and I have arranged with him to drop by Santa Fe for a discussion with you before returning here.

My suggestion would be that the form of this order be reviewed by you and Governor Miles and the Commission's staff so that any questions which arise may be discussed with Mr. Thompson upon his arrival at Santa in a day or so. I am uncertain about the formal matters of heading and conclusion and call them to your attention for such adjustment as you may think advicable.

With best regards, I am

Yours very truly,

Willis L. Lea, Jr.

WLL:fr
encls.
cc - Mr. J. R. Cole
Mr. Van Thompson

P.S. Under separate cover I am forwarding two copies of a map showing the Kutz Canon-Fulcher Basin wells and identifying the state, federal and fee lands, respectively, by distinctive colors. Please see that Geo. Graham gets a map.

SOUTHERN UNION PRODUCTION COMPANY
BURT BUILDING
DALLAS, TEXAS

April 22, 1948

Case 126

Air Mail

Mr. R. R. Spurrier, Secretary
Oil Conservation Commission
Santa Fe, New Mexico

Dear Dick:

Confirming our long-distance conversation this morning, it has been suggested, and we agree, that at the bottom of page 2 of the suggested form of order heretofore submitted, there should be deleted the words "authorized by the Commission to be" so that the phrase at the bottom of the page will be "apply to wells hereafter drilled. . . ."; moreover, that the word "granted" appearing in the third line of Section 1, page 3, should be change to "approved".

As I told you, the reason for including lands adjacent to the Byrd-Frost #1 Hargrave in this suggested form of order is the fact that this well encountered a good "kick" (using the words of Mr. Van Thompson) in the Pictured Cliff, thus clearly indicating the extension of the Pictured Cliff productive area to lands adjacent to the Hargrave well. I understand that this fact can be readily and easily established, probably with information in our possession.

Referring to the mechanics of extending the area subject to this order, it does not matter particularly to us whether the suggested procedure for automatic extensions is followed or not. It strikes us that the suggested procedure is sound and convenient and workable, that it saves time and trouble, and that it is a more modern approach to gas field extensions; however, if you prefer to follow the practice of periodic supplemental orders extending the area, that is certainly all right. We think it is important that the original territory be described, as suggested in the proposed order, sufficiently large to incorporate all possible direct and diagonal 160-acre tracts on the flanks of the developed area which offset existing wells; otherwise, the order will not accomplish its purpose. Our land description was prepared with the thought in mind that the order should as a minimum include all the flanking 160-acre tracts on which wells might be drilled offsetting present production.

Mr. Morrell said on the telephone the other day that he was not pleased with the 750-foot provision in Section 1(c), and that he might discuss it with you. We think there is ample basis to change this to 990 feet and would, in fact, prefer to see it 990 instead of 750. The present 750-foot provision was suggested in deference to ideas expressed at and after the hearing. It is just a middle-ground approach which does not seriously affect the 160-acre spacing program. Either 750' or 990' or some intermediate figure will be satisfactory with us.

I urge you to complete consideration of this matter, discussing it with Mr. Graham and others of your staff, to the end that it may be concluded without further delay. Should there be any further questions or problems, please do not hesitate to call me collect in Dallas, Central-8010, through Saturday, or in care of the Company's offices at El Paso during the day Monday, as under those circumstances I will expect to meet with you in Santa Fe at the earliest convenient time.

Just as soon as I can I will consider the question you asked on the telephone and give you a memorandum.

With best regards, I am

Yours very truly,

Willis L. Lea, Jr.

WLL:fr

cc - Mr. Van Thompson

April 5, 1948

CASE NO. 126, Southern Union Production Company.

MEMORANDUM:

Testimony shows that in Fulcher Basin-Kutz Canyon, San Juan County, that there was an original rock pressure of 585 pounds as of 1927 and 1928. A pressure survey in 1947 showed that the average rock pressure of gas to be 385 pounds, and it is indicated that since 1947 test the gas pressure has declined from the average of 385 pounds.

Certain wells, some of which have been drilled during recent years, are shown by chart to be below the original 585-pound pressure, but slightly above the 385-pound average of 1947. Evidence was submitted to the effect that approximately one-third of the as of the field has already been taken out.

Upon the plat or diagram submitted there are "two sinks" indicating roughly the two old fields. In these the pressure is down to about to 350 pounds. Some of the recent wells drilled showed the pressure of between 400 and 500 pounds, which is below the pressure in the Feasel Well to the northwest end of the field which has 385-pound pressure indicating that the closely drilled wells has caused pressure decline.

The petitioner offered in evidence the results of an

interference test covering seven wells on a 160-acre spacing to substantiate claim that there was gas drainage across 160 acres. The test consisted of Walker No. 1, Walker No. 2, McGrath 1, 2, and 3, Kattler No. 1, and Hudson No. 2 wells. All were shut in for twelve days, then all except Walker No. 1 were put on production against a line pressure of 261 P F I. Thereafter, on the following day, the six surrounding wells were taken off the gas line and blown to the air, with the Walker No. 1 continuing to be shut in. A recording pressure chart on the wellhead of Walker No. 1, the shut in well, showed a considerable gain in pressure, explained as the normal build up. Pressures on the third and fourth days continued this build up. On the fourth day, the six surrounding wells were put back on production. On the fifth day, the pressure of Walker No. 1 fell back below because of previous delays, thus indicating pressure interference. The average pressures dropped 1.8 pounds pressure, (not large but petitioner urges that in consideration of other reservoir factors is conclusive for a material drainage under 160 acres). The drop-back was about two pounds. Figures submitted were that the porosity of the Pictured Cliff was about 20%, estimated from about 20 core samples. The engineer calculated that under 160 acres under original pressure of 535 pounds that there was an approximate 1,878,000,000 cubic feet. The field would not be any good

after the pressure goes down to 150 pounds, figured about 72% of the initial gas in place

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 997
Roswell, New Mexico
July 2, 1948

Mr. R. R. Spurrier
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Dear Dick:

With your letter of May 13 you forwarded a copy of a proposed order covering the petition of Southern Union Production Company for an order fixing 160-acre well spacing in the Kutz Canyon-Fulcher Basin gas field and requested comments or suggestions thereon.

In my opinion the proposed order as drafted is very satisfactory and should be very helpful to maintain and encourage orderly development of the gas reserves of this field. I offer minor suggestions and changes as follows:

Paragraph D, third line, change the word "may" to "would".

Beginning at the end of the fourth line, delete the words "under present economic conditions".

Paragraph H, eighth line, change the word "will" to "may".

In Sec. 2(d), second line, change the word "a" to "the".

In the same line, change the semicolon to a comma.

It is my impression that section 2(d) would provide for a reduction in gas allowable if exceptions were granted to permit drilling on less than 160-acre drilling units.

In view of the recent formulation of the Northwest New Mexico Nomenclature Committee, it is assumed of course that you will use the name of that Committee in the second line of the paragraph beginning "It is further ordered", also that the definition of the Kutz Canyon-Fulcher Basin gas field will be revised to conform with the definition recommended by the said Nomenclature Committee as indicated on a list recently prepared by Mr. Barnes of your office which appears complete and correct as to this field.

I regret that the press of other business has unduly delayed my reply to you on this matter. However, I have previously concurred in the order and discussed these particular changes in personal conferences with you on June 15. This letter will confirm those statements and may be filed with your record of the case to show the concurrence of this office in the proposed order.

Very truly yours,

Foster Morrell

Foster Morrell,
Supervisor, Oil and Gas Operations.

economically justifiable.

6. It is realized that some action may be necessary to protect the investment of operators who drilled wells on 160-acre tracts. It is possible, however that the entire situation could best be handled by an operators committee formed by active operators in the area. Regular meetings could be held and all additional information studied and discussed. In the event of failure of such a committee to bring reasonable agreement among the operators, resort could be had to legal action by the Oil Conservation Commission.

Yours very truly,

/s/ Albert L. Greer
Albert L. Greer

* The decrease in the cost of drilling would result from improved methods and competition in drilling as more activity centers in this area.

PROPOSED ORDER

BEFORE THE OIL CONSERVATION COMMISSION OF THE
STATE OF NEW MEXICO

IN THE MATTER OF A HEARING CALLED
BY THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO FOR THE
PURPOSE OF CONSIDERING:

CASE NO. 126
ORDER NO. 748

IN THE MATTER OF THE PETITION OF THE
SOUTHERN UNION PRODUCTION COMPANY FOR AN
ORDER FIXING THE SPACING OF WELLS IN THE
KUTZ CANON-FULCHER BASIN GAS FIELDS OF SAN
JUAN COUNTY (AS THEY MAY BE EXTENDED) ON THE
BASIS OF ONE WELL TO A DRILLING UNIT OF AP-
PROXIMATELY 160 ACRES WITH SUITABLE PROVIS-
IONS FOR ANY RELATED MATTERS, INCLUDING
SPECIAL APPROVAL OF NONCONFORMING WELL LO-
CATIONS WHERE NECESSARY.

PROPOSED ORDER OF THE COMMISSION

BY THE COMMISSION:

WHEREAS, after due notice as required by law the Commission held a public hearing in Santa Fe on February 17, 1948, to consider the petition of Southern Union Production Company for the adoption of an order fixing the spacing of wells hereafter drilled in the Kutz Canon-Fulcher Basin gas field, San Juan County, New Mexico, and related matters; and

WHEREAS, the Commission having considered the evidence adduced at such hearing, pertinent information otherwise available in the Commission's records, the statements made and viewpoints expressed by interested parties at or in connection with such hearing,

FINDS, from the evidence adduced:

A. That the Kutz Canon and Fulcher Basin gas pools are productive of natural gas from the Pictured Cliffs sandstone formation, that such pools are contiguous and from all information available to date appear to be one continuous gas producing area or pool in the Pictured Cliffs sandstone;

B. That such pool has produced natural gas for more than 15 years, during which time the average of well-head pressures has declined approximately 200 P.S.I. gauge.

C. That by reason of rules of this Commission previously applicable to the pool, of the general practices of certain operators in the area and of policies of the U. S. Geological Survey, a fairly uniform spacing of one well to 160 acres has heretofore prevailed throughout most of the pool;

D. That one well will, in view of present evidence, economically and effectively drain the recoverable gas from at least 160 acres of the pool and, accordingly, that more dense spacing in the pool may be conducive to waste and will unnecessarily increase the costs of development and production under present economic conditions;

E. That for wells hereafter drilled, a general spacing pattern of one centrally located well on a unit of 160 acres, substantially in the shape of a square, is required to protect the equities of those having interests in wells heretofore drilled on 160-acre tracts, for which general spacing pattern the pooling of properties should be encouraged when necessary;

F. That the gas productive area of the pool is likely to be substantially more extensive than the presently developed portion thereof;

G. That waste will result in the drilling of wells in the pool, unless special rules and regulations are adopted for the prevention thereof; and

H. That, while the Kutz Canon-Fulcher Basin gas field has been commercially productive for more than 15 years, it has not been subject to cooperative action representative of the interest of all the operators or leaseholders within the area during that period. In addition, properties, holdings and/or leases of an undetermined number of small landowners or leaseholders, whose total acreage is either less than 160 acres or includes portions of 160-acre tracts, still exist within the pool boundaries, as herein defined. Furthermore, the number of such holdings will increase as the pool boundaries are extended by subsequent drilling. In recognition of these facts, the Commission hereby serves notice that in order to equally protect the interest of all property owners and leaseholders within the Kutz Canon-Fulcher Basin pool, exception to the following rules will be granted in cases where it can be demonstrated, by petition and hearing, as provided by law, that compliance would cause undue hardship, loss, or expense.

THEREFORE, IT IS ORDERED that, effective on the date of this order, the following rules and regulations shall apply to wells hereafter drilled or completed or recompleted to the Pictured Cliff pool in the Kutz Canon-Fulcher Basin area, defined below, in addition to the Commission's applicable rules, regulations and orders heretofore or hereafter adopted to the extent not in conflict herewith:

Section 1. No well shall be drilled or completed or recompleted, and no Notice of Intention to Drill or drilling permit shall be approved, unless

(a) such well be located on a designated drilling unit of not less than one hundred sixty (160) acres of land, more or less, according to legal subdivisions of the United States Land Surveys, in which unit all the interests are consolidated by pooling agreement or otherwise and on which no other well is completed, or approved for completion, in the pool;

(b) such drilling unit be in the shape of a square except for normal variations in legal subdivisions of the United States Lands Surveys; and

(c) such well be located on its drilling unit at a distance from the unit boundaries of not less than nine hundred ninety feet (990); provided, if such proposed new well is to be an offset to any then producing gas well completed in the pool, or the drilling of which was authorized, prior to the effective date of this order, located on an adjoining unit in which the interests are not identical with those in the unit proposed to be drilled, such proposed well may be located and drilled offsetting the existing well and as close to the common unit boundary line as the well to be so offset.

Section 2. Any provision herein to the contrary notwithstanding, the Commission may, and in proper cases will, on petition or on its own motion, by order entered after notice and hearing to the extent required by law, grant exceptions and permit drilling locations to become effective, thereby authorizing the drilling or completion of wells in the pool not conforming to the requirements of Section 1 above if the Commission shall find that the property sought to be drilled would be deprived of an opportunity to produce gas from the pool in the absence of such exception, and shall also find one or more of the following conditions to exist:

(a) that consolidation or pooling of the property sought to be drilled with necessary adjoining land, notwithstanding diligent efforts made in good faith, is impossible or impractical;

(b) that the property sought to be drilled is located within a then developed portion of the pool and its non-conforming size or shape is due to the adjoining developed properties in the pool;

(c) that because of the nature of the terrain, location of the proposed well at a lesser distance from one of the outer boundaries of its drilling unit should be permitted; or

(d) that by reason of the location of the property to be drilled along the southwest or northeast flank of a developed portion of the area; it appears improbable that gas can be produced in paying quantities if the well conforms to Section 1, in which case the Commission may modify the requirements of Section 1 as to such well to the extent it deems necessary;

or, irrespective of such findings, if the Commission shall find that by reason of all circumstances an exception is proper in the prevention of waste, or undue drainage between properties, or otherwise in the exercise by the Commission of its jurisdiction over the spacing of wells or its other powers conferred by law, express or implied.

IT IS FURTHER ORDERED that, in accordance with recommendations of the New Mexico Nomenclature Committee approved and adopted by this Commission, the Pictured Cliff gas producing pool in the Kutz Canon-Fulcher Basin area, to which this order applies, is defined to include the following described land in San Juan County, New Mexico:

Township 27 North, Range 10 West	
Sec. 4	All
Sec. 3	W/2

Township 28 North, Range 10 West	
Sec. 15	SW/4
Sec. 16	S/2
Sec. 17	SW/4, W/2
Secs. 18,19	
20,21	All

Township 28 North, Range 10 West	
Sec. 22	W/2
Sec. 27	NW/4
Sec. 28,29	All
Sec. 30	N/2
Sec. 32,33	All

Township 28 North, Range 11 West	
Secs. 10,11,12,13	
14,15 and 24	All
Sec. 22	NW/4
Sec. 23	E/2 SW/4

Township 29 North, Range 11 West	
Sec. 6	SW/4
Sec. 7	W/2
Sec. 17	S/2 SW
Secs. 18,19,20	
21	All
Sec. 27	S/2
Secs. 28,29 & 30	All
Sec. 32	NW/4
Sec. 33,34	All
Sec. 35	W/2

Township 29 North, Range 12 West	
Secs. 1,2, & 3	All
Sec. 4	NE/4
Secs. 10,11,12	
13, & 14	All
Sec. 15	E/2
Secs. 23 & 24	All

Township 30 North, Range 12 West	
Secs. 28,29,30,32	
33,34	All
Sec. 35	W/2,SE/4
Sec. 36	SW/4

All additional lands located within one-half (1/2) mile of any part of a drilling unit established hereunder which includes land in the pool as defined or as it may be extended shall conform to these rules and regulations; provided, however, that such pool shall in no event be automatically extended so as to include any lands now or hereafter included by the Commission in some other producing area formally designated as an oil or gas pool in the Pictured Cliffs, provided, further, by order of this Commission the pool may be redesignated from time to time so as to embrace other lands in the vicinity which are believed, on the basis of additional developments, to be capable of producing gas from the Kutz Canon-Fulcher Basin pool, whether or not such other lands shall have been at one time included in another designated field or pool producing from the Pictured Cliffs.

Entered and adopted by the Oil Conservation Commission this 14 day of May, 1948.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

CHAIRMAN

MEMBER

SECRETARY

Mountain Oil and Gas Company
Box [illegible]
Hobbs, New Mexico

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO.
JUN 24 1948

Case 126

June 22,1948

State Oil Conservation Commission
Santa Fe, New Mexico

Dear Sir:

I would like to state the opinion of this Company on the petition of Southern Union Gas Co. of 160 acre spacing in the Fulcher Kutz Canyon gas field were we have oil gas lease holdings and have laid plans for developement of this property,and now have one well drilling.

It is this companys opinion that approval of this petition would greatly hinder operations of the Independent and small operator for the development of gas which is badly needed thoughout the country.And on a standpoint of conservation of the States natural resoures the fourty acre spacing has proved very satisfactory. I remain

Very truly yours
David L. Mills
President

cm/D.M.

OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

18 May 1948

Mr. Willis L. Lea, Jr.
Attorney At Law
Burt Building
Dallas 1, Texas

Dear Willis:

Thank you very much for your letter of 14 May. Your work and opinions are very much appreciated.

Hope the Order for Case 126 is reasonable in your opinion.

Sincerely

PRG:bsp

C O P Y

WILLIS L. LEA, JR.
ATTORNEY AT LAW
BURT BUILDING
DALLAS 1, TEXAS

May 14, 1948

Mr. R. R. Spurrier,
State Geologist
Oil Conservation Commission
Santa Fe, New Mexico

Dear Dick:

My absence from Dallas has prevented earlier attention to your request for my views on the propriety under your statutes of holding Oil Conservation Commission hearings with only one member of the Commission present. I understand that your inquiry was raised because of the absence or expected absence of one or two members of the Commission and you have in mind that ultimately at least two (2) members of the Commission would concur, after review of the record, in any order which might be issued.

I have given the question considerable study and have, in addition, asked one of the men in my office, Robert M. Martin, to go into your question more deeply than I have done. It is unfortunate that your statute does not make express provision for the trial examiner procedure since that would clearly meet your requirements at this time.

For the reasons indicated below I cannot be convinced that it is safe for you to proceed with the conduct of hearings unless at least two (2) members of the Commission are, in fact, present and acting. While it is by no means clear that procedure with a one-man hearing and a two-man order is improper, I cannot give you an opinion that it is good procedure and, therefore, must advise against it.

The following provisions of your statute are significant:

"Two (2) members of the Commission shall constitute a quorum for all purposes." (Emphasis supplied.) Sec. 69-204.

"The Commission, or any member thereof, is hereby empowered to subpoena witnesses, to require their attendance and giving of testimony before it, and to require the production of books, papers or records in any proceeding before the Commission." (Emphasis supplied.) Sec. 69-207.

"Included in the power given to the Commission is the authority: . . . to hold hearings . . . " Sec. 69-211.

It is worthy of notice that, while the Legislature made express provision that one member of the Commission might administer oaths or might subpoena witnesses for giving testimony before the Commission, no provision is made for trial examiner procedure, and authority therefor must be found, if at all, in implications of the Act.

I realize there is, perhaps, as much argument in favor of propriety of the trial examiner procedure as there is opposed to it. For example, in Sec. 69.206 we find "The Commission shall prescribe its rules of order or of procedure in hearing or other proceedings before it under this Act", from which it may be ably contended that the Commission has authority to set up the trial examiner procedure by regulation. Sec. 69.210 gives support to such contention, and Sec. 69.221 provides that a hearing may be held "at such time, place and manner as may be prescribed by the Commission." While I believe the term "manner" must mean a manner consistent with statutory authorization, I, nevertheless, see the possibility that your courts might find the trial examiner procedure proper if expressly authorized by Commission regulation adopted after notice and hearing before a majority Commission. My associate here is inclined to the contrary view, and, as noted above, I definitely think it unsafe.

While the trial examiner procedure is widely used, I know of no instance of its use in the absence of express legislative sanction. For example, in my own experience the trial examiner procedure is authorized by express statute in the Public Utility Holding Company Act (SEC), in the Federal Power Act and Natural Gas Act (FPC), in the Texas Railroad Commission statutes, in the National Labor Relations Act and in various workmen's compensation statutes, for example, Arizona, Utah and Oklahoma. When so authorized, the trial examiner may be either a member of the Commission itself or an agent appointed by the Commission to preside at the hearing. The doubts in my mind are not dispelled by the cases which hold that referees or trial examiners act in a quasi judicial capacity, not in a purely ministerial function. I will not burden you with the cases, although I will be glad to supply citations if you are interested in going deeper into the question.

I am sorry this investigation did not result in more useful information for you, but it just seems to me that the court could very well decide for or against trial examiner procedure, and, therefore, it is not a safe course in the present state of your statutes.

With best regards, I am

Yours very truly,

WLL:fr

SOUTHERN UNION PRODUCTION COMPANY
BURT BUILDING
DALLAS, TEXAS

April 6, 1948

Mr. R. R. Spurrier, Secretary
New Mexico Oil Conservation Commission
Santa Fe, New Mexico

Dear Mr. Spurrier:

Having had an opportunity to review the stenographic transcript of our February 17 hearing, I wanted to call to your attention one or two minor discrepancies.

At page 8 in the center of the page Exhibit 4 should consist of "the chart and data accompanying Mr. Nichols' letter. . .". I notice that the letter is made a part of the transcript proper and to complete the record both the accompanying chart and data should be attached as Exhibit 4.

At page 10 the first sentence appearing below the appended core analysis information should be amended by deleting the word "to" so as to make the sentence read "From the data the average porosity is found to be 20%."

If you concur in these corrections, please advise me so that I may make them on my copy of the record. At the same time please call to my attention any other discrepancies which you observed.

Mr. Thompson has now returned to Dallas and we are trying to get together during the day with respect to revision of the suggested form of order. In any case, we will expedite our work and let you hear from us as promptly as possible.

I appreciate the very satisfactory conference we had in your office last week and trust that an appropriate order can be promptly entered.

With best regards and thanks, I am

Yours very truly,

Willis L. Lea, Jr.

WLL:fr
cc - Mr. George Graham

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

State of New Mexico to:

All named parties in the following case,
and notice to the public:

CASE NO. 126

In the matter of the petition of Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canon and Fulcher Basin gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for any related matters including special approval of unorthodox well locations where necessary.

BY MR. WILLIS LEA, Attorney for Southern Union Production Company.

If the Commission please, for the Petitioner we have Willis Lea of Dallas and Manuel Sanches of Santa Fe.

This is a petition of the Southern Union Production Company for an order of the Commission to fix a spacing program in Kutz Canon and Fulcher Basin. We have referred to them as two fields and it may be two fields, however, more recent drilling has developed the fact that the fields are contiguous. I believe our evidence will indicate, for practical purposes at least, the fields are one.

This problem of spacing has been handled rather satisfactorily heretofore because of several well known facts. During the war the P. A. W. had a spacing program of 160 acres, and this Commission conformed to it. Prior to that the activity in the area did not seem to require any particular spacing. Shortly after the war the 160 acre rule of this Commission applicable to that area was rescinded, with the result that the general spacing rule which I believe is 40 acres, with wells to be drilled 330 feet from lease boundary lines, has prevailed. This is an economic problem. We all know in a given reservoir there is only so much gas and only so much can be commercially extracted. This field is 20 years old, the first well was drilled in 1929; it has developed sometimes gradually and sometimes rapidly. The facts the Southern Union Production Company has accumulated over the years as one of the oldest operators are available to us. The Company has made its own study of spacing and what is the proper spacing in that area. This is no oil area unless you want to call the oil turned up in the so-called Farmington series.

It may be one or more of the wells might commercially produce oil from the Farmington. In fact, I know of no well that is producing oil in this immediate area. We have a gas problem. We recently employed Mr. Earl Nichols of Dallas to test our figures and reach his own conclusions; for the benefit of the Commission and others interested as to what is a proper spacing unit for that field. His conclusions go not only to the area which a well will drain, but also go to the question of the economics of drilling on the 160 acres as opposed to some smaller spacing units. I don't think we have a pro-ration problem; it is not our view to do that. We have peculiarly a spacing problem. The wells in that area that have been drilled today have been connected with a pipe line. The gas comes to Santa Fe and Albuquerque. If there are any exceptions I don't believe I know of them, and if there are the wells must be recently completed and pipe line connection in the process of being made. As we all know, gas is maintained and necessarily so from other areas; none of it comes from Fulcher Basin.

(After being duly sworn Mr. Earl Nichols and Mr. Van Thompson testified as follows)

MR. LEA:

Mr. Nichols, state your name for the record.

MR. NICHOLS:

Earl Nichols.

Q. You live in Dallas, Texas?

A. That is right.

Q. What is your profession?

A. Petroleum Engineer.

Q. You are actively engaged in that profession at the present time?

That is right, consultant.

Q. For how long?

A. As consultant or petroleum engineer?

Q. Petroleum engineer?

A. Since the first of 1938 - about 10 years.

Q. What has been the nature of your experience since 1938?

A. I spent about three years with Carter Oil Company in Oklahoma, during that time they put me through the training program - gasoline plant work, research work in chemical laboratory, field engineering, office and inventory courses - a little bit of everything they felt a Petroleum Engineer should have. After I left Carter I worked for Phillips in their research department for a short while; then with Core Laboratories, Inc., in Dallas. I worked for them about 6½ years as manager of the reservoir fluid analysis department.

Q. You have had experience in the study of reservoir conditions?

A. Primarily that has been the biggest majority of my work.

Q. Included the study of reserves and porosity?

A. That is right.

Q. What is your educational background?

A. I received my degree from Texas Christian University, major in physics and math, a small amount of graduate work in physics from the Washington University in St. Louis.

Q. Have you been employed by Southern Union Production Company to make a study of statistics and conditions applicable to Kutz Canon-Fulcher Basin?

A. That is right.

Q. Is this the first time you have been employed by Southern Union Production Company?

A. That is right.

Q. Were the Company's data made available to you in so far as they apply to these fields?

A. Yes, they gave me all their data.

Q. Did you find those data c mplete or not for your purpose in making the required study?

A. Yes.

Q. How many wells located in these areas?

A. Approximately 77.

Q. Do you know when the first well was drilled?

A. I don't have that information.

MR. VAN THOMPSON:

The first well was completed in 1927 or 1928.

Q. What would you say to have been the initial field pressure in that area?

MR. NICHOLS:

In the order of 585 pounds, might be some variation one way or the other.

Q. 585 pounds Virgin Rock Pressure?

A. Yes, sir.

Q. From your study of the present conditions of that area what do you find to be the arithmetical average of pressures presently prevailing in wells completed in that area?

A. A lot of the work was based upon the last pressure survey of April 1947. The arithmetic average pressure at that time was 385 pounds.

Q. As opposed to 585 pounds originally?

A. That is right.

Q. Would you state whether or not the pressure is likely to have declined under 385 pounds since the last test in April of 1947?

A. I think it is reasonable to assume that it would have - yes.

Q. In connection with these pressures, have you prepared a chart showing graphically the initial field pressure of approximately 585 pounds as compared with the average prevailing pressures in this field by years and also showing the initial well-head pressures of certain wells more recently completed in that area?

A. I have.

Q. Is this the study you refer to? (Presented charts)

A. Yes, it is.

Q. Will you please state what that means for the benefit of the record?

A. This particular compilation of data is divided into two areas, Kutz Canon and Fulcher Basin. In the Kutz Canon field the average arithmetic pressure in the wells producing at any given time has been plotted versus the time in years, that is the lower broken line near the middle or bottom of the page. The upper dotted line is a flat line showing approximately the initial pressure of the field. Between these two lines some of the wells have been drilled later in the life of the field. Some of them have been drilled during the last year, and the pressure in those wells is spotted in the proper position. The pressure on those wells does not lie near the 585 pound but between the 585 pound line and the average field pressure. A line has been drawn through these new wells representing an average of their pressures.

Q. Is it approximately one-half way between?

A. Yes. Not any individual well, but groups of wells by average, and it lies approximately one-half way between. There is a definite indication that in those areas where these wells have been drilled there had been pressure decline from the initial pressure, indicating you had pressure reduction out there previous to those wells having been drilled. The same would apply to Fulcher Basin.

Q. What is the conclusion or conclusions to be drawn from this type of study?

A. You have undoubtedly had, if the initial field pressure over the area is 585 pounds, and if you have drilled in adjacent areas since that time it is pretty conclusive you have had pressure decline in those areas. If you had pressure decline you have had removal of gas out of there.

Q. What does it mean with respect to the quantity of gas ultimately to be recovered from one of the wells more recently drilled?

A. The quantity of gas existing in a given unit of the reservoir is proportional to pressure existing on that gas. Whatever your pressure might be the quantity of gas you will recover is proportionate to the pressure of the gas existing. You would expect less gas from these wells drilled in lower pressure areas.

Q. If you drill a well with initial rock pressure of 400 pounds you could compute the quantity of gas which might be ultimately recovered from that well as opposed to the quantity expected to be recovered from a well having approximately the 585 pound virgin field pressure?

A. You could.

Q. In any event, to the extent that your initial rock pressure in any well is below the initial field pressure of 585 pounds, the quantity of gas to be recovered is reduced?

A. That is right.

Q. Would it be a fair question to ask you if you could approximate by a fraction of the total reserves recoverable from a given spacing unit that will not be recovered because of the lower pressure from the recently drilled wells?

A. If the average pressure is 385 pounds and the initial 585 pounds you would have a ratio of 400 to 600 pounds absolute, and would have approximately 1/3 of your gas having already been produced.

Q. That is 1/3 of the gas that originally underlay a drilling unit that has been taken out by drilling not on that unit but on adjacent units?

A. That is right.

Q. Have you prepared, Mr. Nichols, what I will refer to as pressure contour map, showing in general terms at least, the prevailing well-head pressures in this field?

A. That is right.

Q. If the Commission please, may we have identified as Petitioner's Exhibits 1 and 2 the schedules concerning which Mr. Nichols has just testified to?

COMMISSIONER MILES:

You may.

Q. We will offer them in evidence at a later time.

May we have similarly identified as Petitioner's Exhibit No. 3 the map I will refer to as a pressure contour map, dated January 7, 1948?

COMMISSIONER MILES:

You may.

Q. Mr. Nichols, I hand you this map identified as Petitioner's Exhibit No. 3, and ask you to explain the method of its preparation and give the conclusions to be drawn from it.

A. On this particular map, I took the pressures existing in April of 1947 and spotted them in their proper geographical location, adjacent to the well location. Then drawing lines of equal pressures in their proper place between these pressure points, we get what we call a pressure contour map showing the overall pressure picture of the area. The outer line is the 575 pound contour. These are in 25 pound intervals so the innermost contour is the 375 pound contour. The innermost further down on the map is the 350 pound contour. There are two "sinks", and it is rather apparent those lie roughly in the center of the two old fields, with the intervening area having remained undrilled for sometime, It is normal you would expect in the older areas to have larger pressure declines. You will notice also in the new intervening area between the two sinks. That sink is quite likely due to the influence of production from the two older areas. Another sink is forming in the upper northwest area; that is due to the total withdrawals from that area being proportionately large due to the small well spacing units.

Q. Is it not a fact that the area on the northwest is a newer developed area?

A. I believe that is right,

Q. Do you have the dates on which those wells were drilled?

A. Yes, sir. Waggoner #1, June 1946. Waggoner #2, September 1947. Coop #1 September 1946. Coop #3, October 1947. Hyper #2 January 1947

Q. All fairly recent drilling?

A. That is right,

Q. What can you say with respect to the pressure in that area surrounding those wells?

A. You have pressures existing all the way from 475 pounds to 500 pounds, which is 100 pounds or so lower than the initial field pressure. It looks like the pressure decline there is rather rapid in that particular area.

Q. Are those wells more or less densely spaced than the wells further to the south?

A. I think by observation they are more closely spaced.

Q. Any comparison between the pressure declines in these more densely spaced wells in comparison with the wells to the south which appear to be drilled on the 160 acre unit?

MR. THOMPSON:

That last record is in April 1947, and the majority of them have completed since that time.

MR. NICHOLS:

Your question could be tied back to withdrawals in any area regardless of the wells. Your total withdrawals on an area basis would give you an indication.

Q. Referring to this well in the extreme southeast portion of the field, the Feasel #1, what is its original rock pressure?

A. 565 pounds. Some 20 pounds lower than the initial of the field.

Q. Is it very close to any other well drilled in the area?

A. No it isn't.

Q. In other words, the Feasel well was drilled some distance from the other wells and you found initial pressure within 20 pounds of the original virgin rock pressure?

A. That is right.

Q. Will you compare that to some wells more recently drilled?

A. The wells in the center section, drilled a year or so ago, some of the Mangum wells, had pressures in April existing between the 425 pound and 450 pounds contour.

Q. Those were initial pressures?

A. Those were pressures existing in April 1947.
The Mangum #1 was completed in February 1947, and the initial pressure was 492 pounds, No. 2 was completed in June 1947 at 454 pounds, No. 3 was completed in July 1947 at 440 pounds.

Q. How do you account for the fact that those wells had lower initial pressure than the Feasel No. 1 well?

A. The drainage from those two adjacent areas seemingly had a great effect on this pressure.

Q. That is because production from adjacent wells previously drilled had reduced the pressure in that vicinity that in the main portion of the field you find lower initial pressures?

A. That is right.

Q. Anything else in particular to be said about this map?

A. I don't believe so.

Q. Mr. Nichols, state whether or not the Company caused to be made an interference test at your suggestion on six or seven wells drilled in this area with a spacing unit of 160 acres for each well?

A. They did.

Q. Will you state in general terms how the interference test was conducted and what assumptions were necessary and what was found as a result of the interference test?

A. I believe my letter to Mr. Thompson dated February 5, 1948 will explain that.

(Letter as follows)

"EARL A NICHOLS
Consulting Petroleum Engineer
2000 Kidwell Street
Dallas, Texas
T3-4422

February 5, 1948

Mr. Van Thompson
Southern Union Gas Co.
Burt Building
Dallas, Texas

Dear Mr. Thompson:

"I have received the charts giving the results of the recommended field tests. These tests were performed on the Kutz Canyon - Fulcher Basin Field in order to attempt to establish a positive, mechanical answer as to whether pressure interference exists across 160 acre tracts in the above mentioned field. It was our belief that should such pressure interference exist between wells now drilled on approximately 160 acre spacing, one could accordingly feel that drainage across 160 acres tracts existed.

"Seven wells whose approximate spacing are 160 acres per well were chosen. They were the SUP Walker #1, SUP Walker #2, SUP Mc Grath #1, SUP Mc Grath #2, SUP McGrath #3, SUP Kattler #1, and the SUP Hudson #2 wells. These wells were shut in at noon January 9, 1948 and remained shut in until 8:30 A.M. January 12, 1948. At this time all of the wells except the Walker # 1 were put on production against a line pressure of 261 to 270 P.S.I. ga. At 9:00 A.M. on January 13th, the surrounding wells were taken off of the line and blown to the air, the Walker #1 still remaining shut in. A recording pressure chart on the well head of the Walker # 1 well during this test reveals the attached tabulated and graphical results.

"It is to be noticed that due to the normal cycle of atmospheric temperature change during a 24 hour period, the temperature effect on the recording instrument shows a distinctive 24 hour cycle change on the recorded pressures. To help clarify this effect, the pressures were plotted versus time of day and this graph is included. It will be noticed that, irregardless of these temperature effects, the overall curve of pressures for the second day lie considerably above the curve of the pressures for the first day of the shut in period. This is explained, of course, as being the normal build up of pressure due to the well being shut in. Likewise, the curves of pressure for the 3rd and 4th days lie respectively higher each day, showing this same build up. The surrounding wells were put on production, on the morning of the 4th day, but their effect on Walker # 1 is not significantly felt until the 5th day. It will be

-4-

noticed that the curve of pressures for the 5th day falls back below those of the 4th day, very definitely indicating pressure interference had reached the Walker # 1 from the outlying wells.

"In order to try to evaluate the magnitude of this pressure drop, an arithmetic average of the pressures the last 21 hours of the tests give a value of 401, 8 P.S.I. gauge. An arithmetic average of the pressures during the same hours of the preceding day gave 403.6 P.S.I. gauge. This is a 1.8 pound drop. This may not seem like a large drop, but after consideraing all of the reservoir factors involved, this is felt to be as large a pressure drop as one might expect.

"It is my feeling that these tests have conclusively shown pressure interference between wells now drilled on a 160 acre pattern. It is further my feeling that since pressure draw down can be experienced between such wells, drainage of reservoir material across 160 acre tracts exists under such conditions.

"If there are any points discussed on which you would like further comment, please contact me.

Very truly yours,

/s/ Earl A. Nichols

Earl A. Nichols

EAN/ly"

The Chart accompanying Mr. Nichols' letter was marked for identification as Petitioner's Exhibit #4.

MR. LEA:

Lets try to identify where these wells are located.

MR. THOMPSON:

Sections 2 and 3, Township 29; Section 34, Township 30, each in Range 12 W.

Q. Identify for us on this map the test well - Walker No. 1, outlining the spacing unit of Walker #1.

A. NE/4 Section 3, 29 N, 12 W.

Q. Will you identify for us the surrounding units on which the other six wells are located?

A. Walker #2, McGrath #3, McGrath #1, Kettler #1, Hudson #2, Southern Union Production McGrath #2.

Q. Your test well is located right in the middle of these other units?

A. That is right.

Q. Your pressures were taken on the Walker No. 1 Well?

A. MR. NICHOLS:

Yes, sir, those adjacent wells had been shut in. The pressures throughout that whole period of time were measured on the Walker Well.

Q. That is, I believe, without exception 160 acre spacing units with the well located in approximate center of the spacing unit? The fourth day is the red line?

A. That is right. The fifth day fell below the fourth day and in certain periods below the third day. The pressure during the last hour was below the third and fourth day pressures.

Q. Yet during this entire time the Walker No. 1 was shut in, the outlying wells were being produced during the last how many hours of the test?

A. Approximately 25 hours of the test.

Q. From the time the outlying wells were open to the air, how long did it take the pressure decline to be noted in the centrally located test well?

A. The remaining wells were put on the line at 8:30 a.m., January 12th at 9:00 o'clock a.m., January 13th twenty five hours later, they were taken off and put on the air, and there was approximately 24 hours remaining in this test.

Q. You regard the result of this interference test as being significant?

A. I do.

Q. Does it not indicate that not only did the outlying wells pull down their own pressures on 160 acre units - but that the outlying production also pulled down the pressure on the centrally located test well?

A. That is right.

Q. Is not each of those wells located on a regular 160 acre tract?

A. That is right.

Q. It is not noteworthy that instead of continuing to build up the test well pressure not only ceased to build up but in fact declined?

A. That is right. I think it might be expected that the well would have continued to build up for some time longer, how long I don't want to say. Might be a day or a week.

MR. SPURRIER:

How much did it drop back?

A. About 2 pounds. That is the arithmetical average in the last 21 hours.

MR. LEA:

Looking at this chart I find at the beginning of the first day a pressure of approximately 381 pounds on Walker #1.

A. It varies by the hour, it started at 381 pounds.

Q. At the same hour of the second day the well had built up to 398 pounds.

A. That is right.

Q. Approximately 17 pounds build up.

That is right.

Q. The same hour the next day it had built up to approximately 403 pounds.

A. Right.

Q. At the same hour the fourth day the build up was approximately 407 pounds.

A. Right.

Q. At the same hour the fifth day I find a very noticeable pressure interference had been commenced.

A. That is right. It was at that hour of the fifth day that the interference began to show up. There was undoubtedly some effect after the fifth day.

Q. From the data available, has it been possible for you to compute the total gross number of cubic feet of gas which should be expected to be in the reservoir under 160 acres of land?

A. Yes, it has been. There are certain assumptions one frequently has to use. An attempt was made to calculate the actual reservoir gas in place from the available reservoir data.

We had one set of core analysis data on the Cozzens #2 well. This is certainly a minimum amount of core analysis.

Sample Number	Permeability Millidarcys	Porosity Per Cent
1	98	18.3
2	92	16.7
3	74	23.3
4	90	18.6
5	102	14.3
6	10	9.8
7	51	12.3
8	83	9.6
9	59	17.5
10	5.5	8.1
11	18	20.5
12	16	19.3
13	8.6	19.5
14	10	18.3
15	18	17.7
16	11	16.3
17	18	19.1
18	15	10.3
19	44	15.5
20	17	18.5
21	50	19.2
22	95	12.3
23	118	13.1
24	340	11.1
25	423	19.5
26	160	16.2
27	6.5	6.1
28	15	18.5

be 20%. The connate rity of reservoirs you have you have a film of water stone you have some usually referred to as ir to reservoir; the figure . Some reserconnate water. An feet used. It varies ome that have 10, 12 (about 50 wells) gives

part of the gross sand ed. The deviation ifying some of the is nothing more than ideal gas laws. All

tual gas in place nds, initially, on u.ft. of gas at standard conditions exist in 160 acres of the reservoir initially.

That is the total gas in place. Below a certain pressure this field cannot be operated economically. We set it at 150 pounds. The net gas that can be taken from the reservoir between 585 pounds and 150 pounds is 3,361,000,000, or about 72% of the initial gas in place.

MR. CASWELL SILVER - Florence Company:

Would you consider all of those permeabilities as being within the effective pay?

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ly some effect

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ns one frequently
actual reservoir

s #2 well. This

From the data to the average porosity is found to be 20%. The connate water is estimated to be 20%. In the great majority of reservoirs you have water existing in the reservoir itself - in sand you have a film of water existing in and around the sand grains. In limestone you have some water existing around the lime itself. This is usually referred to as connate water - that value can vary from reservoir to reservoir; the value of 20% here used is a rather conservative figure . Some reservoirs have less and some have considerably more connate water. An average effective thickness of pay section of 40 feet used. It varies from well to well - some more than 100 feet to some that have 10, 12 and 13 feet; an average of the majority of wells (about 50 wells) gives a figure of 40 feet effective pay.

Q. You refer to the effective thickness.

A. That is right. Effective thickness is that part of the gross sand which has porosity, permeability and gas saturated. The deviation factor has been set at 9/10 as a matter of simplifying some of the calculations - to explain a little further, that is nothing more than the amount this particular gas varies from the ideal gas laws. All natural gases deviate some from the ideal laws.

From these data a calculation was made of the actual gas in place under the initial pressure conditions of 585 pounds, initially, on a 160 acre block. Approximately 1,878,000,000 cu.ft. of gas at standard conditions existed in 160 acres of the reservoir initially.

That is the total gas in place. Below a certain pressure this field cannot be operated economically. We set it at 150 pounds. The net gas that can be taken from the reservoir between 585 pounds and 150 pounds is 1,361,000,000, or about 72% of the initial gas in place.

MR. CASWELL SILVER - Florence Company:

Would you consider all of those permeabilities as being within the effective pay?

MR. NICHOLS:

There was no consideration made as to the permeability in determining the effective pay. I presume you are referring to the thickness data. It was taken from the various drilling logs available and one or two electric logs were taken into consideration.

The amount of gas - net gas you might expect to recover between 585 pounds and 150 pounds, multiplied by 5¢ per thousand cu.ft. and allowing for State taxes, royalty and production tax brings the net down to about 84⅓¢ which would give gross income irregardless of time of about $56,000 per 160 acre block. That does not give any consideration to operating expense or the present worth of a dollar. A lot of these dollars are going to be obtained a number of years hence. This is simply the gross income minus royalty and tax. The cost of drilling wells would be roughly $16,000 per well varying from person to person. That would allow a ratio of dollars returned on your investment of about 3½ to 1.

If you will take 160 acres at the present pressure average of the field of 385 pounds. The ultimate total income to be recovered over the years would be $30,000 after deducting royalty and taxes, but without giving any effect to operating expenses or other factors.

MR. SILVER:

That is assuming initial well-head pressure of 385 pounds would give you a ratio of about 1.9?

A. Yes - it would give you a ratio of about 1.9 to 1. If we look at it as a 40 acre drilling unit and calculate the ultimate returns you might expect in the order of $14,000 with the initial pressure of 585 pounds. If the well cost you $16,000 you would be in the red to begin with. If your well was drilled in an area with 385 pound pressure your total revenue would be in the order of $7,500 and your well would still cost $16,000.

MR. LEA:

Mr. Nichols, would you care to express an opinion from the studies made and data reviewed - whether or not one well drilled on 160 acres at approximately the center could be reasonably expected to drain in this field more or less than 160 acres or exactly 160 acres.

A. I feel the material we have looked at here has shown that the drainage from one well is adequate for a 160 acre block. You will be able to drain a 160 acre block with one well.

Q. Are there any instances where the gas produced from one of the older wells in the field exceeds ~~the field exceeds~~ the calculated quantity of gas initially in place under 160 acres.

A. There are several wells where total production to date has already either exceeded or been very close to the 1,878,000,000 cu. ft. of gas in 160 acres. The Browning and Stewart No. 4 well has produced over 2 billion cubic feet; that well still has 305 pounds of pressure and will undoubtedly produce still more gas.

MR. ENGLISH:

Who owns that well?

MR. THOMPSON:

We do now - Southern Union recently bought it from Browning and Stewart.

MR. NICHOLS:

Angels Peak, the 9-B and 10-B - between the two of them there has been 2,600,000,000 cubic feet of gas in 160 acres, and one-half of this is 1,300,000,000 each, which is approaching the 1,878,000,000. Summit #1 has produced 1½ billion and the Summit #2 has produced 1-1/10 billion. The Cornell wells 3 and 4 have together produced nearly 1½ billion, one half of which for each well is 7/10 billion with 373 pounds pressure remaining.

MR. ENGLISH:

Where you are drawing more gas off one well, would that make a difference in your pressure? Your pressure would be lower than where you did not have to draw as much gas?

A. Yes, especially if you did not have any gas from other areas to help re-build your pressure. Those pressure sinks had been influenced from some adjacent areas. This is indicated by the pressure build-up. There have been times when some areas have been shut in and have had a considerable build up, indicating you have had pressure build-up from these outlying areas.

MR. LEA:

In making assumptions necessary to compute the total reserves of gas under the 160 acre tract you have taken such data as was available?

A. That is right.

Q. Where assumptions had to be made were you on the long side or on the low side in making your estimate.

A. I feel in all these estimates we have been optimistic in making the necessary assumptions for computing reserves.

(EXAMINATION OF MR. VAN THOMPSON)

MR. LEA:

Your name is Van Thompson and you live in Dallas?

MR. THOMPSON:

Yes, sir.

Q. You are employed by the Southern Union Gas Company and the Southern Union Production Company?

A. That is right.

Q. How long have you worked for Southern Union?

A. Since 1930.

Q. What is your present capacity?

A. I am Chief Engineer of the Company in charge of production for all properties.

Q. Are you familiar with the gas situation in Kutz Canon and Fulcher Basin?

A. I have been personally familiar with it since 1932.

Q. Is it, at the present time, under your personal supervision?

A. Yes, sir.

Q. Are you familiar with the statistics and data in the way of gas production, open flow capacity, pressures, etc.?

A. That is right - our Company has accumulated this information by years since the beginning . We had a practice instituted of shutting all wells in for a week and took pressures during that time every year.

Q. Was that the data made available to Mr. Nichols in the course of his study?

A. Yes, sir.

Q. You have heard Mr. Nichols testify, are his findings made in connection with the study of this field - have they confirmed or altered your own conclusions?

A. Yes, it has convinced me that on a lot of the wells we have drilled in the middle of the field on closer spacings we will never get our money back out of them - it isn't economical.

Q. Did your figures on the total reserves of gas on 160 acres correspond with the figures Mr. Nichols has given us?

A. I would say, if anything, they would probably be a little less.

Q. Your figures would be less than his?

A. Yes, sir.

Q. What experience have you had in connection with unitization or more simple form of commutisation of separately owned tracts?

A. Well, during the last 1½ years we have unitized about seven different tracts into 160 acre drilling units. These have included fee land and federal land, so far they have not included any state land.

Q. Have you used the so-called short form of commutization agreement in these?

A. Yes, sir.

Q. Has your experience been satisfactory or unsatisfactory?

A. So far it has worked very well, it hasn't taken long to get them approved.

Q. Have you commutized federal land with fee land?

A. Yes, sir.

Q. How about commutized with federal and federal?

A. I think we are working on one at the present time but it isn't completed.

Q. In general, your experience has been good and delay has not been too bad?

A. Right.

MR. LEA:

If the Commission please, we would like now to offer in evidence Exhibits which have been identified as Petitioner's exhibits 1 to 4 respectively.

COMMISSIONER MILES:

Exhibits received.

MR. LEA:

Mr. Foster Morrell wrote a letter regarding this proceeding in his letter suggested he would have no objection to the use of it in this proceeding. It may be well known that Mr. Morrell, and I presume his predecessors, have participated to some extent in the 160 acre spacing condition which generally prevails at the present time.

He writes under date of February 10, 1948 - -

"UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 997
Roswell, New Mexico
February 10, 1948

Mr. Willis L. Lea, Jr.
Southern Union Production Company
Burt Building
Dallas, Texas

Dear Mr. Lea:

"Reference is made to your letter of January 26, enclosing for our information a copy of Southern Union Production Company's petition forwarded to the New Mexico Oil Conservation Commission requesting an order, after notice and hearing fixing spacing requirements for wells hereafter drilled in the Kutz Canyon-Fulcher Basin gas fields, San Juan County, New Mexico. You requested our opinion concerning the proper spacing of wells in these fields.

"The essential facts presented in your petition are substantiated by the records of this office, and, accordingly, this office concurs in your request for the establishment of a well spacing plan with a minimum of one well to 160 acres to promote orderly development without waste in the Kutz Canyon and Fulcher Basin gas fields.

"As most of the lands in these fields are public lands of the United States, it is the desire of this office to encourage uniform and economic development and greatest ultimate recovery of gas from these fields. This can be accomplished only so long as reasonable profit can be secured from capital invested. Federal leases have been developed generally on a well spacing pattern of one well to 160 acres, except where necessary to protect properties from closer spacing by offset operators.

"Only where the market demand and marketing facilities are unlimited for continued expansion with the completion of additional outlets of producing gas wells can necessary profit be obtained to continue development. These conditions are not present in the fields under consideration. Hence the drilling of unnecessary wells does not proportionately increase the ultimate volume of gas available for sale but instead tends to reduce the margin of profit of all wells in the fields and to discourage proper development of the fields.

"Future development at a well density consistent with the majority of past development is essential to prevent injury to neighboring leases or properties and to protect equities involved.

"There is no objection to your use of this letter in connection with your petition to the New Mexico Oil Conservation Commission. As this office is very interested in the subject, I expect to be present at the hearing in Santa Fe on February 17.

Very truly yours,

/s/ Foster Morrell

FOSTER MORRELL
Supervisor, Oil and Gas Operations"

MR. LEA:

I would like to have this in evidence as Petitioner's Exhibit No. 5. I believe that is all we have at the present time.

(Exhibit No. 5 admitted).

DUDLEY CORNELL:

I would like to ask Mr. Nichols is it a fact that the conclusions which you have drawn from your work here would support an application for pro-ration of gas in this field on a 160 acre basis just as fully as it does on 160 acre spacing?

A. My conclusion is that there is adequate drainage by one well on a 160 acre block.

Q. The petition here would really prevent the wells being drilled on 40 acres - have you given any thought to the wells on 40 acre spacing?

A. My purpose was to determine if adequate drainage can be obtained by one well, on a 160 acre block.

Q. If 160 acre spacing in this field is used, do you have any suggestions in handling the present wells on 40 acre spacing?

A. I have not given the problem any consideration. I think you will find some precedent set up, however.

MR. LEA:

We have always visualized this matter as a spacing matter. For that reason I am sure Mr. Nichols has not approached it on pro-ration.

MR. CORNELL:

I cannot see how the two problems can be separated, I was wondering if you would ignore the situation.

MR. LEA:

I would make a statement - Here is the way we see it, this field is 20 years old or more. It has been growing and developing by fits and starts ever since, but it is an old field with a rather loose spacing regulation which has prevailed during most of the time. It is only natural there have grown up several inequities where the spacing of units is too close to larger adjoining units. I have your situation in mind among others. Pro-ration may have to come to the Kutz Canon-Fulcher Basin field on a proper pro-ration proposal. I can say now my Company will have no objection to pro-ration but we will be very much interested because of the additional burden cast upon us by pro-ration, and I think the Commission will be very much interested because of the additional burden of administering pro-ration.

MR. CORNELL:

You have referred to my own situation, makes it personal - I would like to ask Mr. Thompson one or two questions.

You have an 80 acre lease on which you have two wells known as the Cornell-SUG 3 and 4?

MR. THOMPSON:

That is right, yes, sir.

MR. CORNELL:

And that 80 is entirely surrounded by acreage I am interested in.

MR. THOMPSON:

I am not sure it is surrounded on the south.

MR. CORNELL:

Yes, sir. How far do you think those two wells are draining?

MR. THOMPSON:

They are draining considerably more than 80 acres.

(CONTINUED ON PAGE 17)

Q. In this study you say it is draining [illegible] 160 acres, would you say this draining would go ½ mile from [illegible]?

A. No, I wouldn't say it is draining [illegible]. [illegible] would be a half section in each direction.

Q. Presupposing 160 acre spacing, the drainage would [illegible] across the next 40 acres?

A. Yes, sir.

Q. A well located such as that would at least drain the 40 acres adjoining it?

A. That is correct.

Q. With an 80 acre lease - 2 - 40 acres on east, west, north and south, 6 - 40's plus the 80 you have, your two wells would be effective draining 640 acres?

A. In the petition we are asking for 160 acres minimum spacing and the purpose is to prevent what is happening right there.

Q. I am simply making a little argument for this pro-ration; wouldn't it be true those two wells would be draining effective 640 acres?

A. Possibly so. We are contending one well would drain 160.

Q. If your spacing rule is put into effect without pro-ration those two wells will continue to drain 640 acres.

MR. LEA:

I don't believe the witness is in agreement with you that the two wells were draining 640 acres. It is conceded that one well will drain 160 acres.

MR. SILVER:

You make a presumption that Mr. Nichols has proved that. I don't believe the Commission has yet admitted that.

MR. LEA:

My statement was I did not think the evidence submitted would substantiate the idea, or that the witness agreed, that the two wells would drain the 640 acres.

MR. SILVER:

No one has admitted that a well would drain the 160.

MR. LEA:

We are willing to grant [illegible] Mr. Nichols [illegible] two wells [illegible]

MR. SILVER:

You are willing [illegible]

MR. LEA:

Mr. Silver, I can't make any [illegible] binding on this Commission.

MR. CORNELL:

I agree with the witnesses from the standpoint of the economics of drilling these wells on the 40 acres, but the spacing rule without a follow-up with a pro-ration order, I think is just doing one-half the job, and creates additional inequalities. I would like to suggest what we need for this field is a pro-ration order, ratable taking and common purchaser act. I would like to suggest to this Commission that some leader appoint a committee to present such legislation for the next legislature, that it be carefully prepared and operators have a chance to voice their suggestions and at this next legislature all the operators combined with their influence, to the end we do obtain a common purchaser and ratable taking law for gas. I think there has been changeon some operators in this subject. I think it ties into this application here.
I would like to ask another question - Mr. Nichols, with reference to your interference test of the seven wells, isn't it a fact that the original pressures on those wells differ and that their open flow potentials are different.

MR. NICHOLS:

That is right, I am sure it is.

Q. Very considerable difference isn't there?

A. I can check them and see.

Q. I would like to develop more fully in the economics in those wells, the amount of gas withdrawn and their open flow potentials.

A. In the interference test all the measurements were made on one well, the Walker No. 1. Irregardless of the open flow potentials and the pressures on the surrounding wells the pressures on this well built up to the fifth day and then dropped back. The only difference which the open flow potentials of the surrounding wells might make would be in the quantity of gas produced from them during the test, which in turn might influence only the magnitude of the pressure drop during that time.

MR. THOMPSON:

Hudson #2 well had an open flow in January 1948 of 580 MCF, McGrath #1 of 416 MCF, McGrath #2 140 MCF, McGrath #3, 396 MCF - Walker No. 1 584 MCF

Q. I did not have in mind proving anything particularly, but thought that information should be in the record.

MR. SILVER:

How are these wells gauged?

MR. NICHOLS:

The Walker No. 1 well had a recording instrument on the well head.

Q. What kind of recording instrument, dead weight?

MR. THOMPSON:

Bristol Spring Gauge - recording gauge.

Q. Mr. Nichols, you are familiar with spring gauges. To your knowledge isn't it true spring gauges have variation of five to 10 pounds. In use of spring guages they have to be tested against larger tested gauges?

A. That is true in any type of gauge.

Q. In Sections 11 and 14, township 29 N, range 10 W, wasn't there considerable variation in rock pressure when the wells were brought in?

A. I think that is brought out in the exhibit showing initial field pressures and pressures of wells drilled later in the life of the field.

Q. Isn't it true that the pressure measured on a well is in part functional of the length of time in which that well is allowed to remain idle?

A. Your build-up time certainly affects the pressure measurements.

Q. Isn't it also true that the permeability changes and that the lower the permeability the longer the pressure build-up required to reach stabilization?

A. I am not aware the permeability changes in a given field.

Q. I have the permeability as given me here. (Quoting certain figures noted from evidence).

A. The permeabilities you are reading there are indivudual measurements on individual feet - one sample for each foot. That is normal in any kind of reservoir. Permeability of a given foot is constant and does not change during life of the well.

Q. Isn't it true the permeability in this well, which is the only well in the field that has core analysis, is not a good test of the permeability?

A. In what manner?

Q. In that one well, if the variation of permeability is so great from foot to foot vertically, then conceivably the permeability from foot to foot horizontally is just as great.

A. Getting back to your point, it is true that the amount of our core analysis data is on the low side. I pointed out early in my discussion that we had in that instance a minimum of data, and that we had to assume certain things - for example the deviation factor.

Q. I have no objections to your deviation value.

A. Along that same line of thought we have a minimum of permeability data but we used what we had, which is the best we can do.

Q. The point I was attempting to bring out was the very serious effect permeability would have on your concept of drainage across 160 acres - I wanted to point the manner in which they affect that.

A. I think we can approach it from this angle; the permeability is a measure of the rate at which a well can produce, but not a measure of the total amount it will produce. Permeability times feet will be an index of the open flow. Potentials on every well in the field are not exactly the same.

Q. That is exactly right.

MR. THOMPSON:

Would you mind stating what you think minimum spacing should be?

MR. SILVER:

We have a field of our own on which we own considerable part or majority of acreage in the San Juan Basin that has almost exactly similar reservoir conditions. Any decision the Commission might make with respect to your field will certainly have a bearing on a field almost exactly like it geologically. We have no opinion as to what the well spacing should be in this field, we are only interested in finding out what the most economic spacing would be.

Therefore, we are vitally interested in this case. That will determine what the economic spacing is in our field. Therefore, I want to bring out some of the inadequate data presented by Mr. Nichols. The fact that an additional test should be made which may aid the Commission to determine the type of drainage on 160 acre spacing they would want, but by 160 acre spacing the data presented today, I do not think is adequate. By meeting with Mr. Nichols I believe we could find out.

MR. NICHOLS:

Back to about the last point I made in regard to total production from certain blocks - that is based on porosity. It does not tie back into permeability or productivity.

MR. SILVER:

As I stated before, I thought you were over generous in the amount of gas in place.

A. That fact tied with the actual production from some of these wells is pretty hard to overlook.

MR. SILVER:

Let's go into the problem of reservoir development - each well is a sink and each field is in itself a larger sink within a known gas area. I think there are men in this audience who know there have been wells drilled outside this field which have encountered gas and that gas has been non-commercial. It is entirely conceivable this is the only commercial gas production in the area. If you have a sink here what is the optimum number of wells draining this basin.

A. That is an economic problem. I think the productivity of the wells is related directly to permeability. I think the fact that there has been greater production from these wells on the 160 acre block than the total original gas in place proves very definitely drainage across those areas.

MR. SILVER:

I do not believe this whole heartedly myself, but as a point of reasonable doubt, Mr. Thompson, you have drilled many wells in the area, the United States Geological Survey in its professional paper No. 134, by Mr. J. B. Reeside, Jr., gives the thickness of the Picture Cliff sand zone in this zone between 75 and 225 gross feet.

MR. THOMPSON:

The gross and effective thickness are two different things.

MR. SILVER:

Q. We have cored as much as 25 feet of such sand and found the core bleeding gas all the way.

MR. THOMPSON:

This appears in wells of that type as well as wells of thicknesses of 10 and 12 feet.

MR. SILVER:

Q. You get some influx of drainage of gas upward from the lower permeability zones?

A. Is it in the lower part?

MR. SILVER:

Q. Usually it is in the lower part but you get streaks of higher permeability with lower permeability.

MR. CONNELL:

Mr. Nichols, you stated in your opinion 72% of the gas underlying 160 acres would be withdrawn under 160 acre spacing - how much do you think under 40 acre spacing?

MR. NICHOLS:

I said it was, if we want to assume the abandonment pressure of 150#, it would be 72%.

Q. What would be the recovery from 40 acre block as compared to 160 acres?

A. You would have ¼ as much gas.

Q. How much gas is going to be missed in the sand - approximately 28% of the gas?

A. It would be the same percentage if your pressure was brought to the same pressure regardless of size of the unit.

MR. SILVER:

You could withdraw more gas on 40 acre spacing than 160 acres.

A. That is an economical problem. I don't know why you could.

Q. This isn't economics, I am just helping Mr. Cornell get his point.

A. You could take it to absolute zero pressure but you would be there an awful long time.

MR. ENGLISH:

Finishing the wells - the Picture Cliff wells have all got coal and water just above the pay zone. I wonder if it would make any difference in the finishing of the well - if it would make any difference in your pressures. We drilled a well and got ½ more gas - we cemented off some of that gas, I wondered if that would make any difference in your pressure?

A. If you cemented the casing above that water it would make some difference.

Q. Some of these wells you are getting your figures off of - if they are wells of bad completion jobs and have some water in the well bore.

MR. THOMPSON:

We have siphon lines in every one, even then we get pressure that will be 10 to 20 pounds low.

MR. NICHOLS:

If your well bore goes into the main part of Picture Cliff sand your build-up on that well is determined by the permeability - your pressure would be all right.

COMMISSIONER MILES:

One question was asked I did not get the answer on - someone asked if it would be more complete recovery of gas with a well on 40 acres than 160 acres.

MR. NICHOLS:

If your pressure over the whole block, whether it be 40 or 160 acres, is drawn down to 150# your gas recovery percentage would be the same recovery of gas from a 40 acre block would be ¼ of the gas recovered from a 160 acre block.

MR. LEA:

Let me get this question clear - take a 40 acre unit as opposed to a 160 acre unit. If during the commercially productive life of this field you had one well on 160 acres as opposed to one on 40 acres, in the center of each unit, and no drainage between the units, would you be able to get from a 40 acre tract more than 25% of what you would get out of a 160 acre tract - during the productive life of the entire field. For your ultimate productivity of gas during the productive life of the field would recovery be substantially greater in the case of four wells equally spaced on 160 acres than with one well in the center, or

is it just a question of time?

MR. NICHOLS:

If your pressure is stabilized, if you draw down that whole area to 150# the same in any geographical area, if your complete 40 acre block is drawn down to exactly 150#, you would get ¼ of what is recoverable on the 160 acre block drawn down to exactly 150#. Those things are true because equal withdrawals in a given unit will be as your pressure is drawn down; just the same in a large area as a small. You will get the gas out one way or the other. It is this question of drainage from 160 acres being adequate and I believe it is.

MR. LEA:

Given a reasonable period of time, which might be measured by the economic life of the field, would your pressure equalization of 160 acres with one well be substantially all the way across that 160 acres?

A. If your permeability from one area to another is substantially the same, whether foot by foot does not matter - the permeability times the feet is uniform geographically, the answer is yes.

MR. LEA:

Would you be able to state from the study of this field and from the data available that there exists, generally speaking, that type of permeability - are you satisfied there is drainage across 160 acre tracts by virtue of permeability of the areas?

A. I believe about the first thing we introduced was that those wells drilled later in the life of the field had initial pressures considerably lower than the field initial of 585#. Those were taken where they might happen to hit and have indicated that generally speaking you have sufficient permeability for drainage over large areas.

MR. ALBERT GREER:

In your first exhibit you have shown these wells - the new wells come in with pressure between the old field pressure and the initial field pressure. In other words, you found a pressure differential which here approximates 100#. You made the statement that the wells would probably have to be abandoned at 150# pressure which I assume to be the seven day shut-in pressure you have recorded.

MR. NICHOLS:

I do not believe I stated that they had to be abandoned at 150#. This 150# arbitrarily has been set as possible abandonment pressure.

MR. GREER:

There would still be a pressure differential between the old wells and new wells.

MR. NICHOLS:

These wells vary from well to well. Even drilled at a given time there is as much as 70# difference from well to well. It would depend on where you drilled your well.

MR. GREER:

Too, isn't the differential increasing as the pressure in the old field declines.

MR. NICHOLS:

Magnitude, yes. It is not declining by percentages.

MR. GREER:

At 150# for the field we may expect a differential of 150 or 200#.

MR. THOMPSON:

I don't think there will be any new wells at that point.

MR. GREER:

I was assuming there would be - doesn't that 200# represent additional recoverable gas if the wells had been drilled on closer spacing?

MR. THOMPSON:

If you found a position to drill where that was true - but that would be uneconomical, don't you think?

MR. GREER:

I think that ought to be decided by the Commission. Approximately 3/4 of the gas originally in the place would still be there.

MR. THOMPSON:

This well - a theoretical well - what is the actual pressure - 150 plus 200# - - -

MR. GREER:

Would there be a greater recovery of gas with denser spacing - there will be more, just how much you are just about to figure out.

MR. NICHOLS:

If your pressure is 365# and initial 600# you would have approximately 61% of your pressure remaining or approximately 1,100,000,000 cu. ft. of gas. At 150# we have a little over 500,000,000 remaining, which would amount to a difference of 500 or 600 million that could be obtained between 365# and 150#.

MR. GREER:

Which represents a very large volume of gas when you consider a large field.

MR. NICHOLS:

On a 160 acre block at 5¢ a thousand, it would be about $30,000 derived.

MR. GREER:

If the operator could reduce the cost from 14 or 15 thousand dollars to 10 thousand dollars he would have a ratio of 3 to 1 and could do it economically.

MR. NICHOLS:

If your drilling cost could be reduced that great, those conditions would hold true.

MR. GREER:

That is one thing possibly an operator could do.

MR. NICHOLS:

It doesn't prove that closer spacings would recover more gas - if your pressure reduction is such that you have equalization of pressure of 150# over the entire area you will recover the same amount of gas regardless of well density.

MR. GREER:

The information you present here does not substantiate that fact. The wells open with most bottom hole pressure and the well you were testing had a draw down, very small draw down compared to very many of the oil and gas fields in the state.
We have a great draw down but spacings are not changed. The operators believed they would recover more oil or gas due to the fact that they get greater production. Draw down of approximately 400# in adjoining wells that caused draw-down of 2# in the adjoining wells was very small.

MR. NICHOLS:

But is an indication of differential.

MR. GREER:

You will have that anywhere in the United States. The question is one of how much will it draw down and how much will it affect it.

MR. THOMPSON:

I think these wells shown in the outlying area - show that.

MR. GREER:

What percentage?

MR. THOMPSON:

It is 150# compared with 600#. You are assuming pressure of some theoretical amount in the outlying area.

MR. GREER:

You do not have evidence to support that and we don't know it will do it.

MR. THOMPSON:

You have got drainage across there.

MR. GREER:

Drainage, but how much drainage and at the end of the time how much gas is left in the reservoir that you could have produced?
Spacing on 160 acres it would be adjoining wells on your spacings. We can take wells in most of the fields of New Mexico and West Texas and you will find the same type of pressure interference between wells on adjoining units. That factor alone is not sufficient evidence, it is a minor important consideration. The well spacing itself - it is going to result to the unrecoverable gas and cost of drilling the wells. There is a question it will be a considerable amount of gas left.

MR. THOMPSON:

I don't follow you. If you drilled a well on 160 acres - we are going to abandon that particular well at 150#, you could not possibly have 360# pressure inside the unit.

MR. GREER:

We are not talking about new wells - two or three miles in some cases, in most cases they are off to the sides - the average.

MR. THOMPSON:

In some cases they are 160 acres from the old wells.

MR. GREER:

When you have that you have no differential at all.

MR. THOMPSON:

All these wells had not been produced at all when this was taken. That was a dead section, no production being taken out there at all.

MR. GREER:

Let's take a close one - 415#, that is a difference of 60# on a 160 acre unit.

MR. THOMPSON:

This well wasn't being produced at the time. It had just been drilled. When you connect it with the pipe line it will immediately start declining. You would have an area of 1/4 or 1/2 mile - everywhere else where you had a well connected with the pipeline it will be coming down in pressure.

MR. GREER:

So would the well drilled five miles away, but how far would it deplete the area? Mr. Morrell said something about inadequate market for all the wells and the drilling of additional wells would further decrease the take from any individual well. It was his opinion 160 acre spacing would tend to alleviate that situation. It appears to me 160 acres would tend to aggravate rather than alleviate. There are a great many wells now drilled that lie on the inside of any particular block but the company drilled the well, which is greater than 1320 feet from the edge of the lease. This well then does not force the offset on the adjoining lease. If the 160 acre spacing is taken up a great many more offsets will be forced and required than is now existing in the field on 40 acre spacing ruling. If we take this information presented today as correct, a man would have the right and privilege to say to the land owners - I do not believe I can economically drill this well on 40 acres - it is possible he can unitize with someone or he would have a reasonable excuse for not drilling a well himself. 160 acres, he would not have the excuse or reason for not drilling the well and you would have additional wells drilled not forced or required. I think for the 160 acre spacing you require more 80 or 40 offsets in the field.

MR. DAY:

You assume that if the requested order is entered, any 160 acre unit which shows a 160 acre unit you have got to have a well drilled on it?

MR. GREER:

I presume that to be so, if the Commission passes this ruling. It is not a 40 acre ruling and I believe it would be 160 acre for 160.

MR. DAY:

I. If you are predicting what the government is going to do that is one thing, but if you are asserting the necessity for such offsetting I would be inclined

to disagree with you.

A. The government thinks this is the logical thing to do. It will depend on how your lease is written up. I believe they are federal leases in the Kuts Canon area - - -

MR. ENGLISH:

The majority of them.

MR. GREER:

I believe this should be taken into consideration.

MR. THOMPSON:

Nichols and I checked the amount of gas withdrawals from the two fields for last year. The average take from the whole field was 17% of its open flow.

MR. GREER:

You feel any wells in those fields would be granted an allowable to what it has been in the past, regardless of the production and spacing.

MR. THOMPSON:

I did not follow you at all.

MR. GREER:

I believe if you will show the government acreage in these fields you will find approximately 15 or 20 additional locations which will be forced if the 160 acre ruling is upheld.

MR. THOMPSON:

Why on 160 if it is not being forced on 40?

MR. GREER:

Some of the wells now drilled are more than 1320 feet from the edge of the lease.

MR. THOMPSON:

I believe that is a problem of the United States Geological Survey.

MR. SPURRIER:

Al do you mean to say that the distance of 1320 feet is the offset distance. If I am drilling a well closer than 1320 feet to your acreage then you will be forced to drill an offset. - By whose rules and regulations?

MR. GREER:

Mr. Morrell will you contradict or add to that?

MR. MORRELL:

I would like to make my statement all at one time.

MR. SPURRIER:

Is it reasonable to believe that the price of gas in this area will remain at 5¢ per thousand and if so how long. I am not being

facetious in the least - Mr. Nichols' figures were necessarily predicted on 5¢ a thousand but also the prices were assumed.

MR. GRUER:

Additional recoverable gas left in the ground more from it and possibly additional wells. Just how much gas would be left is the question.

COMMISSIONER MILES:

The point I am interested in is as to the recovery. It may become more valuable - but the recovery is what I am interested in.

MANUEL SANCHEZ:

Wouldn't your regulations have to be changed then? It is a matter to be considered at the time. When the time comes if you can recover it below 150 economically, isn't that the time to come in and pass regulations?

COMMISSIONER MILES:

If it could be recovered now that would be the time to consider it.

MR. SANCHEZ:

Has there ever been any basic figure fixed upon which recovery at the present time could not be had economically?

MR. NICHOLS:

I think that varies both with your drilling cost and operating expense in any given areas; I think it would be considerably misleading for me to try to give a point such as that.

MR. GRUER:

It is conceivable all gas could be recovered on 160 acre basis - it is better for the operators to get together and decide among themselves as to what they prefer. Certainly an operator is not going to drill a well closer than he feels he can recover gas economically in and at the same time he would like to be able to drill on smaller area if he feels he can.

MR. LEA:

Mr. Commissioner, I would like to make a statement. Mr. Spurrier asked the question regarding the price of gas. We don't know what is going to happen to the price of gas in San Juan County or any other location. We only know the price of gas in this general area has increased within the last 18 months from 3½¢ to 5¢. The consensus of opinion among producers is that the price of gas will increase. We all know the value of gas in a given area depends on many factors, not the least of which is the amount of gas available in that area. I don't know whether 150 or 190 or some other figure is the abandonment pressure for this field, but it strikes me that the operating costs of the producer or of the gathering company is a real and positive barrier, not only on the value of the gas but on the abandonment pressure for the field. Unless I am badly informed, I believe Southern Union Production Company in its operations in this Kutz Canon - Fulcher Basin area is required to visit every well on a daily or twice daily basis for the purpose of checking the well as to its operating condition. Having operated up in that field for a long time it has been our view, as evidenced by our own operations, we have op rated on a basis of one well to 160 acres - we believe one well will reasonably and economically drain 160 acres. Anyone is entitled to his views, and ours should not necessarily prevail; however, we have gone to some effort to bolster ourselves in reaching our own conclusions and while it is probable that in any given period you can get more gas out by putting four wells on 160 acres; it is also true and cannot be denied that you do have drainage, counter drainage, cross drainage and drainage

from wide areas. If the present spacing rule prevails - I have heard some comments that made me wonder whether someone would really like to see 240 or 320 acre spacing, but so long as the present 40 acre ruling prevails in these fields some 20 years old - where pressures have declined without exception because of adjoining wells - we contend there is ample drainage across 160 acres. 1/3 of the gas has already been taken out. To leave the spacing like it is will permit or perhaps encourage the drilling of wells on a 40 acre basis, and is actually going to reduce the value of gas produced from that field because of additional operating cost, ultimately, to the man interested in getting value from that gas. My people are convinced we should have had 160 acres in the field all the time. To a large extent we have, in fact, operated on the basis of 160 acres; it is the smallest area that we think is a proper spacing unit. It isn't really feasible to try to unitize any smaller, but if you did you would almost be compelled to go to 40 acres. There might be some gas in remote areas that will never be recovered but we cannot see the economics of it. We can see it is liable to permit and encourage the operators to drill to their own self-destruction. I think we are all interested in getting the most gas for the least money. We want all the gas we can produce consistently with reasonable investment. It will naturally take longer to get that 71% of the total reserves out of one well on 160 acres than it will take with one well on each 40 acres; as pressures get lower and lower it is naturally going to produce less.

With the Southern Union Compressor Station serving this area - it is now some 2000 HP - and the gathering lines and with 160 acre spacing prevailing we aren't concerned about our ability to get the gas out of there. There is a definite danger to anybody owning and operating in that field under a spacing rule that will permit the drilling of wells on 40 acre units. We have just had an example of it - we have some wells located on like units, under the rule of the Commission and don't criticize it. Under your rules, however, it was proposed recently to drill a well up in the nook of three 160 acre units 330 feet from each of them. Such well would require a 3 way offset and that kind of thing isn't even 40 acre spacing. We would be forced to pay compensatory royalty or drill three wells to offset - I am sure my figures are right and the distance between those wells is only 660 feet. If that is not 10 acre spacing I am badly mistaken. It is this very situation that brought this matter before this Commission. The well was re-located before it was commenced and put in the center of a 160 acre unit. We sincerely have brought this thing to the Commission because we felt that something had to be done. We are drilling in an old area where 1/3 of the gas is already gone. As to the old wells on small units, the wells were drilled properly and lawfully at the time. They are there and if we had it all to do over again we wouldn't drill them in some cases. Whether that is true with some other people I don't know, but there the wells are and we cannot do anything about it. We do know that one well will drain more than 160 acres of land if given a reasonable opportunity in point of time. We suggest 160 acres because that is the generally established spacing.

COMMISSIONER [illegible]:

Anybody else like to ask any questions?

(No response)

Let me get one point straight - as an overall picture, I was talking about the matter we were discussing at that particular time pertaining to whether or not you could produce more gas from 4 wells on 40 acres each than 1 well on 160 acres.

MR. [illegible]:

I will concede it is manifest that in the same period of time you can extract more gas on 160 acre tracts by drilling 4 wells than one well. It is the limiting factor of the open flow. I think everyone realizes that they can produce more gas per day with 4 wells than one. Our problem is to find an equitable spacing unit [illegible] cannot produce more gas ultimately from 4 wells than from one location on a 160 acre unit.

JUDGE SETH:

On behalf of the Stanolind Oil Company I am instructed to advise the Commission they have no objection, but believe the spacing should be larger than the 160 acres in these pools of gas.

DUDLEY CORNELL:

Mr. A. Greer has been informal chairman of independent operators, and he asked me to ask that a copy of these exhibits be made available - and that the independent operators be allowed a rebuttal at the next meeting of the Commission.

MR. LEA:

I don't know what that means exactly, but it strikes me a little singular. We went to the extreme of mailing to each person a copy of our petition with the suggestion that we exchange information with a view to ending our business properly at this hearing. I do not comprehend exactly why it should be necessary under those conditions - adequate notice has been given and we had no request from anyone for information. We did not hear from Mr. Cornell. We are not denying the opportunity to anyone to be heard in this matter, but I believe the opportunity has been given.

MR. SILVER:

I would like to make a statement for my employer. As I said before, we have no particular desire about well spacing other than the most economical. We have a peculiar problem in San Juan Basin of having a like permeability of sand structure, productive areas which are not too well understood to the present day. We do not particularly have any preference in this field, we have a small amount of acreage on which we probably will never drill. We would like to see, if possible, additional data on this field as time goes on. So far as the 160 acre spacing is concerned, it is entirely feasible that a greater or lesser spacing might be desirable. That should be determined from the economic facts. We would like to see the data given here today given to us in some form.

COMMISSIONER MILES:

Mr. Lea, you do not feel you can operate on less than 160 acres from an economical standpoint?

MR. LEA:

We sincerely think it would be a mistake to do it. Mr. Nichols' figures assume $16,000.00 cost and a 5¢ rate on present day conditions. If you could find a spot where a well drilled could produce 535# and you drill on 40 acres, the only thing other than 160 acres that is feasible, you would recover only 37% of your investment disregarding operating cost and disregarding the fact that it would take you years to do it in. If you drill a well with 400# of pressure you would recover - assuming you had this kind of condition, exactly one-half your original investment.

MR. ENGLISH:

You fellows have been talking on pressure all day and have never [illegible] the millions of feet you could get.

[illegible]:

Mr. Nichols gave it in the record.

MR. ENGLISH:

I would like to know about millions of feet of gas.

MR. [illegible]:

The testimony has developed the net recoverable gas on 160 acres as 1,5[illegible],000,000 feet. If you drill on 40 acres and [illegible] [illegible] [illegible]

wells at $16,000.00 a well - would be almost $8,000,000.00 you would have to spend. It would be impossible to ever recover the original investment.

MR. LEA:

My statement was made on the same assumption, a 400# well could never produce the same quantity of gas as a 686# well.

MR. ENGLISH:

You fellows have anything against ratable taking?

MR. LEA:

No. But about a year ago there was a bill appeared - about a year ago - and it was the most immature I have seen. If we are going to have one, let's have a good one.

COMMISSIONER MILES:

That was the only bill presented, you had the same opportunity of anybody else to present one. The meeting was called for the purpose of discussing it and that should not be taken as an example.

MR. LEA:

I did not mean to suggest that at all, but the fact does remain that a bill was presented and we thought it a bad one and had to oppose it. Pro-ration may come to this field, perhaps it should. There are people in the field today that would be hurt by this. Our only question about pro-ration would be the additional burden on the operators and the Commission.

COMMISSIONER MILES:

This is a matter to come before the Legislature and not this Commission.

MR. GREER:

I would like to request that the Commission consider the offsets that will be required if a 160 acre spacing ruling is upheld or in deciding on spacing ruling that they be taken into consideration; and the reason for that being considered I would refer to Mr. Foster Morrell's letter in which he remarks about the market, and the increased number of wells causing the production from each well to be so small as to make it uneconomical to drill additional wells. Also the rule 4 - 40 acres to a unit, and establishing a great number of bad spaced wells throughout the field. I doubt that the average spacing in the field exceeds 120 acres. I do not believe the retaining of the 40 acre spacing unit will see additional wells in the old field unless it does become economically feasible.

FOSTER MORRELL:

I would like to clarify the points that have been raised.

First, in order to show the interest that the Federal Government has in the Kutz Canyon - Fulcher Basin areas, I have prepared some acreage figures. A conservative estimate taking in more than 1/2 mile from present existing wells - arrived at a figure of approximately 22,080 acres that could be considered as proven production. From the south end of Section 32 up to Section 19, 30 N, 12 W - of that acreage the federal is 16,200 or 71%, fee land 6400 acres or 29%. According to our maps there are 80 acres of state land we could not get percentage mark on. In that proven acreage there have been 77 wells completed; 46 on government lands and 32 on fee lands. The development, 59% of the wells, against 41% for fee lands as compared to 71% of the acreage, broken down to fields - Fulcher Basin total is 14,400 - 72% - lands government, 28% fee and no state.

In the Fulcher Basin fields, 40% of the wells on U. S. land, in number 21 on U.S. land, 31 on fee land - a total of 52. Kutz Canon is a total of 10,280 acres, of the federal interest represents 96%, of the fee 4%. Twenty-five wells have been completed, 24 of those 25 wells are on our federal land, with the control we have under the lease act and federal leases in Kutz Canon, we have 96% of the acreage developed by 96% of the wells. Going back somewhat into history of the development, I think the whole picture is somewhat complicated by the variance of opinions of individuals versus companies which we always have with us, but our position is one that equity should be provided regardless of whether the operator is a major company or an individual or small company. The facts with respect to development are indicated in a very short statement I reported recently to Washington, that during the past six years wells increased from 8 as of December 31, 1941 in Fulcher Basin only to 15 as of December 31, 1944 and 51 as of December 31, 1947. A ratio of 3 to 51 or over six times increase. The field withdrawals during that period is represented by the figures of 1 billion cu. ft. for 1942, 1.9 billion in 1945, and 2.6 billion in 1947. That is a ratio of one to 2.6. We have a number of outlying producing wells but the number of wells increased 6 times and the market increased by only 2.6 on all wells in the same period. The withdrawal per unit decreased.

MR. ENGLISH:

Have they been taking all that gas?

A. They have a market for all the gas.

MR. ENGLISH:

If you are furnishing gas from Barker you wouldn't be taking as much gas from Fulcher Basin?

MR. MORRELL:

Barker comes into the pipeline south of Kutz Canyon and does not affect the deliveries in the Kutz Canyon - Fulcher Basin area.

Any market from any field will depend on deliverability of the gas from that field, and deliverability depends on the open flow capacity. You can't get away from pressure at the rate to which the wells can get it up.

MR. ENGLISH:

At one time they had the same pressure in each field. You are not going to try and tell me there isn't any more gas than before. How do you know this field won't reach out and take in a large area?

MR. MORRELL:

This is just a matter of record of past production. The point we are making is that you have greater increased wells than you have in the market, which means you will have to divvy up your market.

MR. ENGLISH:

From what I hear there is a pretty good gas market.

MR. GROVER:

Isn't it natural for the pressure of gas wells to decline in any gas field? They could have taken more gas from time to time by lowering their pressure.

MR. MORRELL:

I don't know about lowered pressure in order to get more gas. It is a matter of record in all gas publications that for protection of reservoirs one should not exceed 25% of the flow. For the years you will find that limit is maintained.

MR. GROVER:

The position of Fulcher Basin would be calculated at 25% of the open flow and

whether you hurt the reservoir by taking more is certainly an open question.

MR. CORNELL:

It has been debated for the last 30 years and there has been very little proof otherwise. You are getting to the matter of rate at which a reservoir will re-charge itself. If you pull it out too fast when it comes you are going to have to sit there and wait for it.

MR. GRAVES:

I do not believe you could find evidence to substantiate that.

MR. SILVER:

This field and your data given - more gas by harder draws and I believe it will be substantiated.

MR. THOMPSON:

I said the average annual take was 17% of its open flow, I don't know of a field in the country that is being given a better pull than that.

MR. MORRELL:

In the earlier days of development, there were certain spacing exceptions made before it was determined that a 160 acre spacing was the most economical and best for the reservoir - at that time by agreement with both Southern Union Gas and Dudley Cornell in connection with the development of the Fulcher Basin field, the only one active at that time - we set up 160 acre units. P.A.W. had the 640 acre limitation and at the request of Cornell and Southern Union Gas, several 160 acre exceptions were made.

MR. CORNELL:

Southern Union Gas refused to join with me in my application at that time.

MR. MORRELL:

The fact was that we had 160 acre spacing and the Oil Conservation Commission adopted an order for that field - Order 551 effective in June 1943.

On application from private land operators and after a hearing of the Commission, the Commission cancelled the order. The Interstate Compact Commission made a recommendation that well spacing adopted during the war should be continued wherever feasible to protect equities. A great additional development - this increase from 15 to 31 over a three year period has been to a considerable extent caused by the recent development on private lands along the Animas River. I think they are entitled to all the gas underneath their ground and should be given considerations, but I don't think that acreage should rule as spacing for the entire field. What the Commission could do and should do has been pointed out in the testimony. The only other thing I could see at this time would be by legislation for pro-ration, as Mr. Cornell proposed. As I understand the petition of the Southern Union Gas it is for development from now on and will not adversely affect any existing wells up to this time. In answer to some of the questions that have been raised, Mr. Graves has given us some ideas. Maybe we can get more wells drilled ourselves.

MR. SMITH:

That is what we are afraid of.

MR. [illegible]:

The question of offsets is a matter of your lease terms, lease terms on private lands are more strict than on federal land. If the operator does not do what the owner thinks he should, he can take it into court and have him drill an offset. The public lands leases allow considerable discretion - that discretion is in favor of the operator. Compensatory royalty is called for in lieu of actual

drilling. We made this as to each location and wherever a possible location might be we take into consideration all known facts. If we think there is drainage we will call on you to show cause why you shouldn't drill. You have a chance to show us and if the information is adequate that is all there is to it. Our office at Roswell has leaned over backwards on the spacing matter in Fulcher Basin, primarily because of the small type of production obtained. To let this thing come to a head where it can get to a point of development - I have in mind a tract surrounded by four wells, immediately adjoining that 120 on which we have asked Byrd-Frost to drill one well, but if the Commission does not see fit to protect the equity of operators who have already drilled and allows unnecessary wells to be drilled on 40 acre tracts - - -

MR. ENGLISH:

What well is that?

MR. MORRELL:

That is the Byrd-Frost Hudson.

MR. ENGLISH:

You don't consider that a gas well?

MR. MORRELL:

That is a gas well of the type being completed in that field.

If the Commission does not see fit to set up a minimum spacing for that, more than 40 acres and up to 160, it may become necessary for us to essentially draw a fence around private operations by requiring offsets where we have a block of acreage on 160 acre spacing. We don't want to do that, that is false economy. The testimony presented has shown this is more a matter of economics than anything else. I would like to take exception to Mr. Greer's statements as to the gas left in the ground. There will not be any more gas in the 160 than the 40. I would also like to correct a statement made by Mr. Silver - you said you had an identical field.

MR. SILVER:

I meant the geological boundaries - type of formation, age, conditions of accumulation, everything but the pressure.

MR. MORRELL:

Would you name that for the record - the name of the field?

MR. SILVER:

Blanco field - two producing zones, Mesa Verde formation and Point Lookout sandstone. 4400 feet and approximately 5051 feet.

MR. MORRELL:

Pressure is about what?

MR. SILVER:

The pressure is around 1300#, the only difference, the accumulation is currents of gas the limits of the field and their field is not limited by geological conditions so much as by economical factors of production and development. We feel we have a field limited the same way by economic factors of production and development. The geological factors closely approximate those in Fulcher Basin - Kutz Canon.

MR. MORRELL:

I understood you were talking of an entire different reservoir. You state the state and what was done in the Fulcher Basin and Kutz Canon would apply directly to your field.

MR. SILVER:

I meant what action the Commission might take on low permeability reservoir, it is economically a marginal reservoir, has to be produced as such. We feel also our reservoir might be marginal reservoir and will have to be produced as such. The action of the Commission in this case will have some bearing on our field.

MR. MORRELL:

Did you have in mind a spacing of 160 acres or more.

MR. SILVER:

Our pressure is greater. We could not conceivably see less than 320 acre spacing.

MR. MORRELL:

As I recall, the south of your present wells at San Juan, the river crosses your structures on which there is considerable land. The same question could arise in the Blanco area as in Fulcher Basin.

It may be a good idea to make an application to the Oil Conservation Commission before it gets out of hand.

MR. SILVER:

We feel we cannot discuss it with the Oil Conservation Commission without a geological survey.

MR. LEA:

Yours is a new field?

MR. SILVER:

No, it is fully as old as Fulcher Basin.

MR. MORRELL:

I would like to mention for the information of the Commission - I think Governor Miles mentioned something about 5¢ gas - I think the operators in Fulcher Basin - Kutz Canon should feel very fortunate that they are receiving 5¢ mcf because there is no other gas produced in the State of New Mexico that is getting 5¢ per mcf. The standard price in Lea County - the best you can get on normal sale is 3½¢ mcf.

I do say, as stated in this letter, the 160 acre spacing is a necessary thing to protect all parties who have drilled wells - to protect them from losing the money they have invested - the questions that have been asked indicates a lack of knowledge of what may happen in the future on the part of some individual operators who may be making investments and end up in the red. If we have operators losing money it is going to discourage development. We want to keep operators on a profitable basis.

MR. [illegible]:

If we get 160 acre spacing and if we want to drill a well in Farmington.

MR. MORRELL:

Wouldn't have any effect.

COMMISSIONER [illegible]:

Anyone have a question or [illegible]

MR. [illegible]:

I would like to present these petitions from farmers in San Juan County, and [illegible]

COMMISSIONER MILES:

They will be considered by the Commission and included in the record.

MR. LEA:

While all these statements have been made without the benefit of the testimony I have some other statements for the record.

One from the Western Natural Gas Company expressing approval of the plan, and one from J. J. Hudson. There seems to be several spots of concern about exceptions; I guess we have taken it for granted that exceptions would be provided by the Commission. There will be and there are situations in which if the operator can find it economically feasible to drill he should be permitted to do so, on petition to this Commission describing what he expects to do and be given full consideration whatever spacing unit should be adopted. That applies not only in the well developed field but in the flanking areas where open flows and permeability are a little out of the trend. The citizens from Farmington seem concerned over the statement in the petition that the Commission's order should govern the field or area as it might be extended. The only purpose of that is to make unnecessary new orders of the Commission on account of extensions. The Commission's order should include the immediate surrounding area of the field as it is extended; otherwise, it could only be controlled by repeated orders of the Commission. I did not suppose anyone had the idea this field would include other developed areas. The Commission's order should have a provision to include this field and exclude other producing areas. So far as other areas are concerned it strikes us there is not sufficient information to this Commission or to the operator to know what is needed. There is no reason to prevent this Commission from entering, on petition, whatever additional orders might be necessary.

MR. MORRELL:

Of the wells drilled 71% of the total and 98% in Kutz Canon and 54%, I believe, in Fulcher Basin are on Federal land. I would like to add we have had in the past several applications and one current for relief on account of high operating costs, for relief from rentals on public land leases from $1.00 an acre to 25¢ an acre. In granting those the Department has recognized the low return. We have one by Mr. Carroll and Mr. Carroll has developed his own lease on 160 acre spacing and still needs reduction on the rental.

This increased number of wells and the annual rate of withdrawals at 2.9 billion for 1947 and estimated for 1948 approximately the same. Fifty one gas wells in Fulcher Basin $15,000 or $16,000 per well for cost of drilling. You can add your taxes, you would have in the neighborhood of $1,000 to $1,500 net per year, in the neighborhood of $100 per month. That is the situation if you get into excess wells it will continue to decrease. Instead of $100 to $150 per month you get $75 to $100 per month.

MR. GORDON:

Byrd-Frost encourages spacing not less than 160 acres to the well, but we are concerned with this offset proposition and also feel when the boundaries of the field is reached there should be some latitude given on the location of wells less than 1/2 mile if possible, and should be a little latitude there.

MR. SILVER:

The geological limitation of the field we have been discussing will be more by economics than by geology.

MR. [illegible]:

I will say as [illegible].

MR. [illegible]:

Regarding [illegible] Geological Survey there is no [illegible].

MR. MORRELL:

I am afraid we would have to differ, anything is a structure.

MR. GRAHAM:

What area did the proposed order apply to?

MR. THOMPSON:

Approximate area is described in the application.

COMMISSIONER MILES:

Anybody else any question to ask or any statement to make?

The Commission is going to take this case under advisement and anyone who wants to file a written statement to the Commission, we will be glad to have you do so.

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

The State of New Mexico, by its Oil Conservation Commission, hereby gives notice, pursuant to law, of the following public hearings to be held February 17, 1948, beginning at 10:00 o'clock a.m. on that day in the City of Santa Fe, New Mexico:

STATE OF NEW MEXICO TO:

All named parties in the following cases, and notice to the public:

Case No. 126

In the matter of the petition of Southern Union Production Company for an order fixing the spacing of wells in the Kutz Canyon and Fulcher Basin gas fields of San Juan County (as they may be extended) on the basis of one well to a drilling unit of approximately 160 acres with suitable provisions for anyrelated matters including special approval of unorthodox well locations where necessary.

Given under the seal of the Oil Conservation Commission of New Mexico, at Santa Fe, New Mexico, on January 26, 1947.

STATE OF NEW MEXICO

OIL CONSERVATION COMMISSION

By R. R. Spurrier
R. R. SPURRIER, Secretary