Case No.

908

Application, Transcript,
Small Exhibits, Etc.

CASE 908: Revisions re Fulcher Kutz-PC, Aztec-PC, Ballard-PC and South Blanco-PC Gas Pools

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 908
Order No. R-672

THE APPLICATION OF THE OIL
CONSERVATION COMMISSION UPON
ITS OWN MOTION AT THE REQUEST
OF SKELLY OIL COMPANY FOR AN
ORDER AMENDING, CLARIFYING AND
REVISING PRESENTLY ESTABLISHED
HORIZONTAL LIMITS OF THE BALLARD-
PICTURED CLIFFS, FULCHER KUTZ-
PICTURED CLIFFS, AZTEC-PICTURED
CLIFFS, SOUTH BLANCO-PICTURED CLIFFS,
ALL GAS POOLS IN SAN JUAN AND RIO
ARRIBA COUNTIES, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a. m. on May 18, 1955, at Santa Fe, New Mexico, before the Oil Conservation Commission, hereinafter referred to as the "Commission".

NOW, on this 17th day of August, 1955, the Commission, a quorum being present having considered the records and testimony adduced and being fully advised in the premises,

FINDS:

(1) That due notice of the time and place of hearing and the purpose thereof having been given as required by law, the Commission has jurisdiction of this case and the subject matter thereof.

(2) That proration within the Huerfanito Unit is complicated by the fact that the north end of said unit is prorated and included within the South Blanco-Pictured Cliffs Gas Pool while those wells located in the southern and central portions of the Huerfanito Unit are located within the horizontal limits of the Ballard-Pictured Cliffs Gas Pool; the same being a non-prorated and non-allocated pool, and

(3) That the problem of gas proration within the Ballard-Pictured Cliffs Gas Pool should be taken up by the Commission at the earliest instance.

(4) That insufficient and inconclusive evidence was presented to support a connection between the Ballard-Pictured Cliffs Gas Pool and the South Blanco-Pictured Cliffs Gas Pool, and

(5) That it would be premature for the Commission to combine areas of production whose limits as presently defined are separate and individual.

(6) That certain extensions to the horizontal limits of the Ballard Pictured Cliffs Gas Pool are necessary to include wells completed in this common source of supply.

(7) That extensions to the South Blanco-Pictured Cliffs, Fulcher Kutz-Pictured Cliffs and the Aztec-Pictured Cliffs are inadvisable.

IT IS THEREFORE ORDERED:

(1) That the delineation of the Ballard-Pictured Cliffs Gas Pool be, and the same is hereby amended. The following described property will hereinafter constitute said Ballard-Pictured Cliffs Gas Pool.

Ballard-Pictured Cliffs

TOWNSHIP 25 NORTH, RANGE 8 WEST, NMPM

Sec. 2: All
Sec. 3: All
Sec. 4: N/2
Sec. 5: N/2
Sec. 11: All
Sec. 12: All

TOWNSHIP 26 NORTH, RANGE 8 WEST, NMPM

Sec. 17: SW/4
Sec. 18: All
Sec. 19: All
Sec. 20: W/2
Sec. 27: All
Sec. 28: All
Sec. 29: All
Sec. 30: All
Sec. 31: All
Sec. 32: All
Sec. 33: All
Sec. 34: All

TOWNSHIP 26 NORTH, RANGE 9 WEST, NMPM

Sec. 3: S/2
Sec. 9: All
Sec. 10: All
Sec. 11: All
Sec. 12: All
Sec. 13: All
Sec. 14: All

TOWNSHIP 26 NORTH, RANGE 9 WEST, NMPM (continued)

Sec. 15: All
Sec. 16: S/2
Sec. 21: NE/4
Sec. 22: N/2
Sec. 23: All
Sec. 24: All

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN F. SIMMS, Chairman

E. S. WALKER, Member

W. B. MACEY, Member and Secretary

/ir

DEARNLEY-MEIER AND ASSOCIATES

Ada Dearnley • Marianna Meier • Juanita Godding • Thurman Moody • Amado Trujillo

605 SIMMS BUILDING • P.O. Box 1092 • ALBUQUERQUE, NEW MEXICO • Phone 3-6691

April 2, 1956

Sent 4-4-56 bhp

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

Attention: Bobby Postlewaite

Dear Bobby,

We have received an order for a copy of the transcript of Case No. 908, taken on May 18, 1955, also the rehearing of the same case taken on October 13, 1955.

We would appreciate it very much if you would send us your copy so that we may fill this order.

Sincerely yours,

DEARNLEY-MEIER & ASSOCIATES

By Ada Dearnley/BH.

AD/bh

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

September 12, 1955

COPY

Mr. William G. Webb
17th Floor
Mercantile Bank Bldg.
Dallas, Texas

Dear Sir:

We enclose a copy of Order R-672-A issued September 6, 1955, by the Oil Conservation Commission in Case 908.

Very truly yours,

W. B. Macey
Secretary - Director

WBM:brp
Enclosure

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 908
Order No. R-672-A

THE APPLICATION OF THE OIL
CONSERVATION COMMISSION UPON
ITS OWN MOTION AT THE REQUEST
OF SKELLY OIL COMPANY FOR AN
ORDER AMENDING, CLARIFYING AND
REVISING PRESENTLY ESTABLISHED
HORIZONTAL LIMITS OF THE BALLARD-
PICTURED CLIFFS, FULCHER KUTZ-
PICTURED CLIFFS, AZTEC-PICTURED
CLIFFS, SOUTH BLANCO-PICTURED
CLIFFS, ALL GAS POOLS IN SAN JUAN
AND RIO ARRIBA COUNTIES, NEW MEXICO.

ORDER OF THE COMMISSION FOR REHEARING

BY THE COMMISSION:

This matter came on for consideration upon petition of Skelly Oil Company, through their attorney, George W. Selinger, for rehearing on Order No. R-672, heretofore entered by the Commission.

NOW, on this 6th day of September, 1955, the Commission, a quorum being present, having fully considered said application for rehearing:

IT IS HEREBY ORDERED:

That the above-entitled matter be reopened and a rehearing in said cause be held October 13, 1955 at 9 o'clock a.m. on said day at Mabry Hall, Santa Fe, New Mexico.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN F. SIMMS, Chairman

E. S. WALKER, Member

W. B. MACEY, Member and Secretary

ir/

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 903
Order No. R-672-B

THE APPLICATION OF THE OIL
CONSERVATION COMMISSION, UPON
ITS OWN MOTION, AT THE REQUEST OF
SKELLY OIL COMPANY, FOR AN ORDER
AMENDING, CLARIFYING AND REVISING
THE PRESENT ESTABLISHED HORIZONTAL
LIMITS OF THE BALLARD-PICTURED CLIFFS,
THE FULCHER KUTZ-PICTURED CLIFFS AND THE
SOUTH BLANCO-PICTURED CLIFFS GAS POOLS
IN SAN JUAN AND RIO ARRIBA COUNTIES, NEW
MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for rehearing in compliance with provisions of Order No. R-672-A at 9 o'clock a.m. on October 13, 1955, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission".

NOW, on this 27th day of January, 1956, the Commission, a quorum being present, having considered the records and testimony adduced and being fully advised in the premises,

FINDS:

1. That the Commission has continued jurisdiction of this cause as established in the initial hearing.

2. That due notice of the time and place of hearing has been given as required by law.

3. That insufficient and inconclusive evidence was presented to justify consolidation of the Ballard-Pictured Cliffs, the Fulcher Kutz-Pictured Cliffs and the South Blanco-Pictured Cliffs Gas Pools.

4. That delineation of the Ballard-Pictured Cliffs Gas Pool as heretofore set forth by order of the Commission should be revised, due to new development.

IT IS THEREFORE ORDERED:

1. That the delineation of the Ballard-Pictured Cliffs Gas Pool be, and the same is hereby revised. The following described acreage will hereinafter constitute said Ballard-Pictured Cliffs Gas Pool:

TOWNSHIP 25 NORTH, RANGE 6 WEST, NMPM	
Section 2:	All
Section 3:	All
Section 4:	N/2
Section 5:	N/2
Section 10:	N/2
Section 11:	All
Section 12:	All
Section 14:	NE/4

TOWNSHIP 26 NORTH, RANGE 8 WEST, NMPM

Section 7:	S/2
Section 15:	S/2
Section 16:	S/2
Section 17:	All
Section 18:	All
Section 19:	All
Section 20:	All
Section 21:	All
Section 22:	All
Section 23:	All
Section 26:	All
Section 27:	All
Section 28:	All
Section 29:	All
Section 30:	All
Section 31:	All
Section 32:	All
Section 33:	All
Section 34:	All
Section 35:	All

TOWNSHIP 26 NORTH, RANGE 9 WEST, NMPM

Section 1:	W/2
Section 2:	All
Section 3:	All
Section 4:	All
Section 9:	All
Section 10:	All
Section 11:	All
Section 12:	All
Section 13:	All
Section 14:	All
Section 15:	All
Section 16:	All
Section 21:	NE/4
Section 22:	N/2
Section 23:	All
Section 24:	All

TOWNSHIP 27 NORTH, RANGE 9 WEST, NMPM

Section 33:	SE/4
Section 34:	S/2
Section 35:	SW/4

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN F. SIMMS, Chairman

E. S. WALKER, Member

W. B. MACEY, Member and Secretary

gm

BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO

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

CASE NO. 908

THE APPLICATION OF THE OIL CONSERVATION
COMMISSION UPON ITS OWN MOTION AT THE REQUEST
OF SKELLY OIL COMPANY FOR AN ORDER AMENDING,
CLARIFYING AND REVISING PRESENTLY ESTABLISHED
HORIZONTAL LIMITS OF THE BALLARD-PICTURED CLIFFS,
FULCHER KUTZ-PICTURED CLIFFS, AZTEC-PICTURED CLIFFS,
SOUTH BLANCO-PICTURED CLIFFS, ALL GAS POOLS IN
SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO.

APPLICATION FOR REHEARING

Comes Now Skelly Oil Company and Alleges and States:

1. That heretofore on the 17th day of August, 1955, the Commission issued its Order No. R-672 in Case No. 908, amending, clarifying and revising the presently established horizontal limits of the Ballard-Pictured Cliffs and the South Blanco-Pictured Cliffs Gas Pools in San Juan County, New Mexico.

2. That in said Order, the Commission found insufficient and inconclusive evidence to support a connection between the Ballard-Pictured Cliffs gas pool and the South Blanco-Pictured Cliffs Gas Pool; That in said order the Commission found it to be premature to combine the areas of production whose limits are presently defined as separate and individual; And further found in said Order, that certain extensions to the present limits of the Ballard-Pictured Cliffs Gas Pool were necessary to include wells completed in the Pictured Cliffs common source of supply.

3. That by said order the Commission established the Ballard-Pictured Cliffs in T26N-R9W, the following sections: (amended) as per request of letter

Sec. 12:	All	Sec 3 S/2
Sec. 13:	All	" 4 all
Sec. 14:	All	" 9 "
Sec. 15:	All	
Sec. 16:	E/2	
Sec. 21:	NE/4	
Sec. 22:	N/2	
Sec. 23:	All	
Sec. 24:	All	

4. That Applicant files this motion for rehearing in accordance with Section "N", Rules of Procedure, more particularly Rule No. 1212, in which Applicant prays that this Commission grant a rehearing for the presentation of additional testimony and evidence which Applicant has now found to be pertinent for a proper decision in determining productive limits of the Ballard-Pictured Cliffs and South Blanco-Pictured Cliffs Gas Pools.

5. WHEREFORE, your Applicant prays that this Commission set this matter down for rehearing and at said hearing permit Applicant to introduce testimony indicating the productive limits of the Pictured Cliffs common source of supply lying within the area set forth in said Order No. R-672, Case No. 908 and for such other areas upon which there is additional information to be disclosed to the Commission indicating such Pictured Cliffs productivity in this general area. In addition to this area delineated in said Order R-672 such information from Section 1-T26N-R9W, Section 36-T27N-9W and Sections 2, 3, 4 and 16-T26N-R9W, and for such other Orders, Rules or Regulations that may be necessary.

Respectfully submitted

SKELLY OIL COMPANY

George W. Selinger

George W. Selinger

GWS:zmr

ALBERT R. GREER
PETROLEUM ENGINEER
FARMINGTON, NEW MEXICO

May 15, 1953

Mr. J. Glenn Turner
Operator, Huerfanito Unit
1700 Mercantile Bank Building
Dallas, Texas

Re: Participating Areas for Pictured Cliffs Production, Huerfanito Unit, San Juan County, New Mexico

Dear Mr. Turner:

Transmitted herewith is a report prepared at your request, which report covers the results of an engineering and geological study relative to the establishment of Pictured Cliffs Participating Areas within the Huerfanito Unit, San Juan County, New Mexico.

The object of this engineering and geological study was to determine, for the development and operation of the Pictured Cliffs formation in the unit, a proper participating area, or areas, and to recommend procedures for expanding these areas; setting forth criteria to be used in delineating the participating areas and lands to be included by expansions.

The majority of the wells in the Huerfanito Unit produce from the reservoir of the Ballard Field. This field is of recent development, and is one with which I am quite familiar. All of the drilling has been within the last eighteen months, during which time I have studied the area from the standpoint of planning development and extension wells for leases in the central and south part of the field. I have personally supervised the drilling and completion of about one-half the wells in the presently defined Ballard Field. Because of my experience with this field from which most of the Huerfanito Unit wells produce, along with my experience with other unit operations, including the Gallegos Canyon Unit of San Juan County, I feel particularly well qualified to make this study and report for you.

It is apparent to me from this study that the wells in the south end of the unit, which form the important part of the development to date, are producing from a reservoir which is separate from that in which the wells

ALBERT R. GREER
PETROLEUM ENGINEER
FARMINGTON, NEW MEXICO

in Participating Area No. 1, in the northeast part of the unit, produce. Being separate reservoirs, it is necessary, in order to properly allocate production to the owners of interest in the unit and to protect the correlative rights thereof, to regulate the two reservoirs as separate fields, and possibly separate units. From a practical standpoint, however, I would not recommend dissolution of the one unit and the formation of two units in its stead, but simply to establish two participating areas. It is my interpretation of the Unit Agreement that it provides for the establishment of separate participating areas for wells producing from separate reservoirs.

In brief, it is my finding from this study that wells in the south part of the Huerfanito Unit produce from a reservoir separate from that under Participating Area No. 1, and it is my recommendation, based upon this finding, that a second participating area be established to encompass the wells in the south part of the unit which have now been completed and for which there is no participating area established. Each participating area can be enlarged as offsetting wells are completed to show the extent of the reservoirs. It is my opinion that the reservoir under Participating Area No. 1 will be rather limited in extent as to the area it covers within the unit boundaries. The productive area in the south part of the unit, however, holds promise of much greater expansion. As this development progresses to the north, and the impermeable barrier between the two participating areas is approached, outpost wells should be planned with extreme caution, to avoid the drilling of unnecessary dry holes.

In my opinion the findings of this study and the data supporting them are straightforward and quite conclusive. However, should you desire further explanations or interpretations please advise me, and I will be pleased to expand the study.

Yours very truly,

Albert R. Greer

UNITIZATION REPORT
OF THE
HUERFANITO UNIT AREA, SAN JUAN COUNTY, NEW MEXICO
RELATIVE TO ESTABLISHMENT OF PARTICIPATING AREAS
FOR PRODUCTION FROM THE PICTURED CLIFFS FORMATION

MAY 15, 1955

ALBERT R. GREER

MAY 15, 1953

ENGINEERING REPORT
ON THE
HUERFANITO UNIT AREA, SAN JUAN COUNTY, NEW MEXICO
RELATIVE TO ESTABLISHMENT OF PARTICIPATING AREAS
FOR PRODUCTION FROM THE PICTURED CLIFFS FORMATION

I. HISTORY

The Huerfanito Unit was approved by the United States Department of the Interior June 2nd, 1952. The unit area comprises the following described lands in San Juan County, New Mexico:

Township 27 North, Range 9 West

Section 22 - All
Section 23 - All
Section 24 - W/2
Section 25 - W/2
Section 26 - All
Section 27 - All
Section 28 - All
Section 33 - All
Section 34 - All
Section 35 - All
Section 36 - All

Township 26 North, Range 9 West

Section 1 - All
Section 2 - All
Section 3 - All
Section 4 - All
Section 10 - N/2
Section 11 - N/2
Section 12 - All

(a) Development in the North Part of the Unit

The discovery well within the unit area for Pictured Cliffs production was the Magnolia #1 Cleveland-Federal located in the northwest quarter of Section 28, Township 27 North, Range 9 West, which well was completed in December of 1952 for an initial potential of 33 MCF per day on 3-hour open flow test, and has been classified by the New Mexico Oil Conservation Commission as being in the Fulcher-Kutz Field. This is a non-commercial well, and a participating area was not established around it. In 1953, three Pictured Cliffs wells were completed for production in the northeast portion of the unit. These wells were located as follows:

Township 26 North, Range 9 West

NW/4 Section 24
NE/4 Section 26
NW/4 Section 25

A participating area was later formed around these three producing wells. This participating area covered lands as follows:

Township 27 North, Range 9 West

Section 23 - E/2
Section 24 - S/2
Section 25 - E/2
Section 26 - NE/4

Attempts to extend the productive area of this reservoir to the southwest and west resulted in three dry holes, located as follows:

Township 27 North, Range 9 West

NW/4 Section 23
NW/4 Section 26
SE/4 Section 26

Other Pictured Cliffs wells drilled outside the unit boundary to the east and to the north of the participating area form, with the initial three productive wells in the unit, an area which for the most part has Pictured Cliffs wells of low capacity and is considered economically marginal. These wells are classified by the New Mexico Oil Conservation Commission as being in the South Blanco Field.

(b) Development in the South Part of the Unit

Development of Pictured Cliffs production by the drilling of wells in the south part of the unit in 1954 resulted from extension wells to the Ballard Field. The Ballard Field was discovered in December of 1953 by the drilling of Woodriver #1 Greer. Development of this field was quite rapid through the year 1954, and at the present time there are approximately 65 completed Pictured Cliffs wells. The Ballard Field is apparently producing from a reservoir which is entirely separate from that of any of the previously designated Pictured Cliffs fields in the San Juan Basin. Wells completed in this field to date indicate on the average to have good producing charactoristics.

Nine producing Pictured Cliffs wells have been completed in the south part of the unit, located as follows:

Township 26 North, Range 9 West

SW/4 Section 3
NW/4 Section 10
NE/4 Section 10
NW/4 Section 11
NE/4 Section 11
NE/4 Section 12
NW/4 Section 12
SW/4 Section 12
SE/4 Section 12

II. [illegible]

There are three areas of development within the unit boundaries. These are:

(a) The small well in the northwest corner of the unit, which is operated by itself as a non-commercial well.

(b) The economically marginal Participating Area No. 1 in the northeast part of the unit, in which are completed three small wells.

(c) Nine extension wells of the Ballard Field, which nine wells are located along the south boundary of the unit area, and produce from a reservoir of economically good characteristics. A participating area has not yet been established for these wells in the south part of the unit.

These three areas within the unit and their relation to the fields in which they have been classified by the New Mexico Oil Conservation Commission are shown on Exhibit A of this report.

III. CONCEPT OF SEPARATE RESERVOIRS IN THE PICTURED CLIFFS FORMATION

The Pictured Cliffs formation is a sandstone which occurs over the greater part of the San Juan Basin of northwestern New Mexico. It exists as a "blanket" sandstone, and as such is readily traceable from one producing area to another. The general structural features of the sedimentary San Juan Basin are reflected in the Pictured Cliffs formation. Producing Pictured Cliffs gas wells are completed from reservoirs within the Pictured Cliffs formation which are stratigraphic traps. The accumulation of gas in the reservoirs of the Pictured Cliffs formation is not related to structural domes or anticlines, as is often the case with gas fields, but is controlled by permeability variations within the sandstone. Since production is obtained from stratigraphic traps within this "blanket" sandstone, the misconception has developed among a large number of people associated with the gas industry in northwestern New Mexico that inasmuch as the wells produce from a "blanket" sandstone, they also produce from a "blanket" reservoir. This assumption is erroneous. The reservoirs of the Pictured Cliffs formation are separate, and production from one does not affect production from another.

The fact that Pictured Cliffs wells are producing from different reservoirs is evidenced by the difference in initial shut-in pressures of the wells. If all the Pictured Cliffs wells in the San Juan Basin were producing from a common interconnected reservoir, then the stabilized shut-in pressures of the wells throughout the Basin would be exactly the same. The only difference which would occur would be for differences in elevation of the wellheads; the wells with wellheads at higher elevations would have slightly lower shut-in pressures. The formation dips

basinward from the outcrops, and wells drilled to the Pictured Cliffs within the central part of the Basin approximate 4000' in depth, whereas wells close to the western outcrop encounter the Pictured Cliffs at depths approximating 1500'. This difference in depth could cause a difference in reservoir pressure, the deeper part of the formation having a slightly higher pressure due to the weight of the column of gas. The surface pressures for wells with wellheads at the same elevation, however, should be exactly the same if the reservoirs are connected, or if they are producing from a common reservoir. ** Wells producing from the Pictured Cliffs formation in the San Juan Basin have initial stabilized wellhead pressures from as low as 468 psig for the shallow West Kutz Field to pressures approximating 1000 psig in the deeper wells in the central part of the basin. It is obvious that it is an impossibility for these wells to be producing from a common interconnecting reservoir.

An example of this continuity within a reservoir and impermeable barrier between reservoirs is the West Kutz Field and its relation to the Fulcher-Kutz Field. For a distance in excess of twenty miles from the northwest end to the southeast end of the West Kutz Field, wells exhibited original wellhead pressures of approximately 468 psig, whereas wells in the Fulcher-Kutz Field had original pressures of about 100# greater, and the distance separating the two fields is less than one mile in some places. An equalized pressure for twenty miles within a field, and a pressure difference of 100# in one or two miles between fields, certainly indicates a difference in the nature of the reservoir rock. The explanation is simply that a relatively impermeable barrier exists between the two fields. If it is impermeable, it need be only a few feet wide to prevent migration of gas from one field to another. Although the fields are usually separated by distances of one mile or more, it is possible to have offset wells producing from two different reservoirs. To date, attempts to "tie" the West Kutz and Fulcher-Kutz fields together at the south end by drilling wells have resulted in non-commercial wells or dry holes.

** For the purpose of clearer understanding of the reservoir pressure difference which could result from difference in depth for two wells completed in a common reservoir, which reservoir is 1500' deep at one end and 4000' deep at the other, and for a wellhead pressure of 468 psig (which is the original pressure of the shallowest Pictured Cliffs field in the San Juan Basin) the reservoir pressure in the shallower well would approximate 486 psig, and the reservoir pressure in the deeper well would approximate 515 psig. It cannot be too strongly emphasized that this is the only pressure difference which could result for a difference in depth of a reservoir from 1500' to 4000', and that this is a difference in reservoir pressure only. Wellhead pressures for wells at the same elevation would be exactly the same.

ALBERT R. GREER

Interference tests taken between offset Pictured Cliffs wells on 160-acre spacing have shown interference in periods of time as short as three weeks. Measurable interference of wells within a reservoir has been determined at distances up to one mile in a period of months. It is quite obvious that such a reservoir, which is continuous and exhibits pressure interference such as this in a comparatively short time will, in the course of millions of years of geologic time, equalize its pressure throughout its connected area. By the same token, two separate reservoirs, although only a short distance apart but separated by a sand of low permeability, and whose pressures (between the two fields) have not equalized over the period of millions of years of time, must be so poorly connected that production from one reservoir during a period of twenty or thirty years production history will not affect the other.

It is therefore quite evident that Pictured Cliffs wells with initial stabilized pressures which differ by reasonably measurable amounts are producing from separate reservoirs. This pressure analysis is the chief criterion to be used in determining the continuity of reservoirs producing from the Pictured Cliffs formation. It should be realized, of course, that the pressures referred to here must be reasonably stabilized pressures. The period of shut-in time required varies as to wells, but in general, pressures taken after 30 to 60 days of shut in will provide data suitable to delineate reservoirs.

IV. THE SEPARATE RESERVOIRS WITHIN THE HUERFANITO UNIT

The Huerfanito Unit lies at the approximate junction of three separate Pictured Cliffs fields. These are the Ballard Field to the south, the Fulcher-Kutz Field to the northwest, and the South Blanco Field to the northeast. Schedules showing summarized completion data of wells in the vicinity of the Huerfanito Unit which produce from these three reservoirs are set out in Exhibits B, C, D, E and F. Adequate pressure data is available for wells completed in the Ballard Field and extension wells to this field, as shown in Exhibits B and C, as to justify the assumption that the Ballard Field is a single interconnecting reservoir. Pressures of key wells as shown in Exhibits B and C have been set out on the map Exhibit G, from which it is readily seen that pressures have equalized within a few pounds over the present length of the field, which is approximately twelve miles, and the width of the field, which is approximately four miles in the area from Benson & Montin #2 McManus to Southern Union #1 Nickson. The virgin pressure of this field is believed to be 669 psig, which was measured in Benson & Montin #1 McManus. This well is located in the approximate center of the field as now defined, and the pressure of 669 psig was measured after the well had been shut in 284 days following its potential test. With the exception of the three hours the well was open on this test, it had been shut in 351 days, and the pressure increased only

one pound the last 184 days. It is apparent that this well had built up to its maximum pressure. It is to be noted that this pressure also is the highest pressure measured in the field.

In contrast to the Ballard Field pressure of 669 psig, pressures measured in wells in the reservoir of the Participating Area No. 1 along the northeast boundary of the unit show pressures up to 719 psig. We do not have enough information to know how close to stabilization these wells had reached when the pressures were taken. Whether stabilized or not, however, the original pressure was at least 50# greater than the 669# in the Ballard Field. *** This pressure differential establishes the fact that an impermeable barrier lies between the Ballard Field reservoir in the south part of the Huerfanito Unit and the wells completed in Participating Area No. 1.

The manner in which the Pictured Cliffs reservoirs and impermeable barriers between them occur is clearly shown on Exhibit H, which is a cross-section of the Pictured Cliffs formation from the Ballard Field to the South Blanco Field. The location of this cross-section is shown on the map Exhibit G as cross-section X-Y-Z. This cross-section, prepared from Schlumberger electrical logs, shows in red color the productive intervals within the main Pictured Cliffs sand. Non-productive sand is colored in yellow. This section depicts, from left to right, the change in lithology of the Pictured Cliffs formation progressing from the center of the Ballard Field east and northeast to the South Blanco Field. This section clearly shows the deterioration of the productive sand as the northeast edge of the Ballard Field is approached, and also the fact that the productive interval drops close to the bottom of the Pictured Cliffs section in the vicinity of Southern Union #1 Hickson. From the #1 Hickson, progressing further north, all remnants of the Ballard Field producing sands disappear, and production in the South Blanco Field occurs in the top of the Pictured Cliffs section, as shown by the well on the extreme right-hand side of the cross-section. The existence of an impermeable barrier

*** All wells shown on Exhibits D and E with one exception showed initial pressures greater than the Ballard Field pressure. Three pressure measurements have been made on Southern Union #2-A Newsom, covering a period of 27 days, and although the well probably was not yet stabilized, this is the best pressure data we have available for wells immediately north of the impermeable barrier which defines the northeast limit of the Ballard Field. It is probable that this well is an extension of the reservoir under Participating Area No. 1, and that the original stabilized pressure of this reservoir was in excess of 720 psig. If the other wells in this reservoir had been shut in long enough, their pressures probably would have approached that of Southern Union #2-A Newsom and Skelly #1-A G. A. Gentle.

between the Ballard Field and the South Blanco Field is evidenced in the area of this cross-section not only by the pressure difference in the two fields, but by the dry hole, Sharp #3 Luthy. Although an electric log is not available for this well to compare with the others on the cross-section, I am sure that it was a bona fide dry hole, because casing was set and the well was shot with nitroglycerin in an attempt to establish production.

Another cross-section was prepared and is included herein as Exhibit I. The location of this cross-section is shown on the map, Exhibit G, as cross-section V-W. On this cross-section, as on Exhibit H, the deterioration of the productive sands is evident as the impermeable barrier is approached.

Most of the wells in the Huerfanito Unit area were logged by radioactive surveys, which do not show the character changes in the Pictured Cliffs formation as clearly as Schlumberger electrical surveys. For this reason, a cross-section was not prepared in the unit area.

The location within the unit of the impermeable barrier can be approximated, however, without a cross-section, by the dry holes in Section 26. It is impossible to determine the exact location of this impermeable barrier from the information available to date. It could be a very narrow strip, or it could cover a rather large part of the unit area. The electric log of the Pictured Cliffs section in the Magnolia #1 Crandell, which was drilled to the Dakota formation, indicates the sand in this area to be probably productive. It is reasonable to assume that the productive limits of the reservoir in the south part of the unit will extend at least as far as this well in the northeast quarter of Section 3.

Set out on Exhibit G is the location, insofar as it can now be determined, of the impermeable barrier. It is quite possible that this non-productive zone extends over the west half of Section 23 and most of Section 22. As can be seen from Exhibit G, it is quite doubtful that the reservoir of Participating Area No. 1 will ever be extended to include much more additional productive acreage. The Ballard Field reservoir, however, holds promise of considerable expansion. As this productive area is extended to the north by the drilling of additional wells, extreme care should be used in an effort to delineate the non-productive barrier and avoid the drilling of unnecessary dry holes.

Pressures reported for wells in the southeast part of the Fulcher-Kutz Field, as shown on Exhibit F, are somewhat erratic. No build-up pressures are available for these wells, and it is not possible at this time to determine if the southeast part of the Fulcher-Kutz Field and the Ballard Field could be producing from the same reservoir. Because of the low capacity wells in Sections 28 and 29, Township 27 North, Range 9 West, which is the extreme southeast part of the Fulcher-Kutz Field, and the dry

holes in Sections 5 and 8, Township 26 North, Range 9 West, it appears to me quite likely that another impermeable barrier exists along the west edge of the Huerfanito Unit area and separates the Fulcher-Kutz Field from the Ballard Field. Drilling of wells toward the west boundary of the unit, then, should be controlled with the same caution as extension wells approaching the impermeable barrier near Participating Area No. 1.

V. BENEFITS OF UNITIZED OPERATION.

There are three primary benefits to be derived from unitized operation of oil and gas leasehold properties. These benefits, in the usual order of importance, are as follows:

1. Secondary recovery or pressure maintenance operations.

2. More equitable distribution of the proceeds of production to the owners of interests under the affected lands.

3. Reduced development and operating expenses through lowered overhead costs and more efficient use of surface equipment and facilities, such as central road systems.

The first of these benefits can be utilized only in oil or condensate reservoirs, and obviously does not apply to gas reservoirs such as the Pictured Cliffs under the Huerfanito Unit. However, under proper regulation of production from the unitized lands, the owners of interest therein can enjoy benefits Nos. 2 and 3 above. Benefit No. 3, the reduction of development and operating costs, affects only the working interest owners. The only benefit, therefore, that can be enjoyed by all owners of interest in the Huerfanito Unit is No. 2, more equitable distribution of production. It is a well known fact that it is almost impossible to produce wells individually from Pictured Cliffs reservoirs and prevent drainage across property lines. This results from the fact that the producing ability of a Pictured Cliffs well is not a direct measure of the reserves underlying its tract. A high capacity well can easily produce a large percentage of the reserves from under neighboring tracts as well as its own, thereby resulting in an inequitable amount of the field's reserves being produced by this well as compared to its neighboring wells. Under conditions such as these, if the wells were operated as a unit under proper regulation, then it would be immaterial from which wells the production was taken. In fact, key wells could be shut in for the purpose of observing reservoir performance, and proper allocation of production from wells which are produced can be credited to each owner. Such a benefit of unitized operation over that of individual operation can be realized, of course, only in the event the wells so affected produce from a common interconnecting reservoir. The application of benefit No. 2 must therefore apply <u>within</u> a reservoir, not <u>among</u> different reservoirs. In the case of a unit which covers

more than one reservoir, this benefit can only be derived by operating its reservoirs as separate participating areas. The benefit will apply among the wells within each reservoir, if the reservoir is operated as an entity.

VI. SUMMARY

The study of this area discloses the fact that the wells in the south part of the unit are producing from a reservoir separate from Participating Area No. 1 in the northeast part of the unit. The impermeable barrier separating these two reservoirs is not a local condition applicable only to the unit area, but has been traced a distance of at least ten miles, as set out on Exhibit G.

A separate participating area should be established for the wells in the south part of the unit. Each participating area can be expanded as the drilling of offset wells indicates the extent of the reservoir. I believe no difficulty will be encountered in determining boundaries of the two participating areas. In event of question, however, as to which participating area a well may belong, the final criterion should be its stabilized pressure.

It is my opinion that properly to enjoy the benefit of unitized operations, the wells in the unit should be operated under two separate participating areas. In fact, I believe it is necessary to establish two participating areas in order to protect the correlative rights of the owners of interest within the unit.

ALBERT R. GREER

BALLARD PICTURED CLIFFS FIELD
SAN JUAN COUNTY, NEW MEXICO
INITIAL WELL POTENTIALS AND INITIAL SHUT-IN PRESSURES
(Area covered by wells listed in this Exhibit is the field as now defined by the New Mexico Oil Conservation Commission and extensions currently proposed by the Commission)

		DATA FROM POTENTIAL TEST				ADDITIONAL SHUT-IN PRESSURES APRIL & MAY, 1955		
OPERATOR AND WELL	COMP. DATE	I.P. MCF/DAY	SHUT-IN PRESSURE psig	DATE	TIME SHUT IN FROM COMP. (Days)	DATE	SHUT-IN PRESSURE psig	TIME SHUT IN FROM POTENTIAL (Days)
J. Glenn Turner								
#1-3 Crandell	12-30-54	1505	640	1-12-55	7			
#1-10 Ballard	6- 4-54	3445	655	6- 9-54	8			
#2-10 Ballard	7- 3-54	2505	625	8- 4-54	9			
#1-10 Crandell	11-24-54	2656	638	12- 4-54	9			
#2-10 Crandell	11-30-54	2174	611	12- 8-54	7			
#1-11 Ballard	12-13-54	615	626	12-15-54	13			
#2-11 Ballard	12-30-54	582	650	1- 5-55	13			
#1-11 Crandell	7-31-54	2148	645	8- 4-54	11			
#2-11 Crandell	7-31-54	2085	654	8- 4-54	16			
#1-12 Ballard	12-31-54	2148	620	12-15-54	7			
#2-12 Ballard	12-30-54	789	636	1- 5-55	18			
#3-12 Ballard	1-11-55	1150	638	1-19-55	7			
#4-12 Ballard	1-11-55	1443	666	1-19-55	14			
#1-14 Ballard	5-25-54	2143	614	6- 2-54	11			
#2-14 Ballard	8-18-54	2774	656	8-25-54	11			
#3-14 Ballard	6- 9-54	1082	630	6-16-54	7			
#4-14 Ballard	8-19-54	2371	642	8-25-54	14			

EXHIBIT 5
Compiled 5-10-55
Page 2

OPERATOR AND WELL	COMP. DATE	DATA FROM POTENTIAL TEST I.P. MCF/DAY	SHUT-IN PRESSURE psig	DATE	TIME SHUT IN FROM COMP. (Days)	ADDITIONAL SHUT-IN PRESSURES APRIL & MAY, 1955 DATE	SHUT-IN PRESSURE psig	TIME SHUT IN FROM POTENTIAL (Days)
J. Glenn Turner (continued)								
#1-15 Ballard	5-14-54	816	661	5-26-54	7			
#2-15 Ballard	8- 6-54	2640	645	8-25-54	18			
#3-15 Ballard	8-18-54	2039	647	8-25-54	7			
#4-15 Ballard	6- 1-54	565	662	6- 9-54	10			
Benson & Montin								
#1 Manrose	11- 1-54	913	652	11-17-54	16			
#1 McManus	4-24-54	2010	668	6-30-54	67	4-10-55	669	284
#2 McManus	9-30-54	2863	652	11-17-54	48	4- 9-55	666	143
#3 McManus	10-13-54	476	544	11-17-54	35	4- 9-55	639	143
#4 McManus	10-16-54	726	605	11-17-54	32	4-10-55	612	126
#6 McManus	11-18-54	270	648	2-27-55	102	4-10-55	649	42
#7 McManus	1-13-55	880	656	2-27-55	40	4-10-55	656	42
#8 McManus	3-23-55		Not tested			4-10-55	668	18
#1 Quitzau	4-30-54	1175	660	6-30-54	61	4- 9-55	663	283
#2 Quitzau	12- 6-54	5100	657	2-27-55	83			
#4 Quitzau	11-27-54	5996	665	2-27-55	92			
#1 Sheets	6-13-54	1055	646	6-30-54	17			
#1 State	10-24-54	2416	661	11-17-54	24	4- 9-55	665	143
#1 Texas Navajo	8- 3-54	1980	654	8-16-54	13	4- 9-55	664	236

EXHIBIT B
Compiled 5-10-55
Page 3

OPERATOR AND WELL	COMP. DATE	DATA FROM POTENTIAL TEST: I.P. MCF/DAY	SHUT IN PRESSURE psig	DATE	TIME SHUT IN FROM COMP. (Days)	ADDITIONAL SHUT-IN PRESSURES APRIL & MAY, 1955: DATE	SHUT-IN PRESSURE psig	TIME SHUT IN FROM POTENTIAL (Days)
Benson & Montin (continued)								
#1 Wilson	7-29-54	2030	663	8-16-54	18	4-10-55	668	237
#2 Wilson	1- 8-55	5638	657	2-27-55	51	4-10-55	657	42
#1 Whan Jones	4- 7-55		Not tested			4-10-55	640	3
						5- 8-55	668	31
#1 Naw-di-des-wood	3-28-55		Not tested			4-10-55	648	13
						5- 8-55	653	41
#1 Bud-dos-pah	4- 3-55		Not tested			4-10-55	651	7
						5- 8-55	666	35
Southern Union								
#2 Newsom	12-10-54	4733	643	1-12-55	23	4-15-55	659	83
#2 Hodges	9- 9-54	850	632	9-22-54	13	4-15-55	626	**
#1 Newsom	9- 1-54	1713	635	9- 8-54	10	4-15-55	656	221
#3 Hodges	12-21-54	176	651	1-12-55	23	4-15-55	648	**
						5- 3-55	651	**
Woodriver								
#1 Greer	12- 4-54	1120	625	12-16-53	12			
El Paso Natural Gas Co.								
#1-A Payne	1-29-54	2836	649	5-26-54	5			

** Flowed intermittently since completion

EXHIBIT B
Compiled 3-10-55
Page 4

OPERATOR AND WELL	COMP. DATE	DATA FROM POTENTIAL TEST I.P. MCF/DAY	SHUT-IN PRESSURE psig	DATE	TIME SHUT IN FROM COMP. (Days)	ADDITIONAL SHUT-IN PRESSURES APRIL & MAY, 1955 DATE	SHUT-IN PRESSURE psig	TIME SHUT IN FROM POTENTIAL (Days)
Stanolind Oil & Gas Co.								
#27 Huerfano Unit	9-15-54	1808	643	9-22-54	8			
#28 Huerfano Unit	9-29-54	3300	632	10- 6-54	7			
#29 Huerfano Unit	10-13-54	264	653	10-20-54	7			
#32-A Huerfano Unit	1- 4-55	3060	611	1-12-55	7			
#35 Huerfano Unit	12-24-54	1115	608	1- 5-55	7			
#36 Huerfano Unit	12-15-54	4983	626	12-21-54	7			

ALBERT R. GREER

EXHIBIT C
Compiled 5-10-55

BALLARD PICTURED CLIFFS FIELD
SAN JUAN COUNTY, NEW MEXICO
INITIAL WELL POTENTIALS AND INITIAL SHUT-IN PRESSURES OF RECENTLY COMPLETED OUTPOST WELLS TO THE FIELD AS NOW DEFINED BY THE NEW MEXICO OIL CONSERVATION COMMISSION WITH ITS CURRENTLY PROPOSED EXTENSIONS

		DATA FROM POTENTIAL TEST				ADDITIONAL SHUT-IN PRESSURES APRIL & MAY, 1955		
OPERATOR AND WELL	COMP. DATE	I.P. MCF/DAY	SHUT-IN PRESSURE psig	DATE	TIME SHUT IN FROM COMP. (Days)	DATE	SHUT-IN PRESSURE psig	TIME SHUT IN FROM COMP. (Days)
Benson & Montin								
#3 Quitzau	2- 8-55		Not tested			4- 9-55	656	60
Southern Union								
#1 Nickson	3-22-55	1640	668	4-30-55	39	4-15-55	659	24
#1-A Newsom	4- 2-55	2442	649	4-29-55	27	4-15-55	643	13
#4 Hodges	12-30-54	573	636	1-12-55	17	4-15-55	616	**
						5- 3-55	627	**

** Flowed intermittently since completion

ALBERT R. GREER

EXHIBIT D
Compiled 9-10-55

SOUTH BLANCO PICTURED CLIFFS FIELD
SAN JUAN COUNTY, NEW MEXICO
INITIAL WELL POTENTIALS AND INITIAL SHUT-IN PRESSURES

(The area covered by wells listed in this Exhibit is the southwest part of the field as now defined by the New Mexico Oil Conservation Commission and which is adjacent to or within the Huerfanito Unit area)

OPERATOR AND WELL	Twp. 27N Rge. 9W LOCATION	DATA FROM POTENTIAL TEST COMP. DATE	I.P. MCF/DAY	SHUT-IN PRESSURE psig
Magnolia Petroleum				
#1 Curly	NW/4 Sec. 25	12-13-53	538	688
Skelly Oil Co.				
#1 John Charles	SW/4 Sec. 13	Plugged and abandoned		
#1 Gentle	SW/4 Sec. 14	2-12-53	1947	710
#2 Gentle	NW/4 Sec. 23	Plugged and abandoned		
#1-A Gentle	NW/4 Sec. 24	3- 3-53	640	700
Southern Union				
#1 Jernigan	SE/4 Sec. 24	6-18-52	627	599
El Paso Natural Gas (J. Glenn Turner)				
#1 H. L. Gentle	SE/4 Sec. 25	10-19-53	614	715
#1-A G. R. Gentle	NE/4 Sec. 26	9-28-53	191	719
#2 G. R. Gentle	NW/4 Sec. 26	Plugged and abandoned		
#2 H. L. Gentle	SE/4 Sec. 26	Plugged and abandoned		

ALBERT R. GREER

EXHIBIT F
Compiled 5-10-55
Page 1

NORTHEAST PART OF THE FULCHER-KUTZ FIELD
SAN JUAN COUNTY, NEW MEXICO
INITIAL WELL POTENTIALS AND INITIAL SHUT-IN PRESSURES

The area covered by the wells listed in this Exhibit is as follows:

All in Township 27 North, Range 9 West

Section 17: W/2 and NW/4
Section 18: All
Section 19: All
Section 20: All
Section 28: W/2
Section 29: All
Section 30: All

OPERATOR AND WELL	LOCATION	DATA FROM POTENTIAL TEST: COMP. DATE	I.P. MCF/DAY	SHUT-IN PRESSURE psig
Aztec Oil & Gas				
#1 Whitley	NE/4 Sec. 17	7- 8-50	460	598
Southern Union				
#1 Riddle	SW/4 Sec. 17	2-29-52	688	629
#1 Hudson	NE/4 Sec. 29	12-13-50	537	518
#2 Hudson	NW/4 Sec. 29	1-20-51	280	514
#3 Hudson	SW/4 Sec. 29	1-20-51	30	339
Magnolia Petroleum				
#1 Reese	SE/4 Sec. 17	2-25-53	520	445
#1 Cleveland	NW/4 Sec. 28	12-10-52	33	208
El Paso Natural Gas				
#1 Lodewick	SE/4 Sec. 18	4-20-51	545	500
#2 Lodewick	SW/4 Sec. 18	4- 9-51	420	523

ALBERT R. GREER

EXHIBIT F
Compiled 5-10-55
Page

OPERATOR AND WELL	LOCATION	DATA FROM POTENTIAL TEST COMP. DATE	I.P. MCF/DAY	SHUT-IN PRESSURE psig
J. Glenn Turner				
#1 Lodewick	NE/4 Sec. 18	4-23-53	1035	599
#1 Denman	NW/4 Sec. 20	3- 6-53	330	500
Johnston Oil Co.				
#1 Lodewick	NW/4 Sec. 19	12- 1-50	1600	635
#2 Lodewick	NE/4 Sec. 19	12-12-50	750	575
#3 Lodewick	SW/4 Sec. 19	12-21-50	500	550

ALBERT R. GREER

EXHIBIT E
Compiled 5-10-55

SOUTH BLANCO PICTURED CLIFFS FIELD
SAN JUAN COUNTY, NEW MEXICO
INITIAL WELL POTENTIALS AND INITIAL SHUT-IN PRESSURES OF RECENTLY COMPLETED EXTENSION WELLS TO THE RESERVOIR UNDER PARTICIPATING AREA NO. 1 IN THE NORTHEAST PART OF THE HUERFANITO UNIT

OPERATOR AND WELL	COMP. DATE	DATA FROM POTENTIAL TEST				ADDITIONAL SHUT-IN PRESSURES APRIL & MAY, 1955		
		I.P. MCF/DAY	SHUT-IN PRESSURE psig	DATE	TIME SHUT IN FROM COMP. (Days)	DATE	SHUT-IN PRESSURE psig	TIME SHUT IN FROM COMP. (Days)
Southern Union								
#1 Starr NE 6-26-8	10-6-54	1615	692	10-20-54	14	4-15-55	686	**
						5- 3-55	690	**
#2-A Newsom SW 4-26-8	4-5-55	926	700	4-13-55	7	4-15-55	709	9
						5- 3-55	716	27
#1-B Newsom SE 9-26-8	1-21-55	Plugged and abandoned						

** Flowed intermittently since completion

To JWG

Re: Case #[redacted]908 from Warren order R-672B

[redacted]

12/9/85

Find (3) That Case 908(A)(B) & 917 - Ballard Pool
(3) That the Ballard P.C. Gas Pool should be redelineated completely
(2) That there was insufficient evidence presented to indicate that the Ballard P.C., Fulcher Kutz and South Blanco P.C. Pools should be consolidated.

Order: (1) That delineation of the Ballard P.C. Gas Pool should be amended and hereinafter constitute as follows: (see corrected R-672 order)

SUPPLEMENTAL DOCKET

REGULAR HEARING NOVEMBER 16, 1955

N. M. Oil Conservation Commission 9 a. m., Mabry Hall, State Capitol, Santa Fe

CASE 978: Application of Phillips Petroleum Company for an order pooling the rights and interests of all persons having the right to drill for, produce or share in the production of gas from the Devonian formation underlying the SE/4 Section 28, Township 25 South, Range 37 East, Lea County, New Mexico, in the Crosby-Devonian Gas Pool.

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

January 27, 1956

COPY

Mr. George W. Selinger
Skelly Oil Company
P.O. Box 1650
Tulsa 2, Oklahoma

Dear Sir:

We enclose a copy of Order R-672-B issued on January 27, 1956, by the Oil Conservation Commission in Case 908, which was heard at the October 13th hearing.

Very truly yours,

W. B. Macey
Secretary - Director

WBM:brp
Encl.

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

August 24, 1955

COPY

Mr. George W. Selinger
Skelly Oil Company
P.O. Box 1650
Tulsa 2, Oklahoma

Dear Sir:

We enclose a copy of Order R-672 issued on August 17, 1955, by the Oil Conservation Commission in Case 908, which was heard at the May 18th hearing upon your company's application.

Very truly yours,

W. B. Macey
Secretary - Director

WBM:brp
Enclosure

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

January 27, 1956

COPY

Mr. William G. Webb
17th Floor
Mercantile Bank Bldg.
Dallas, Texas

Dear Sir:

We enclose a copy of Order R-672-B issued on January 27, 1956, by the Oil Conservation Commission in Case 908, which was heard at the October 13th hearing.

Very truly yours,

W. B. Macey
Secretary - Director

WBM:brp
Encl.

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

August 24, 1955

COPY

Mr. William G. Webb
17th Floor
Mercantile Bank Bldg.
Dallas, Texas

Dear Sir:

We enclose a copy of Order R-672 issued on August 17, 1955, by the Oil Conservation Commission in Case 908, which was heard at the May 18th hearing.

Very truly yours,

W. B. Macey
Secretary - Director

WBM:brp
Enclosure

TURNER, WHITE, ATWOOD, McLANE AND FRANCIS

ATTORNEYS AND COUNSELORS AT LAW

12TH FLOOR MERCANTILE BANK BUILDING

DALLAS 1, TEXAS

J. GLENN TURNER
W. O. WHITE
FELIX ATWOOD
ALFRED E. McLANE
EDWARD L. FRANCIS
JAMES B. FRANCIS
JULIAN M. MEER
TREVOR REES-JONES
HARRY S. WELCH
THOS. R. HARTNETT III
H. L. HITCHINS, JR.
WILLIAM L. McENERNEY
WILLIAM G. WEBB
LEWIS CHANDLER
SNOWDEN M. LEFTWICH, JR.
WILLIAM C. HERNDON, JR.
THOMAS B. McELROY

September 8, 1955

Sent 9-12-55 BP

Mr. W. B. Macey, Secretary - Director
New Mexico Oil Conservation Commission
Post Office Box 871
Santa Fe, New Mexico

Dear Bill:

This will acknowledge receipt of your letter dated September 6, 1955 enclosing a copy of Skelly Oil Company's Application for Rehearing in Case Number 908. As soon as the Commission has acted on the Application we will greatly appreciate the courtesy if you would furnish us with a copy of the Commission's Order.

With kindest personal regards, we are

Yours very truly,

TURNER, WHITE, ATWOOD, McLANE
and FRANCIS

By William G. Webb
William G. Webb

WGW:mch

OIL CONSERVATION COMMISSION
P. O. BOX 871
SANTA FE, NEW MEXICO

September 6, 1955

COPY

Mr. William G. Webb
17th Floor
Mercantile Bank Bldg.
Dallas, Texas

Dear Sir:

I am enclosing a copy of an application for rehearing made by Skelly Oil Company in Case 908. As yet the Commission has not had an opportunity to act on this application. If the Commission grants the rehearing, I will send you a copy of the order.

Yours very truly,

W. B. Macey
Secretary - Director

WBM:brp
Enclosure

SKELLY OIL COMPANY

PRODUCTION DEPARTMENT
J. S. FREEMAN, VICE PRESIDENT

TULSA 2, OKLAHOMA

April 25, 1955

Mr. W. B. Macey
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Gentlemen:

We hereby request that the Commission set down for hearing at the next regular Market Demand date a hearing which should be upon the motion of the Commission since it involves nomenclature and all nomenclature cases are called by the Commission.

The area involved in this application should cover all or portions of Township 28 North, Ranges 8 and 9 West; Township 27 North, Ranges 8 and 9 West; Township 26 North, Ranges 8 and 9 West, and Township 25 North, Range 8 West.

This area should be considered by the Commission in connection with the creation and establishment of a new field insofar as the Pictured Cliffs production is concerned, or in connection with an extension of the present limits of the South Blanco Pictured Cliffs, Aztec Pictured Cliffs or Fulcher-Kutz Pictured Cliffs insofar as they apply to the area delineated in these seven townships. In this connection we believe the Commission should consider the modification, amendment and revision of Order No. R-577 and the subject matter of Case 864, paragraph (g).

The calling of the hearing on the part of the Commission upon its own motion for an order of nomenclature is not only in line with the present procedure but enables all operators interested in this area an opportunity to present to the Commission their recommendations as to how best delineate the Fulcher-Kutz Pictured Cliffs, Aztec Pictured Cliffs, South Blanco Pictured Cliffs, and the Ballard Pictured Cliffs, so that the Commission can properly issue such orders, rules and regulations as may be necessary upon facts that may be presented to it at the hearing.

Skelly Oil Company will be prepared to present testimony to the Commission to show that insofar as the Pictured Cliffs production in Sections 13, 14, 23, 24, 25, 26, Township 27 North, Range 9 West, Pictured Cliffs production in Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, in Township 26 North, Range 9 West and Pictured Cliffs production in Section 6, Township 26 North, Range 8 West, is of one pool and should not be placed in two separate pools.

However, the scope of the hearing should be broad enough to permit the Commission, if it so desires, to either designate this as one separate pool or an extension of existing pools.

Yours very truly,

George W. Selinger

George W. Selinger

GWS:dd

cc: Southern Union Gas Company
1104 Burt Building
Dallas, Texas

Mr. J. G. Turner
17th Floor, Mercantile Bank Bldg.
Dallas, Texas

Mr. Julian Clausen
Skelly Oil Company
Albuquerque, New Mexico

Mr. P. E. Cosper

Area Involved:

Township 28 North, Ranges 8 and 9 West.
Township 27 North, Ranges 8 and 9 West.
Township 26 North, Ranges 8 and 9 West.
Township 25 North, Range 8 West.

Skelly to present testimony on following area to show one pool:

Sections 13, 14, 23, 24, 25, 26, Township 27 North, Range 9 West.
Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, Township 26 North, Range 9 West.
Section 6, Township 26 North, Range 8 West.

BEFORE THE OIL CONSERVATION COMMISSION

OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF THE MAGNOLIA PETROLEUM COMPANY, A CORPORATION, FOR AN ORDER APPROVING THE PROPOSED HUERFANITO UNIT AGREEMENT EMBRACING 10245.38 ACRES IN SAN JUAN COUNTY, NEW MEXICO, WITHIN TOWNSHIPS 26 and 27 N, RANGE 9 W, NMPM.	CASE NO. 286 ORDER NO. R-80

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 10:00 A. M. on the 24th day of July, 1951, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission", upon the application of the Magnolia Petroleum Company for approval of the Huerfanito Unit Agreement embracing lands situated in San Juan County, New Mexico, and the Commission having considered said application and the evidence introduced in support thereof, and being fully advised of the premises finds:

That the proposed unit plan will in principle tend to promote the conservation of oil and gas and the prevention of waste.

IT IS THEREFORE ORDERED BY THE COMMISSION AS FOLLOWS:

SECTION 1. That this order shall be known as the

HUERFANITO UNIT AGREEMENT ORDER.

SECTION 2. (a) That the project herein referred to shall be known as the Huerfanito Unit Agreement, and shall hereafter be referred to as the "Project".

(b) That the plan by which the Project shall be operated shall be embraced in the form of a unit agreement for the development and operation of the Huerfanito Unit Area referred to in the Petitioner's petition and filed with said petition, and such plan shall be known as the Huerfanito Unit Agreement Plan.

SECTION 3. That the Huerfanito Unit Agreement Plan shall be, and hereby is, approved in principle as a proper conservation measure; provided, however, that notwithstanding any of the provisions contained in said unit agreement this approval shall not be considered as waiving or relinquishing in any manner any rights, duties or obligations which are now, or may hereafter, be vested in the New Mexico Oil Conservation Commission by law relative to the supervision and control of operations for exploration and development of any lands committed to said Huerfanito Unit Agreement, or relative to the production of oil or gas therefrom.

SECTION 4. (a) That the Unit Area shall be:

NEW MEXICO PRINCIPAL MERIDIAN

Twp. 27 N, Rge. 9 W, N.M.P.M.
All Sec. 22, All Sec. 23, W 1/2 Sec. 24,
W 1/2 Sec. 25, All Sec. 26, All Sec. 27,
All Sec. 28, All Sec. 33, All Sec. 34,
All Sec. 35, All Sec. 36;

Twp. 26 N, Rge. 9 W, N.M.P.M.
All Sec. 1, All Sec. 2, All Sec. 3,
All Sec. 4, N 1/2 Sec. 10, N 1/2 Sec. 11,
All Sec. 12;

Total unit area: 10,245.38 acres, more or less.

(b) The unit area may be enlarged or contracted as provided in said plan.

SECTION 5. That the unit operator shall file with the Commission an executed original or executed counterpart of the Huerfanito Unit Agreement within 30 days after the effective date thereof.

SECTION 6. That any party owning rights in the unitized substances who does not commit such rights to said unit agreement before the effective date thereof may thereafter become a party thereto by subscribing to such agreement or counterpart thereof. The unit operator shall file with the Commission within 30 days an original of any such counterpart.

SECTION 7. That this Order shall become effective on the first day of the calendar month next following the approval of the Commissioner of Public Lands of the State of New Mexico and the Director of the United States Geological Survey, and shall terminate ipso facto on the termination of said unit agreement. The last unit operator shall immediately notify the Commission in writing of such termination.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

/s/ EDWIN L. MECHEM, Chairman

/s/ GUY SHEPARD, Member

/s/ R. R. SPURRIER, Secretary

SEAL

Cover Ltr

19

SKELLY OIL COMPANY

General Data on Areas "A" & "B"

		Area "A"	Area "B"
1.	Total Producing Wells, as of 3-1-55	6	22
2.	Date of first connection	10-30-53	8-30-54
3.	Acc. Gas Produced, as of 3-1-55	245,923	1,009,821
4.	Avg. Daily Production, for Mar, 1955, Mcf	409	6,701
5.	Avg. 7-Day Wellhead S.I.P. PSIG Calculated from last 7-Day S.I.P, taken (date pressure taken not considered)	558	537
6.	Highest 7-Day Wellhead S.I.P. taken, PSIG	604	599
	a. Date Pressure taken	11-23-54	After 10-1-54 (Connection Date)

Note: Pressures on non-producing wells not used in calculating average in (5).

SKELLY

SKELLY OIL COMPANY

PRODUCTION DEPARTMENT
J. S. FREEMAN, VICE PRESIDENT

TULSA 2, OKLAHOMA

May 25, 1955

File Case 908

Re: Case 908

Mr. W. B. Macey
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Dear Sir:

For whatever value the information may be, we are herewith attaching copy of telegram received from J. Glen Turner and our reply for your consideration in this case.

Yours very truly,

George W. Selinger

GWS:dd

DOMESTIC SERVICE
Check the class of service desired; otherwise this message will be sent as a full rate telegram
FULL RATE TELEGRAM
DAY LETTER
NIGHT LETTER

$ S E

WESTERN UNION

1206 10-51

W. P. MARSHALL, PRESIDENT

INTERNATIONAL SERVICE
Check the class of service desired; otherwise the message will be sent at the full rate
FULL RATE
LETTER TELEGRAM
SHIP RADIOGRAM

NO. WDS.-CL. OF S.-C.	PD. OR COLL.	CASH NO.	CHARGE TO THE ACCOUNT OF	TIME FILED
			Skelly Oil Company, Tulsa, Oklahoma	

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

C O P Y

C O P Y

Tulsa, Oklahoma
May 23, 1955

J. Glenn Turner
1711 Mercantile Bank Building
Dallas, Texas

Interpret your wire as requesting Skelly approval to adding drilling of well in NE4 Section 36-27N-9W to 1955 Plan of Development. We have no objection to amending plan of development to include the drilling of said well.

Skelly Oil Company

By: T. F. Thompson

DOMESTIC SERVICE
Check the class of service desired; otherwise this message will be sent as a full rate telegram
FULL RATE TELEGRAM
DAY LETTER
NIGHT LETTER

$ S E

WESTERN UNION

1206 10-51

W. P. MARSHALL, PRESIDENT

INTERNATIONAL SERVICE
Check the class of service desired; otherwise the message will be sent at the full rate
FULL RATE
LETTER TELEGRAM
SHIP RADIOGRAM

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

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

C O P Y

1955 May 20 PM 5 41

C O P Y

DA257
D RFYOO1 RFZ1- LONH OD AR-RF Dallas Tex 20 NFT

SKELLY OIL COMPANY, ATTN T. F. THOMPSON
TULSA

HUERFANITO DRILLING COMPANY, INC., HAS REQUESTED THE DRILLING OF A PICTURED CLIFFS FORMATION UNIT TEST WELL IN THE NORTHEAST QUARTER OF SECTION THIRTY-SIX, TOWNSHIP TWENTY-SEVEN NORTH, RANGE NINE WEST, N.M.P.M., SAN JUAN COUNTY, NEW MEXICO. IN ACCORDANCE WITH THE APPLICABLE TERMS OF THE HUERFANITO UNIT OPERATING AGREEMENT J. GLENN TURNER, AS UNIT OPERATOR, HEREBY REQUESTS YOUR APPROVAL OR DISAPPROVAL OF THE SAME. ANSWER REQUESTED BY RETURN WIRE.

-- J GLEN TURNER UNIT OPERATOR HUERFANITO UNIT AREA

SKELLY OIL COMPANY
Tulsa 2, Oklahoma

Case 908

April 25, 1955

Mr. W. B. Macey
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Gentlemen:

We hereby request that the Commission set down for hearing at the next regular Market Demand date a hearing which should be upon the motion of the Commission since it involves nomenclature and all nomenclature cases are called by the Commission.

The area involved in this application should cover all or portions of Township 28 North, Ranges 8 and 9 West; Township 27 North, Ranges 8 and 9 West; Township 26 North, Ranges 8 and 9 West, and Township 25 North, Range 8 West.

This area should be considered by the Commission in connection with the creation and establishment of a new field insofar as the Pictured Cliffs production is concerned, or in connection with an extension of the present limits of the South Blanco Pictured Cliffs, Aztec Pictured Cliffs or Fulcher-Kutz Pictured Cliffs insofar as they apply to the area delineated in these seven townships. In this connection we believe the Commission should consider the modification, amendment and revision of Order No. R-577 and the subject matter of Case 864, paragraph (g).

The calling of the hearing on the part of the Commission upon its own motion for an order of nomenclature is not only in line with the present procedure but enables all operators interested in this area an opportunity to present to the Commission their recommendations as to how best delineate the Fulcher-Kutz Pictured Cliffs, Aztec Pictured Cliffs, South Blanco Pictured Cliffs, and the Ballard Pictured Cliffs, so that the Commission can properly issue such orders, rules and regulations as may be necessary upon facts that may be presented to it at the hearing.

Skelly Oil Company will be prepared to present testimony to the Commission to show that insofar as the Pictured Cliffs production in Section 13, 14, 23, 24, 25, 26, Township 27 North, Range 9 West, Pictured Cliffs production in Section 1, 2, 3, 4, 9,10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, in Township 26 North, Range 9 West and Pictured Cliffs productions in Section 6, Township 26 North, Range 8 West, is of one pool and should not be placed in two separate pools. However, the scope of the hearing should be broad enough to permit the Commission, if it so desires, to either designate this as one separate pool or an extension of existing pools.

Yours very truly,

/s/ George W. Selinger

CASE 908 - CONT'D.

Page 2

Area Involved:

Township 28 North, Ranges 8 and 9 West
Township 27 North, Ranges 8 and 9 West
Township 26 North, Ranges 8 and 9 West
Township 25 North, Range 8 West.

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Section 6, Township 26 North, Range 8 West.

C
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P
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SKELLY OIL COMPANY

Tulsa 2, Oklahoma

April 25, 1955

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New Mexico Oil Conservation Commission
P. O. B ox 871
Santa Fe, New Mexico

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Yours very truly,

/s/ George W. Selinger

GWS:dd

cc: Southern Union Gas Company
1104 Burt Building
Dallas, Texas

Mr. J. G. Turner
17th Floor, Mercantile Bank Bldg.
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Skelly Oil Company
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Township 26 North, Range 9 West.
Section 6, Township 26 North, Range 8 West.

SKELLY OIL COMPANY

TULSA 2, OKLAHOMA

PRODUCTION DEPARTMENT
J. S. FREEMAN, VICE PRESIDENT

September 1, 1955

OK
write
order
granting
Rehearing
Order R-672-A

Mr. W. B. Macey
Oil Conservation Commission
State of New Mexico
Box 871
Santa Fe, New Mexico

Dear Sir:

We are herewith attaching original and three copies of Application for Rehearing in Case No. 908 for which Order No. R-672 was issued.

We would like to have this matter set for hearing on the 15th of September or as soon thereafter as possible, because it is directly related to the subject matter of the area of application in Case No. 955 and in continued Case No. 944. All of these matters are so closely related that we believe in the interest of time and for the convenience of the Commission, it should be heard at the same time.

Yours very truly,

George W. Selinger

GWS:zmr

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 908

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
605 SIMMS BUILDING
TELEPHONE 3-6691
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO
Santa Fe, New Mexico

May 18, 1955

IN THE MATTER OF:

Application of the Oil Conservation Commission upon its own motion, at the request of Skelly Oil Company, for an order amending, clarifying and revising the presently established horizontal limits of the Ballard-Pictured Cliffs, the Fulcher Kutz-Pictured Cliffs, the Aztec-Pictured Cliffs and the South Blanco-Pictured Cliffs Gas Pools in San Juan and Rio Arriba Counties, N. M. Operators in these four gas pools are advised that the Commission will consider testimony relating to redelineation or consolidation of the presently defined areas, as evidence may indicate.

Case No. 908

Before: Honorable John F. Simms, E. S. (Johnny) Walker, and William B. Macey.

TRANSCRIPT OF HEARING

MR. MACEY: The next case will be Case 908.

Gentlemen, in connection with this case, we realize that the testimony presented on both sides of the matter is going to be quite lengthy. We want to assure you that you can take all the time that you want to because we know it is important. Mr. Selinger, do you want to put on your case?

MR. SELINGER: As my letter of April 25, of which I sent a copy to Southern Union and Turner interests, I asked that the notice covered the seven townships. By no means do we have production in all of those townships. My letter stated that, "We will be prepared to present testimony insofar as a small minute part of the seven townships". As I understand, this is an open hearing as to the delineation of the Fulcher Kutz, the Aztec and South Blanco and the Ballard insofar as Pictured Cliffs is concerned. We don't

have any production in the Aztec or the Fulcher Kutz or the Ballard. Our production is now presently classified in the South Blanco-Pictured Cliffs immediately to the south of us and direct offset is a well classified in the Aztec.

So we have no testimony or recommendation as to pool delineations. If other operators have the overall delineation picture, why their testimony will be of more importance than ours insofar as the nomenclature of the pools are concerned. We are restricting our testimony and limiting exclusively to two small areas which we say are connected. If you want to go into that small minute problem of the greater problem, we are prepared to go ahead with that part. We have no recommendations with respect to nomenclature of the seven townships or the areas therein.

MR. MACEY: I think it would be in order for you to go ahead and put on your presentation since, as I understand it, your testimony will more or less pertain to the Ballard and the South Blanco, will it not?

MR. SELINGER: No, our testimony will be with respect to a small area which lies in the center of the seven township area, delineated in the notice with respect to a portion of the Ballard. We have no testimony with respect to the Fulcher Kutz or the Aztec or the South Blanco as such. It is only a small part of the whole general overall area. It can be of no help to the Commission with respect to nomenclature of the various pools. Our only concern is with respect to the portions of this area in which we say are placed in several fields which should be placed in one field, but does not touch Fulcher Kutz or Aztec or the others.

MR. MACEY: Go ahead and proceed with your case.

J U L I A N C L A U S E N

having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. SELINGER:

Q State your name. A Julian Clausen.

Q You are associated with what company?

A Skelly Oil Company.

Q Where are you located, Mr. Clausen?

A I am in their geological office in Albuquerque.

Q What is your profession? A Geologist.

Q Are you a graduate of an accredited school?

A Colorado School of Mines.

Q How long have you been practicing your profession?

A Since 1951.

Q How long have you been stationed at Albuquerque?

A Since '51.

Q Are you familiar with the San Juan Basin?

A Yes, sir.

Q Have you personally been in the San Juan Basin?

A Yes, sir.

Q You have looked over the wells there and the topographical conditions and so forth, is that correct?

A Yes, sir.

Q Are you familiar with the few wells that Skelly Oil Company has in the San Juan Basin? A Yes, sir.

Q Are you familiar with the wells that Skelly Oil Company has and the interest that it has in the so-called Huerfanito unit?

A Yes, sir.

(Marked Skelly's Exhibit No. 1, for identification.)

MR. SELINGER: I wonder if there are any further qualifying questions from this witness as to his profession as a geologist.

MR. MACEY: Does anyone have any questions concerning the witness's qualification? If not the Commission will accept his qualification.

Q I will hand you what has been marked as Skelly's Exhibit No. 1 and ask you what is that plat or map.

A It is a map of the structure of the Pictured Cliff formation aswe interpret it with the outline of the Huerfanito unit shown in the red in the center of the map.

Q What is the datum as indicated on that exhibit?

A The datum is the Pictured Cliff formation. The top of the Pictured Cliffs.

Q You have indicated the Pictured Cliffs in a symbol showing a wide center and the Mesa Verde in a darker field in center, is that correct?

A That is more the result of the printing process on our maps. We separate the two by having a light yellow center for the Pictured Cliffs and orange for Mesa Verde and it came out that way.

Q But it indicates that difference here?

A Yes.

MR. SELINGER: If the Commission please, we would like to have Order R-80 in Case 286 which was issued by the Commission on July 24, 1951 establishing the Huerfanito Unit as outlined on Exhibit 1 in red, made a part of this record.

MR. MACEY: Without objection it will be done.

(Marked Skelly's Exhibit No. 2, for identification.)

Q I will hand you what has been marked as Skelly Exhibit 2 and ask you to state what that is.

A That is primarily an enlargement of the other map with the outline of the Huerfanito Unit in the center again in the large dashed lines, and the finer dotted lines are Skelly acreage in the area. It is a map on the Pictured Cliff formation again, contour interval fifty feet.

Q Are all the wells that are shown on Exhibit 1 indicated on Exhibit 2? That is the recent wells.

A I believe so. There may be a few changes due to the rapidity that they complete their wells.

Q I notice that you have three lines marked AA-BB and CC. What are those lines?

A We have three cross sections of the Pictured Cliff formation.

Q Along east of the respective cross section lines you have numbers. Does that indicate the wells that were used on the cross sections?

A They are the number of the wells shown on the cross section, yes, sir.

(Marked Skelly Exhibits Nos. 3, 4 and 5, for identification.)

Q I will hand you what has been marked as Skelly Exhibit 3 and ask you to state what that is.

A That is an electric log cross section of the Pictured Cliff formation and it is to the west of the Huerfanito Unit area. It is shown on the map as cross section AA Prime.

Q That traverses six wells, is that correct?

A Seven.

Q Seven wells. Are all those wells producing from the Pictured Cliffs?

A No, sir. There are some dry holes.

Q Which of the wells on this cross section is a dry hole?

A Skelly No. 1, McAdams.

Q That is --

A (Interrupting) It is Section 34, Township 27 north, ten west.

Q That is marked as Well No. 4 on the cross section, is that correct?

A That is correct.

Q I notice that there is a location indicated on that exhibit to the south. Do you know whether or not that well has now been completed as a Pictured Cliffs?

A It is at present shut in for gauge. Its last gauge was 250,000 cubic feet.

Q Is that a farmout from Skelly?

A It is a farmout from Skelly.

Q I will hand you what has been marked as Skelly Exhibit 4. Is that the cross section indicated on Exhibit 2 as cross section BB?

A That is correct.

Q How many wells are indicated on that cross section?

A Four wells.

Q The first well is being indicated as located in Section 24, Township 24 north, Range 9 west and marked as Well No. 1, is that right?

A It is in Township 27 north.

Q Yes. Section 24, Township 27 north, range 9 west.

A That is correct.

Q Marked as Well No. 1 on the cross section?

A That is right.

Q Wells No. 3 and 4 respectively being Stanolind and Turner's wells are one in Section 9, 26, 9 and the other in Section 15, 26, 9 is that correct? A That is correct.

Q The well marked No. 2 is what?

A Magnolia No. 1 Crandell.

Q What is that now completed at?

A It is a dry hole. It was drilled to I believe the Dakota formation, and then was dry.

Q From this cross section is there Pictured Cliffs formation in that well? A Yes, sir.

Q When was that well drilled and completed, just roughly the year, two, three, four, five years ago?

A I believe about three years ago.

Q Was any stimulation given to that well in an effort to make it a producing well?

A Not in the Pictured Cliffs formation.

Q Have you made any investigation with respect to that well as to the ability of an operator to make a producing well in the Pictured Cliffs at that location?

A I believe from my study of the electric logs that a well to the Pictured Cliffs in that location would produce.

Q Would it take artificial stimulation in order to do that?

A To make a good commercial producer, yes, sir.

Q Do you know of your own knowledge whether if such artificial stimulation were used in completion of wells in Township 26 north,

Range 9 west? A Yes.

Q I asked you on the question whether artificial stimulation was used in completion of wells in Township 26 north, Range 9 west.

A With very few exceptions, wells, all the wells have been artificially stimulated.

Q With respect to wells in Township 27 north, Range 9 west, do you know whether those wells in that township particularly in and around the Huerfanito Unit, were artificially stimulated?

A In the Huerfanito Unit all wells that are producing were artificially stimulated.

Q With respect to such artificial stimulation, there is a method of completion either by shooting or by sandfracting or sand oil, is that correct? A That is correct.

Q How are the wells in the northern part of the Huerfanito Unit completed, by shot or sand oil?

A They were all shot with the exception of the El Paso No. 2 Gentle in the southwest of Section 26, Township 27 north, Range 9 west, both shot and hydrofract.

Q What is the situation with respect to the wells in and about the south end of the Huerfanito Unit and those wells lying in Township 26 north, Range 9 west with respect to shooting or sand oil?

A They have all been hydrofracted. All the southern wells in the unit have been hydrofracted.

Q I will hand you what has been marked by the Reporter as Skelly Exhibit 5 which is cross section CC. Is that a cross section which is indicated on Skelly Exhibit 2 as being the furthermost east cross section on that map? A That is correct.

Q How many wells are contained in this cross section?

A Six.

Q Three being in the north end of the Huerfanito Unit and two being near or about the south end of the Huerfanito Unit and one being in the approximate center in the north and south direction of those wells, is that correct? A Yes.

Q Are all of these wells producing from the Pictured Cliffs?

A Yes, sir, they are all producing from the Pictured Cliffs.

Q Are there any dry holes in or about the line of cross section CC?

A There are none in the line of cross section. Well, there are none adjacent to it at present.

Q Are there any dry holes in the section that contains any one of these wells on this cross section? A No, sir.

Q These three cross sections which are Exhibits 3, 4 and 5 indicate the Pictured Cliff formation, does it not?

A Yes, sir.

Q As a geologist, is it your opinion that the Pictured Cliffs is continuous and contiguous over the entire general area of the San Juan Basin wherever found productive?

A Yes, sir.

Q Are there any structural impediments in the Pictured Cliff formation?

A There are no structural impediments to production in the San Juan Basin in the Pictured Cliffs where it is producing as we interpret it structurally.

Q Geologically, Mr. Clausen, do you have trends in this area?

A From a study of Exhibit 1, there seems to be trends of

production, yes, sir. Insofar as drilling has proceeded to the present.

Q With respect to drilling as it has occurred up to the present, there are large areas between these trends that doesn't seem to have any development at all. You have been on the grounds in this area depicted by your Exhibit 1, have you?

A Yes, sir.

Q Topographically, are there any reasons for the deterring of drilling in these spaces or areas between trends?

A There are a number of steep sided mesas and steep sided canyons that I feel sure would deter operators from going into an area to start drilling until the last minute.

Q In your opinion, Mr. Clausen, would you say that there is Pictured Cliffs formation under the undrilled areas that are indicated in white or black on Exhibit 1?

A Yes, sir.

Q Also, Mr. Clausen, do you have any opinion as to whether or not these so-called trends which run generally in a northwest, southeast direction, join at various places?

A At present there is no indication that they would join as say two lines coming together, but the trends would tend to simply widen out until they would meet.

Q There is a drilling campaign going on now which are widening these trends towards each other, is that correct?

A That is correct.

Q As a matter of fact, over in Township 27 north, Ranges 10 and 11 and Township 26 north, Ranges 10 and 11, that has occurred between the Fulcher Kutz and the West Fulcher Kutz, is that correct?

A That is correct.

Q Down in Township 26 north, Range 6 west, and Township 27 north, Range 6 west, that is also approaching by drilling toward each other? A That is correct.

Q This well that is in Section 6, Township 26 north, Range 6 west which is Southern Union No. 1 Starr which is on cross section CC, Well No. 4 that is a comparatively recent completion, is that correct, compared to the wells to the northwest there?

A Yes, that is right.

Q In your opinion does that well, the Southern Union Starr No. 1 in Section 6, Township 26 north, Range 8 west, connect up the Pictured Cliffs production of the wells in Sections 24, 25, 26 in Township 27 north, Range 9 west and the wells that are in Township 26 north, Range 9 west?

A I feel that it would connect the two, the two areas, yes, sir.

MR. SELINGER: We would like to offer into evidence Skelly Exhibits 1 through 5 inclusive.

MR. MACEY: Without objection they will be received.

MR. SELINGER: That is all we have.

MR. MACEY: Any questions of the witness? Mr. Webb.

CROSS EXAMINATION

By MR. WEBB:

Q Mr. Clausen, I believe you stated that the well in the southwest quarter of Section 26 of 27 and 9 was shot and sandfracted by El Paso. Is that your testimony?

A Yes, sir. I believe that is in the southeast rather than in the southwest quarter.

Q I believe you further stated that the wells in the so-called

southern portion of the Huerfanito Unit had been sandfracted, but had not been shot?

A No, I did not say that. I said they had all been sandfracted.

Q Do you know whether or not some of those wells had likewise been shot?

A The Turner No. 113 Candrell in the southwest of Section 3 had been both shot and hydrofracted.

Q Then according to your testimony, the wells, the dry holes in Section 26 of 27, 9 and the southern portion of the Huerfanito Unit received the same sort of the same type of artificial stimulation?

MR. SELINGER: Are you talking about the producing well in the southeast of 26 or the dry hole?

MR. WEBB: The dry hole.

MR. SELINGER: Do you understand the question?

A That particular well has received both types of stimulation, yes.

Q I believe you stated in your testimony that there were no structural impediments in the Pictured Cliffs formation in the San Juan Basin.

A In the area where the Pictured Cliff is at present producing, that is correct.

Q Are there any other types of impediments other than structural impediments? A Yes.

Q Going back again to Section 26, I believe you mentioned one dry hole in the southeast quarter of Section 26 of 27, 9 and your map, I believe, also shows another dry hole in the northwest quarter

of the same Section 26, is that correct?

A That is correct.

Q Do you or do you not believe that these two dry holes may have had some influence on operators attempting to extend the productive limits of the northern portion of the Huerfanito Unit to the south orwasit some type of surface impediment, I believe was your word for it.

A The dry hole in the northwest of that Section 2o, Township 27 north, 9 west was only shot, and shooting in that area does not seem to be sufficient stimulation for a good producer. I do not know how much the well made after shot. I feel sure that there was certainly no surface indication of any structure in that area, as the surface in that area is the Tertiary formation which does not adequately reflect deeper structure.

Q I believe you misunderstood my question. I asked you whether or not you believed these two dry holes deterred operators from drilling to the south of those wells as distinguished from what you testified as topographic impediments.

A I could not say what the topography would be immediately to the south of there, not having a topographic map, but they could have been a deterrent at the time to future drilling southward from the two wells.

Q You don't know whether any mountains or canyons are in there or not? A Not off hand, no.

Q Following the drilling of those two dry holes in Section 26, would you recommend to your company that you drill in 23, I believe you own that Section, do you not?

A Yes.

MR. SELINGER: You mean anywhere in Section 25?

MR. WARD: Anywhere.

A Yes, I believe the producer in the southeast there could be made.

Q Have you already made such a recommendation to your company?

A No, sir.

Q How long ago were those dry holes drilled?

A The ones in Section 25?

Q Yes. A I don't know off hand.

Q A year, two years? A I don't know.

Q Do you have the completion data of your well which is the Skelly No. 1-A Gentle, completion data?

MR. SELINGER: We have an engineering witness that will go into all the physical data and general statistical data of all the wells in that area. I don't believe this man can testify as much as our other witness will.

Q I believe you stated in answer to one of my questions that there were other impediments other than structural in the Pictured Cliffs formation in the San Juan Basin. What type of impediments did you have reference to?

A Well, the most obvious example, of course, is that there must be some sort of impediment around the edge for the Pictured Cliffs formation does outcrop all the way round it as gas is produced from the bottom of the structural sincline, and there has to be some sort of edge trap at least to stop the gas from all leaking out.

Q Is there any sort of impediment, so to speak, on the inside of the basin?

A At present none that we know of.

Q No impediment whatsoever? A No.

Q You are familiar that different Pictured Cliffs wells have different pressures in the San Juan Basin, do you not?

A Yes, sir.

Q Wouldn't those differences in pressure seem to indicate an impediment of some nature to the free flow of gas?

MR. SELINGER: We have a witness that will go into the pressures of all the wells in this entire area.

Q Then you don't know whether that is true or not, do you?

A No, I do not know whether there would be subsurface impediments to a free flow of gas.

Q You have testified and answered questions for your counsel, I believe, that all the fields were interconnected. Upon your most recent answer, you don't know whether they are connected or not?

A I feel that drilling between these areas when it is done, would be the only way to prove that it will produce or not.

Q But your company hasn't seen fit to offset any dry holes to attempt to prove that, have they?

A Well, we have lots of other acreage we haven't drilled yet either.

MR. WEBB: That is all.

MR. MACEY: Anyone else have a question of the witness? Mr. Smith.

By MR. SMITH:

Q Isn't it commonly accepted amongst geologists that there are certain lithological impediments in the Pictured Cliffs formation?

A No, sir. We do not recognize particularly that within the

producing area of the Pictured Cliffs that there are impediments to the production.

Q Do I understand you to say in your testimony then, with particular reference to your testimony concerning the approaching production in the Fulcher Kutz field and the West Kutz field, that in your opinion you consider those two areas to be a common source of supply? A Yes, sir.

Q Are you familiar with the differential and bottomhole pressures between the wells located in the West Fulcher Kutz field?

A No, sir.

MR. SELINGER: We have a man that will go into that.

MR. SMITH: I am just asking him.

MR. SELINGER: I am trying to avoid the long cross examination.

MR. SMITH: I want to have the witness tell me that.

A No, sir, I am not familiar with the pressures.

Q If you were familiar with those pressures, would the fact that there is a differential influence your opinion with respect to whether or not there was lithological impediment?

MR. SELINGER: We object because the witness said he did not know what the pressures are.

MR. SMITH: I think it is proper cross examination. If it please the Commission, may I be heard on the matter?

MR. MACEY: Yes, sir.

MR. SMITH: This witness has testified that it is a common source of supply to his knowledge he knows that, he says. I am testing his information as to whether or not the basis for his statement is based upon facts or based upon a mere guess on his part.

MR. SELINGER: Not based on pressures, he said he didn't know anything about pressures.

MR. MACEY: Will you restate your question as to the data you would like him to answer, if he can't answer it he can say so.

MR. SMITH: All right.

Q Mr. Clausen, you have testified that you consider the West Kutz field and the Fulcher Kutz field to be a common source of supply. You have testified also that you know of no barriers within the field within the Pictured Cliffs formation in the San Juan Basin that would prevent a free flow of gas back and forth. Assuming there were testimony in this case to the effect that there was a variance of bottomhole pressures in the West Kutz field from the bottomhole pressures in adjoining wells and nearby wells in the Fulcher Kutz, would that influence your opinion with respect to whether or not there was continuous communication?

MR. SELINGER: We object to that question. The witness has already stated that he did not know what the pressure was. I am not going to let the witness answer anything about pressures because he said he didn't know.

MR. WALKER: That is all he has to say, is, "I don't know".

MR. SELINGER: Mr. Smith is assuming a state of facts which circumvents that I don't know business. This witness is going to say he doesn't know because he actually doesn't know the pressures. He is not going to answer that question under any circumstances, Mr. Smith. We have a witness and I have told you before that we are just going to waste a lot of time. We have a witness who will answer all the questions.

MR. SMITH: Mr. Selinger, you are wasting time now. I

would like to offer this to the Commission. I am not going to be stubborn about the matter, but I submit to the Commission that this man was qualified as an expert witness and it is a rule of law that an expert witness may be tested on his knowledge to see whether he is an expert witness. I submit that this man doesn't know anything about anything.

MR. SELINGER: This man is a geologist, was qualified as a geologist. He is testifying about structure and nothing else. We have a proper witness to answer the engineering facts.

MR. MACEY: I agree that the witness is qualified as a geologist, and if he wants to limit his testimony or statements to his geological knowledge, that is the basis of his testimony. Does anyone else have a question of Mr. Clausen?

MR. GREINER: I have a few. A. S. Greiner, Southern Union Gas Company.

By MR. GREINER:

Q As geologist, you may not be able to answer this question, but does the manner in which a well is stimulated or whether it is stimulated or not, have anything to do with its shutin pressure or have any material effect upon what the initial shutin pressure of the well will be?

A Well, without having made a study of that, I can't say for sure.

Q If you don't know, just say so.

A No.

Q Do you know how many wells does Skelly have now in this northern portion of the Huerfanito Unit that we have been talking about?

MR. SELINGER: You mean that we participate in under the terms of the agreement?

MR. GREINER: That is right.

Q The one in which Skelly Oil and Gas Company has a participating interest under the Huerfanito Unit.

A Skelly has two wells under the Huerfanito Unit.

Q Do you know what the cost of those wells was to Skelly?

A No, sir.

MR. GREINER: Mr. Selinger, will your other witness or witnesses know about the cost of the wells to Skelly?

MR. SELINGER: I don't know, you might ask the other witnesses. I can't tell you whether they do or not.

MR. GREINER: It is a question that I intend to ask your other witnesses. I think it is pertinent to this matter. I would hope that you would have some witness available for that purpose.

Q In your opinion, would the wells in the northern portion of this area have done better or been better wells if they had been hydrofracted like those in the southern portion?

A We feel they would, yes, sir.

Q What has been the deciding factor then in not having them hydrofracted? Apparently they have not been although they have been completed sometime.

A They were drilled rather early in the time when hydrofrac was becoming common in the San Juan Basin, and we had recommended, but the company did not see fit to treat them that way.

Q Would it be possible to go back and retreat them?

A Probably.

Q But they have not yet seen fit to do so?

A No.

Q Have you, or has your office recommended to Skelly, that that be done?

A We have recommended that all future wells be hydrofracted, but our office in Albuquerque cannot recommend that they go back in them and hydrofrac them. It is not our department.

Q Are you familiar with the permeability characteristics of the Pictured Cliff formation through this area?

A All I know is that it is rather low.

Q Are you familiar with it as respects any possible variance or lack of variances between these producing trends that you have spoken to us about earlier?

A I have not studied any permeability figures of the Pictured Cliff formation in the area, but I feel sure there are variances in them.

Q Have you in your professional career, ever encountered or heard about any fields where there were, or let's say areas where there were permeability barriers between one producing zone or trend or area and another? A Yes, sir.

Q But you do not, not having examined the permeability data in this area, you are not then in a position to express an opinion to us as to whether there are or are not permeability barriers between these producing trends, is that correct?

A I can only say that I feel there are variations in permeability. I cannot state how much it varies or within what range.

Q I understood you to state that you thought there were no structural barriers in the San Juan Basin, at least in the interior

portion of it. Would a permeability barrier, in your mind, be a structural impediment as you use that term?

A I said that there would be permeability variations. I did not say there would be a permeability barrier.

Q I am asking you simply this, Mr. Clausen, would a permeability barrier be a structure impediment within the meaning of the term structural impediment as you have used it to us?

A No, sir.

Q So by saying there was no structural impediment, you were not intending to express an opinion as to whether or not there were or were not permeability barriers here?

A That is correct.

Q So your testimony is not to be taken that there are no permeability barriers between the producing trends, is that correct?

A That is right.

MR. MACEY: That is all.

MR. MACEY: Mr. Webb.

By MR. WEBB:

Q I see on your map what appears to be one location, one dry hole, and one producing well in the southeast quarter of Section 26, 27 north, 9 west. All of the maps that we have available show only the dry hole. I would like to know who owns the producing well. A Well --

MR. MACEY: What exhibit are you referring to?

A Exhibit 1.

MR. SELINGER: Exhibit 1.

A That, I am afraid that has come up as a shortcoming that I discovered in just a few days in that we have had a number of

drafting errors appear in the well locations on this map.

Q That producing well in the southeast quarter of 2e should be deleted then, should it not? A Yes.

MR. SELINGER: It is in the northeast corner of that section.

MR. WEBB: It is on the southeast of the one I have got.

A It should be removed from the southeast of that section.

Q There is only a dry hole in the southeast quarter?

A Yes.

MR. MACEY: As I understand it, the producing well in the southeast quarter is an error in the map on Exhibit No. 1?

MR. SELINGER: That is right.

MR. MACEY: Anyone else have a question of Mr. Clausen, Mr. Reider.

By MR. REIDER:

Q At the risk of being repetitious, I would like to get one thing clear in my own mind. Do you or do you not recognize a stratographic or lithologic barrier in this portion or any portion of the Pictured Cliffs?

A We have not in our work seen any definite lithologic barriers as yet.

Q In other words, you do not recognize any barriers either lithologic or stratographic?

A We have not seen any in the wells that have been drilled at present. There may be some dry holes here and there due to impermeable area zones, but certainly no extensive barrier has shown up that we have seen.

Q Localized, but not regional? A That is right.

MR. MACEY: Does anyone have a question of Mr. Clausen?

MR. KELLY:

Q Would you describe, Mr. Clarson, the characteristics of the Pictured Cliffs formation? Is it a complete sandstone? Is there any shale in the so-called formation or any other --

A Yes, sir, there are intermittent stringers of shale frequently even stringers of coal. It is a very fine grain dry salt and pepper sand.

Q Is the accumulation of gas in the very top of the so-called Pictured Cliff formation?

A Apparently the best production is the upper portion of the sand, yes, sir.

Q Is there any portion of the San Juan Basin area in which the sand is entirely missing in the Pictured Cliff formation?

A Yes, I think there is where it is missing insofar as its electrical characteristics go. Apparently there are zones to the very northern part of the state in which it shows up in the samples, but will not show on electric logs.

Q Do you know of any well in the general area under discussion here that was drilled but did not have any sand on the log as represented by the log that might have been run or samples?

A There are no areas in this map here under discussion where there was no sand whatever. There are some areas where there is very little sand, but none that I know of where it is entirely missing.

Q Is it possible in your opinion for there to be certain portions of this area in which there is absolutely no sand in the Pictured Cliff formation?

A It would be possible, but unlikely.

MR. MACEY: Anyone else have a question of the witness?

By MR. UTZ:

Q I would like to ask a question. On your Exhibit No. 2 I notice that you show an El Paso No. 2 Gentle in the southwest quarter of Section 26, 29 and 9 west; 27 north and 9 west. Do you know whether that is a completed well or not?

A That is one of the errors. That was, is to be in the southeast quarter and it is completed as a dry hole.

Q Mr. Clausen, in answer to one of Mr. Webb's questions, did I understand you to say, I think his question was in regard to proving an area in between the two producing areas. I believe you answered him, I would like to know whether I understood you right or not, that the only way you could determine whether that was a producing area or not was to drill it.

A That is correct.

Q Then would it follow that before you would declare that within pool limits, that it should be drilled to determine whether it was productive or not?

A I feel that would be the only way to prove that it was productive, yes, sir.

MR. UTZ: That is all I have.

MR. MACEY: Anyone else have a question of the witness?

RE-DIRECT EXAMINATION

By MR. SELINGER:

Q With respect to carrying on Mr. Utz' cross examination questions, I will ask you whether or not the well in Section 6, Township 26 north, Range 8 west, which is a Southern Union Starr, proves the link between production in the so-called north part

of the Huerfanito Unit and the south part of the Huerfanito Unit?

A I would say that it would indicate that there is not a zone which would be non-productive. That there is not a permeability barrier of great regional extent between there.

Q There is no barrier whatsoever between the north end of the Huerfanito Unit or the immediate vicinity and the south end of the Huerfanito Unit insofar as those two particular areas are concerned? There is no barriers either structural or from a permeability standpoint?

A There are no structural barriers, and from the evidence on the map, you could not say that there was a permeability barrier.

Q Immediately east of the Southern Union Starr in Section 4 there is a producing Pictured Cliffs well, is there not?

A Yes, sir.

Q And southeast two sections there is another recently completed Pictured Cliffs well?

A In Section 15, yes, sir.

Q And immediately southeast of that there is another recently completed Pictured Cliffs well? A In Section 23, yes, sir.

Q Are all those wells on the northwest southeast trend of the so-called north area of the Huerfanito Unit?

A Yes, sir.

Q And the well in Section 23, Township 26 north, Range 8 west has a diagonal southwest offset, does it not?

A In Section 27, yes, sir.

Q And that is in the Ballard Pool, is that correct, or do you know?

A I am not familiar with the outlines of the pools at present.

Q But there is consistent production from the southwest from the well in Section 23? A Yes, sir.

Q I will ask you then whether or not it is your opinion as a geologist, you feel that the north end of the Huerfanito Unit and the south end of the Huerfanito Unit is the same Pictured Cliffs pool.

A It is most certainly the same structurally, and we feel it is, until it has been drilled and proven otherwise, that it is the same zone.

MR. SELINGER: That is all.

MR. MACEY: Any other questions of the witness? Any questions, Mr. Webb?

RE-CROSS EXAMINATION

By MR. WEBB:

Q I believe you stated there is no way to tell, going back to Mr. Utz' question, whether the south part of the Huerfanito Unit and the north part are in fact one pool until wells have been drilled. According to your map there are wells in the north part and wells in the south part, and there are two dry holes intervening. Don't you give those two dry holes any credence whatsoever?

A The Magnolia well, for instance, made no attempt to complete in the Pictured Cliffs.

Q I am talking about the two dry holes in Section 26 drilled by Mr. Turner.

A Both of those were, well the one in the northeast does produce according to our information.

Q The one in the northeast and the one in the southwest are the two wells I have reference to.

A Well, the one in the northwest was only shot, true the one in the southeast was not only shot, but hydrofracted, but I do not know how much gas was made after the treatment. I know there are some wells which made enough after treatment to have produced as much as some wells that are on production in the Basin.

Q There was one well completed by Magnolia, I believe in this same unit, completed at an initial potential of 3700 M.C.F.; is that a commercial well?

A I am not qualified to say what is a commercial well. They apparently thought it was.

Q I believe you further stated in answer to Mr. Selinger's question, that there was no permeability barrier between the north part of the Huerfanito Unit and the south part of the Huerfanito Unit, isn't the only way you can tell whether there is or is not a permeability barrier, is by pressure?

A No, I would say the only way you can tell if there is a permeability barrier is to drill it.

Q How can you make that statement?

A There is no way to tell.

Q You have already admitted that you don't know anything about pressure.

A There is no way to tell whether the land in between couldn't produce until it was drilled.

Q There are two dry holes not producing.

MR. SELINGER: And one producing.

A We have dry holes over and surrounded by producers.

Q It appears to me that there must be some sort of barrier, but you say there is not.

A None that shows on our geologic picture.

MR. WEBB: That is all.

MR. MACEY: Anyone else? Mr. Arnold.

By MR. ARNOLD:

Q I just wanted to ask Mr. Clausen, I believe that they established a producing trend across the northeast quarter of Township 27, 26 north, Range 8 west, I believe there is a dry hole in the southeast quarter of Section 10, is that right, Section 9.

MR. MACEY: Section 9.

A It is in Section 9 on our map.

Q So you are aware there was a dry hole there?

A My information is that they did not even test the Pictured Cliff in that well.

Q It was drilled as a Pictured Cliff well?

A Yes, sir, but our information that was released, information that was released publicly that we get, they did not make a drillstem test in that well.

Q They must have based that decision on something after spending the money for drilling the well.

A Very likely like a couple that we made up here, we interpreted the electric log as indicating that it would not produce.

MR. ARNOLD: That is all.

MR. MACEY: Anyone else?

MR. GREINER: I have a couple more questions.

By MR. GREINER:

Q In this area that we are talking about here, let's take the northern area in the Huerfanito, what do the wells indicate to be the approximate gross thickness of the Pictured Cliffs section there?

I assume that some of these logs that are shown on your exhibits 2, 3 and 4, no, 3, 4 and 5, are probably in this area that you are talking about? A Yes.

Q Generally speaking, what is the total sand thickness in there, gross thickness?

MR. SELINGER: Give it by wells.

A Well, in the No. 2 Jernigan in the southeast of Section 24, Township 26, 27 north, 9 west, it is approximately 75 feet.

Q That is gross sand? A Gross sand, yes.

Q How much of that, or do you know how much of that would you attribute to be net pay?

A We have no way of determining net pay in the Pictured Cliff formation.

Q You have not then attempted to determine how much of that 75 feet is net pay? A No, sir.

Q There is no way of determining that?

A None that we have, no, sir.

Q These logs would not indicate the presence of the shale or coal stringers in or through that gross sand section so that you could determine that from an electric or other log?

A They will determine to a certain extent shale stringers, but gas production in the San Juan Basin now is believed to be often associated with the sand, shale interfaces, and often a section which shows numerous shale streaks will produce better than one that shows a solid sand.

Q Have you attempted to correlate the presence of the shale streaks or coal stringers as between the wells in the northern portion of the unit and those in the southern?

A No, sir.

Q So you don't know whether the intermittent beds of gas-bearing sand are or are not continuous, is that correct?

A No, I don't think that the density of drilling is sufficient to correlate those over that kind of distance.

MR. GAILHER: Thank you.

MR. MACEY: Anyone else have a question of the witness?

MR. [illegible]: I have one more question, please.

By MR. [illegible]:

Q Referring to Exhibit 2 in the Township 26 north, 8 west, in the southwest quarter of Section 6 according to your previous statement, if we should drill a well on the southwest quarter of Section 6 that would be the only way we could determine whether or not that acreage is productive or not, am I correct?

A Yes, sir.

Q If you drill a well there and got a dry hole, would you want to include that in the pool?

A Well, I am certainly not qualified to say whether or not one well should be in a pool or another.

Q You wouldn't want to declare the acreage productive if it were a dry hole, would you?

A Certainly the acreage around that well, if it were adequately treated, would not be productive, no, sir.

Q If it were not productive, it should not be in a pool limit?

A Well, I do not know what the Commission uses to qualify what should be in a pool and what should not be in a pool.

Q For your information, I can clarify that. We do not intend to include any dry hole acreage or dry acreage within the limits

on any pool. That was the point I was trying to make.

A I might make one statement, that the United States Geological Survey does not require that all the acreage within a field or a unit need be productive. That they may permit non-productive areas within a pool.

Q You wouldn't want to allocate gas to a dry hole, would you?

MR. SELINGER: That is the thing, you are not allocating any gas at all in the Ballard Pool at the present time. They are going on restricted 25% of open flow.

MR. UTZ: If this should become a part of South Blanco it would be allocated.

MR. SELINGER: I don't know anyone that is advocating that it should be a part of South Blanco.

MR. UTZ: If it is proved interconnected, it would be a part of South Blanco.

MR. SELINGER: I told the Commission, and I told you and the Commission at the start, our only point was to show that the south end and the north end of the Huerfanito was one pool. We had no recommendation as to pool nomenclature.

MR. UTZ: But you are trying to prove --

MR. SELINGER: (Interrupting) We are not, Mr. Utz.. We are not. We are just talking about the north end and the south end of the Huerfanito Unit and nothing else. We have no recommendation as to any other pool nomenclature.

MR. MACEY: What was your question, Mr. Utz?

MR. UTZ: I guess I am under a misapprehension then as to the meaning of the cross sections. I thought they were to prove continuous Pictured Cliff formation from the Ballard area across to the South Blanco area. Am I wrong?

MR. SELINGER: You are wrong.

MR. HOWELL: Was the Southern Union Starr Well No. 1 that you referred to within the limits of the Huerfanito Unit?

A No, the Starr well is outside the Unit.

MR. HOWELL: That is all.

MR. MACEY: Anyone else have a question of the witness? If not the witness may be excused.

MR. SELINGER: I want to ask a question.

RE-DIRECT EXAMINATION

By MR. SELINGER:

Q The well in the southeast quarter of Section 25, Township 27 north, Range 9 west and the well in the northeast quarter of Section 12, Township 26 north, Range 9 west, do you have those two wells spotted?

A The southeast of 25 and northeast of 12?

Q Yes. A Yes, sir.

Q Is the Southern Union Starr well lying between those two wells?

A Well, it is not on a direct line between them, no. But it is the only well in the zone between them, yes, sir.

Q The only two wells lying between those two wells are the Magnolia Well in Section 3 and the Southern Starr Well in Section 6, is that correct? A Yes, sir.

Q You say that in your opinion both of those wells are productive of Pictured Cliffs production?

A I feel that the Magnolia well is potentially productive.

Q And the Southern Starr is? A Yes.

Q And there are no dry holes between those two wells, are

there? A No.

MR. MACEY: Anyone else have a question?

CROSS EXAMINATION

By MR. REIDER:

Q Are you saying, in other words, that the production within the Huerfanito Unit is continuous from the north to the south?

A No, production is not continuous. There are numerous sections which have not yet been drilled.

Q In other words, the possibility of production --

A The possibility of production is there.

Q You recognize no barrier? A That is right.

Q Back to Mr. Utz' question, you are basing that, part of that statement on this Starr well? A Yes, sir.

Q That is outside the Huerfanito Unit?

A That is correct.

Q You are tieing up two pools, in other words, if the production is consistent across the Huerfanito Unit, then we have two pools coming together, is that right?

A I feel the Starr well shows that there need not be an impermeable barrier between the two zones, between the two areas of the unit.

MR. SELINGER: Actually to answer your question, Mr. Reider, you have the Ballard-Pictured Cliffs, the Aztec and the South Blanco-Pictured Cliffs on the Huerfanito Unit coming together.

MR. REIDER: That is what I wanted to bring out. It is a problem of dedicating acreage that might or might not be productive

to both or either one of the pools or all of them.

A Again I say, I cannot say whether a zone will be non-productive until it is drilled.

MR. MACEY: Anyone else have a question of the witness?

MR. SELINGER: That is all.

MR. MACEY: If not the witness may be excused.

(Witness excused.)

(Marked Skelly Exhibits 6 through 9, for identification.

BARTON W. RATLIFF

having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. SELINGER:

Q State your name. A Barton W. Ratliff.

Q You are associated with what company?

A Skelly.

Q What capacity? A Petroleum engineer.

Q Are you a graduate of an accredited school?

A Graduated from University of Oklahoma in 1950 with a B.S. degree in Petroleum Engineering.

MR. MACEY: His qualifications are acceptable.

Q Have you had occasion to make a study of the San Juan Basin insofar as this particular area is concerned, without going into the general entire San Juan Basin?

A As far as this particular area, I have had the occasion to study just the wells which are now producing and the pressure on the ones that are not producing, but are not completed in that area.

Q When you say that area, you are referring to Township 26,

27 north and Ranges 8 and 9 west, is that correct?

A In general, but not particularly. In particular, the areas A and B on the first exhibit.

Q And on the --

A (Interrupting) Plus a few other wells, but not the entire areas. We did not go into the wells in the South Blanco nor the wells in the Fulcher Kutz.

Q Or the Aztec?

A Well, the Aztec doesn't go down here.

Q You went outside of the areas indicated as area A and B on Exhibit 6 except insofar as a few wells which gave you some pressure information in Township 26 north, Range 8 west, which incidently includes the Southern Union Starr well, is that correct?

A That is true.

Q I hand you what has been marked as Skelly Exhibit 6 and ask you to state what that is.

A This Exhibit shows wells within the areas A and B, the locations and showing the latest seven-day shutin wellhead pressures on producing wells and the wellhead shutin pressures, the current wellhead shutin pressures on wells that are not yet connected.

Q How are they distinguished in their symbols?

A You have a double circle with your gas well designation which are a little darker on the exhibits.

Q Of wells that are not connected?

A Wells that are not connected.

Q What are the figures that you have under each location?

A On the nine connected wells you have the current wellhead shutin pressure, on the producing wells you have the latest obtained

wellhead, seven-day wellhead shutin pressure.

Q Areas A and B as you have designated on Skelly Exhibit 6 includes the Huerfanito Unit and the area immediately adjacent to it, is that correct?

A It includes part of the Huerfanito Unit, but not in its entirety, not all of it.

Q In other words, it has information on the portion of the Huerfanito Unit and acreage lying outside the Huerfanito Unit?

A Yes.

Q The area A is the northern part and area B is the southern part, is that correct?

A Southern part of the two, well the area A is the northern part, a portion of the northern part of the Huerfanito Unit is in area A and a portion of the southern part of the Huerfanito Unit is in area B. There are also wells located outside the Huerfanito Unit on this exhibit.

Q I will hand you what has been designated as Skelly Exhibit 7 and ask you to state what that is.

A This is a pressure map showing the original shutin pressures and the number of days each well was shutin prior to taking this pressure, and also the date each well was completed.

Q Mr. Ratliff, in your study you came to Santa Fe and looked over the records of the Commission with regards to pressures, did you not? A Yes.

Q Did you also have an occasion to be out in the field in this immediate area? A Yes.

Q You didn't attempt, did you, trying to determine the pressures of all the wells in the South Blanco, all the wells in the Aztec,

or all the wells in the Fulcher Kutz insofar as the Pictured Cliff production is concerned?

A I only obtained pressures on wells in the area A plus one additional well in Section 18 of 27 north, 8 west, plus wells in Townships, well in Township 26, Ranges 8 and 9, part of which are in the Ballard-Pictured Cliffs and the others which are in an undesiganted pool.

Q The limited purpose or scope of your study was for the purpose of determining whether or not the pressures in the southeast portion of Township 27 north, Range 9 west and the northeast portion of 26 north, Range 9 west, what the pressures were of those two particular areas, is that correct?

A I tried to determine if they were comparable, which would indicate a common source of supply.

Q Your purpose was not to determine whether or not the pressures in the Ballard-Pictured Cliffs were comparable for example with the pressures in the Fulcher Kutz?

A No, I made no comparisons in that respect.

Q You made no comparisons with the South Blanco-Pictured Cliffs which lies east of Range 8 west in Township 27 and 26 north?

A No. I didn't.

Q I will hand you what has been marked as Exhibit 8 and ask you to state what that is.

A This is a well data on the wells in areas A and B, which I think is self explanatory.

Q It gives the original shutin pressure and the shutin time in days, does it not? A That is right.

Q It gives the latest deliverable test on the 7-day shutin

pressure time.

A It shows, to review the original shutin pressure, the number of days shutin, I.P. of each well, the type of completion, whether shot with sand, oil or both, the date completed, the latest and in this particular case, the only deliverability test taken on these wells, reflecting the 7-day shutin pressure, the deliverability and the date each shutin pressure was taken, plus the accumulative production, accumulative time since connection as of 3-1-55, overall average production rate since connection in M.C.F. per day, and the wellhead shutin pressure P.S.I.G. of the wells that have not been connected with the exception of one which wellhead shutin pressure could not be obtained.

Q What does the exhibit show, the pressure of the two areas in which we allege there is one Pictured Cliffs Pool? What is the average pressure in area B and what is the average pressure in area B on Exhibit 8?

A The arithmetical average which is about all we can go by here, is 558 pounds for the area A, 537 pounds for area B. These averages were calculated from 7-day shutin pressures and not the wellhead shutin pressures on the wells not connected, only on producing wells.

Q You don't attempt to take in the Ballard-Pictured Cliffs that lies south of the south line of area B on Exhibit 6, do you?

A No.

Q Your purpose is solely to connect areas A and B insofar as pressures is concerned?

A It is to show connection, that is true, as far as the pressures are concerned.

Q It might possibly be that if you took all of the pressure

computation of the Ballard-Pictured Cliffs, you might have a different result? A That is right.

Q But insofar as these two areas are concerned, the two closest areas A and B, these are the pressures of the wells that you were able to ascertain their pressures?

A That is correct.

Q I will hand you what has been marked as exhibit, Skelly Exhibit 9 which is indicated as general data on areas A and B in line with the information disclosed on Exhibit 8 and the general summary on Exhibit 9, what is the average 7-day wellhead pressure in area A and in area B?

A As stated before, the average shutin wellhead pressure in Area A is 558 and in area B, 537.

Q A difference of twenty-one pounds?

A Yes, sir.

Q What is the highest 7-day well shutin head pressure in area A and highest in area B?

A The highest 7-day shutin pressure in area A was 640 pounds found in the El Paso Natural Gas H. L. Gentle No. 1, located in the southeast quarter of Section 25. The highest wellhead pressure in area B is 599 found on El Paso's Payne No. 1A located in the southwest quarter of Section 13, 26, 9. The date each of these pressures were obtained coincided November 23, 1954 as taken from the deliverability test submitted to the Commission.

Q You have 22 wells in area B producing as of March 1st, is that correct? A That is correct.

Q The accumulated gas production as of that date, you have indicated, is a little over a billion cubic feet, is that covering

all the 22 wells, or are there some wells that you were unable to secure the cumulated figure?

A That is the cumulated production from the 17 wells. Five of the wells were connected subsequent to this date. However, no record of production could be obtained.

Q Those five wells are indicated on Exhibit 8, is that correct?

A That is correct. On that cumulative production you have no record, M. K.

Q Mr. Ratliff, the pressure of the wells of the four wells that you have that are outside of area A and B, referring to Skelly Exhibit 6, the well in Section 6 of 26, 8, what is the pressure?

A The wellhead shutin pressure was taken on this well May 11 and it was recorded as 690 pourds per square inch gauge.

Q Is that pressure higher or lower than the pressures to the northwest and southwest?

A It is higher than the pressures in either direction.

Q Is there generally a gradation of pressure to the northwest generally in this area?

A Well, generally in the San Juan Basin as a whole on all the Pictured Cliffs wells there is a gradation of pressure to the north and a decreasing pressure to the northeast as reflected by the Commission's pressure map presented in previous hearings.

Q Decreasing to the northeast or southwest?

A Increasing to the northeast. Decreasing to the southwest.

Q That is a general observation that you have made, but your study is restricted to this area as outlined on Skelly Exhibit 6?

A That is true.

Q In your general observation, do you find variation of

pressures within wells of area A and within wells of area B?

A Yes, these pressures, the 7-day pressures vary from the lowest being 507 pounds, the highest being 599 pounds. However, as you will note on Exhibit 6, the pressures, the lowest pressure was obtained 3-8-55 which is three months later than the 599 pound pressure. Had these pressures been obtained at an earlier date they might have been greater. That is the range 504 to 599. The range in the north portion area A is from 475 pounds to 604 pounds. Let me make a correction in area B, you do have a pressure of 444 pounds which I think might be an error. But that could be correct, I don't know for sure.

Q But insofar as the arithmetical average of pressures in the wells in area A and area B, there is a 21 pound difference, is that correct? A That is correct.

Q In your opinion is that sufficient to indicate from a pressure standpoint, that the two areas are not the same pool?

A I would not say it would mean the well could not possibly be in the same pool because there are greater differences between other pools varying from one pound to oh, three or four hundred pounds. So difference in 21 pounds is not unusual within one pool.

Q Would you say then that the 21 pound differential between area A and B is of sufficient magnitude to indicate a separation between the two? A I would not think so.

Q I will hand you what has been marked as Skelly Exhibit 10 and on this map you have indicated a broken red line. Will you explain that?

A This map was an original pressure map prepared by the Commission, showing the initial pressures on all wells in the Pictured

Cliff Pools. All I have done here, and at that time I assumed that Mr. Arnold when he recommended the delineation of these pools, that he based it somewhat on the pressure distribution. Well, in this one particular case where we have wells that have been shut in, in some cases probably seven months since completion, and the pressures on these wells, they are not listed on these data sheets, but they are on a couple of the exhibits, have decreased in the case of the Southern Starr Well two pounds, increased in the, I think that is a Newsom well of Benson Montin, increased from 700 to 719 and there have been two completions here since this map was drawn.

Based on these four pressures, I have drawn the dotted red line which is just a correction on the 700 pound contour showing how it spreads out here.

Q Based on the information of those four additional wells, you have widened that area there insofar as the pressure contour is concerned?

A I have just moved this contour is all I have done.

MR. SELINGER: I might say that the other red lines will be explained by Mr. Clausen. We would like to offer into evidence Skelly Exhibits 6 through 10 inclusive.

MR. MACEY: Without objection they will be received in evidence. Any questions of the witness? Mr. Webb.

CROSS EXAMINATION

By MR. WEBB:

Q I believe you stated in these exhibits, Exhibit 8 and Exhibit 9 stated that you have taken an arithmetical average of the shutin pressures of the wells in areas A and B?

A That is correct.

Q This arithmetical average according to your testimony, is very slight?

A It is 558, not particularly slight. What do you mean slight, you mean the difference in the average in both areas?

Q That is right. A 21 pounds, yes.

Q According to your testimony, that is a very slight difference of no consequence?

A It could be of some consequence depending on the volume of the reservoir you are speaking of. Looking at other areas, I think it would be of little consequence.

Q Directing your attention to area A, how long have wells in that area been producing?

A Wells in area A. Prior to the shutin pressure Skelly G. R. Gentle had been producing 331 days. J. G. Turner, which was a Skelly well now in the Huerfanito Unit had been producing 68 days prior to obtaining the pressure. The Aztec Jernigan Well, 441 days prior to obtaining the pressure. Turner Magnolia Curley had been producing, the El Paso Natural H. L. Gentle had been producing 232 days. Turner Magnolia Curley had been producing 95 days, and the J. G. Turner Gentle had been producing 277 days prior to the taking of these shutin pressures.

Q I might not understand the Exhibit 8 then. It said accumulated time in this column over here. A Since connection.

Q Since connection.

A That is the number of days each well has, that is the time elapsed since the connection date. Up to 3-1-55. Not necessarily the time produced prior to shutin pressures.

Q Where is the total productive time if it isn't shown?

A It is. I shouldn't have given you the information. I will answer the question as you meant it, 486 days. Is that what you just asked me, the number of days each had been on production?

Q That is right. That is the wells in area A. Now, directing your attention to wells in area B, according to your figures they vary from 182 down to 10? A Yes, that is correct.

Q Isn't it true that wells remaining on or being on production as much as 486 days would have a pressure drop in excess of the wells that have been on production for ten days?

A Well, in this case we can't compare because we don't have a shutin pressure of a well that has been on production ten days.

Q What is this well --

A (Interrupting) Excuse me. We don't have the shutin pressure is what I meant. The deliverability test has not been run on the well that has produced only ten days.

Q I will take another one, seventeen days.

A Well, you don't have a shutin pressure on that either.

Q The net of it is you don't have too much data?

A The net of it is that we have a lot of data but only on producing wells, wells that have been on production. You can't take a well that is producing seventeen days and tell too much from it.

Q The wells that have been on production as much as two or three times longer would have a pressure drop in excess of wells that haven't been on production so long, isn't that true?

A That is not true. It depends on the amount of the volume of gas that has been produced and the rate at which it has been produced. It is a number of variables in that particular case where you couldn't have, well say, that just because --

Q (Interrupting) Have you taken --

MR. SELINGER: (Interrupting) Let the man finish.

A I am ahead.

Q Have you taken into account all the variables in your arithmetical average?

A I have not taken into account any variables. I am taking only what we know. The variables -- in this case when we talk about variables we talk about downstairs, and in this case we know exactly what is at the wellhead. That is all we can base this on.

Q You used the word, I didn't. I don't know what you mean by the word variables, but apparently there is something that you didn't take into account in arriving at your arithmetical average.

A I didn't say I didn't or did take any variable into account on arriving at the average. I simply took the pressures and totaled them and divided them by six in one case, and seventeen in the other.

Q I am not attacking your qualifications as an expert, but how long have you studied the Pictured Cliffs formation in the San Juan Basin?

A I would say around, when we say the Pictured Cliffs in the San Juan Basin, that covers quite an area. I haven't studied any of the San Juan Basin except with the exception of this particular area.

Q How long, was my question. A In this area?

Q Yes. A Oh, about three weeks.

Q You know how long it takes for a Pictured Cliff well in the San Juan Basin to build up to its maximum pressure?

A I wouldn't know, no. We have not tested one.

Q Have you tried to find out?

A Oh, I have heard that it takes in excess of five to seven months or more. I don't think there has been extensive work done on that particular item, as to build up test and time required to shutin pressures, because it is required to equalize reservoir pressure.

Q Have any pressure test, pressure build-up tests been taken in Skelly's wells in this area? A No, they have not.

Q Then you are relying on this seven day shutin pressure one hundred percent?

A It looks like that is about all we have to rely on in this case. That is all you have to compare is what you see.

Q Have there been any build-up pressure tests taken in the Ballard-Pictured Cliffs Pool that you know of?

A There -- not that I know of. It could have been.

Q But you haven't attempted to find out?

A Not from all the operators, no.

Q How many operators are there in the Ballard-Pictured Cliff Pool? A I don't have any idea.

Q How long has the No. 1 Starr been shut in?

A No. 1 Starr?

Q Southern Union well, continuously shut in.

A Continuously shut in, 161 days.

Q Was that continuous?

A To the best of my knowledge it is.

Q You don't know whether or not they opened that well periodically to blow off liquids and take a test and so on and so forth?

A I feel sure they didn't. The Commission requires certain pressures. This one was over the ones they required, and they were

told that this well was shut in 11-1-54 and that it hasn't been blown off since that date.

Q Have you checked with the operator, Southern Union?

A I assume that they checked with the operator. I personally did not.

Q You don't have any personal knowledge?

A I have personal knowledge. I have a copy of a letter here from Mr. Arnold in which he sent me the dates these wells were shut in. I assume that he got them from Southern Union.

MR. MACEY: Anyone else have a question of the witness? Mr. Greiner.

By MR. GREINER:

Q Do you have any opinion, Mr. Ratliff, as to the reserves either absolute or relative, as between the wells located in these two areas A and B? A No.

Q So that you are not in a position to say then whether or not the same percentage of the total reserve in these two areas has been withdrawn to date?

A I couldn't say that for sure, no.

Q Does the pressure today as compared to an initial pressure, does the amount of pressure drop tend to vary with the proportion of the total reserves withdrawn?

A I have not made any calculation on that particular item. I just --

Q (Interruoting) I am talking as a general matter.

A As a general, I would say there is quite a bit of variance in that data.

Q I am not sure I understand your answer. I am asking you this,

as a greater proportion of an areas reserves are withdrawn, does the pressure tend to decline?

A As a greater portion of the areas reserves are withdrawn. What do you mean, the greater portion? You mean in respect--

Q If you withdraw 50% of the areas reserves, would you expect to find a lower pressure than if 2% had been withdrawn?

A I would expect to find a lower pressure.

Q In fact, is not pressure decline one of the most commonly accepted engineering techniques of determining reserves?

A That is true.

Q If they have a long enough producing history?

A That is correct.

Q So that in the absence of any information as to what proportion of these two areas reserves have been withdrawn, the figures as to present pressure mean very little as to what the initial reserves were, is that correct? Let's just assume that area A has been in relation to the total reserves, has been pulling out three times as fast as area B. Would you not expect to find a greater rate of decline in pressure in area A than in area B?

A It depends on the area you are draining.

Q Well, how about these areas, do you know?

A Well, I am not sure just how much each well is draining. It might be 160. It might not be. It might be greater.

Q So that you cannot say that these figures on present average pressures represent pressures of areas in an equal state of depletion, is that correct, or relatively equal state of depletion?

A I would say that just observing these, the cumulative production from each area as shown in Exhibit 9, area has produced

one billion, area B has produced one billion, area A has produced two hundred, roughly two hundred fifty million.

Q Well, of course, there is a considerable difference in the number of wells and also the area covered by those wells, is there not?

A There is not that much difference in the number of wells. The ratio as far as 17 to 6 is not even three times the ratio of production, is greater than three times.

Q Turning over to the fifth column on this Exhibit 8, the one where you show original pressure data, I refer you to the wells in area A and ask you if there appears to be any well there whose initial pressure was somewhat out of line with those of the remaining wells in the area?

A I would say that the five -- on the well out of line, do you mean comparing the value of each?

Q What is the difference in pressure between the Aztec's Jernigan well and the next lowest pressure which you find there?

A 599 and 688 would be --

Q (Interrupting) 89 pounds. A 89 pounds difference.

Q What is the difference between the 688 pound well and the highest pressure well that you found in that area?

A Well 688 and 719 would be 31 pounds.

Q In other words, there is approximately three times as much difference between the lowest and the next lowest as there is between the next lowest and the highest, is that correct?

A Oh, that is correct, but you notice the shutin times vary.

Q I notice that the well immediately above the Jernigan well on the tabulation was shutin one day as compared to three, and had

101 pounds greater pressure. That is correct.

Q Is that the way it reads to you?

A That is correct. The one thing you have to consider in comparing the original pressures is the amount of gas blown during completion. There was no way for me to obtain this information, but that factor should be considered. The well is blown say 12 hours, another well is blown a day and a half. Of course it would take longer, you would have a lower original pressure.

Q Would you say that low original pressure would then carry over through some 230 days of production?

A Well, as you see on your 7-day shutin pressure, it is still lower than all the rest, which means it is not particularly out of line.

Q Well, now, it is **again** rather materially lower than any of those than are shown in area A on the 7-day shutin pressure, is it not?

A That is correct. It is only 475 pounds.

Q The variance is approximately the same as it was in original shutin pressure? A Yes, approximately.

Q Could the presence of fluid in the well result in an abnormally low reading in taking a shutin, in our taking a 7-day?

A It could. But in that same respect it could in the wells on the south end in area B. In fact, on a lower productive well you would have less fluid, tending to come into the well bore.

Q Do you find in area B as wide a variance within the area as you do in area A?

A Well, if we consider this 444 pounds we would.

Q I am sorry, I was looking on the original pressure column.

You do not, do you?

A No, you don't find that much variation. However, the Jernigan well is probably, it is a low capacity well, very low permeability. It is a possibility that well might have been blown off quite a bit and that pressure is not representative at all.

Q Have you attempted to recompute your averages, leaving the rather anomolous Jernigan well out of the picture? That is to say, what would the average pressure of 558 pounds be of the 7-day test on the area A wells if you left out the Jernigan?

A I haven't calculated that.

Q Would you think that the calculation that I have made of 574 pounds would be approximately correct?

A If you calculated it right it would be.

Q That would then represent a considerably greater variance between the area A and area B wells, that is by the unadjusted figures as presented in Exhibit A?

A We are trying to get an area average, at least the area surrounding the producing wells. You can't throw one well out and call it an average.

Q If you are trying to obtain a general picture of the area and you find one that is particularly unusual, would you not say that the median of the situation would be perhaps more representative than purely the arithmetical average would mean?

A Well, you can't tell how, at this time, that formation is out there. You don't, well of course if you do throw it out, the pressures will be higher.

Q Thank you, that is the point I was trying to make.

A You made that in statements by yourself.

Q Turning to the deliverability test and the deliverabilities indicated in M.C.F. per day, your Exhibit A indicates that all of those in area A were shot?

A That is true.

Q And those in area B, only four of those wells were shot. It is hard for me to track them across all the way, but coming down the column, I see one that shows to have been shot with a 429 M.C.F. per day deliverability, and one with 486, and one with 271. Do you identify the figures to which I am referring?

A Yes.

Q Am I correct in my conclusion or observation, that each of those four wells is higher than any of the wells in area A with the one exception of the Skelly G. H. Gentle well?

A Well, that observation is correct.

Q If these areas were fully interconnected homogenous below, would you expect that the deliverabilities would be in approximately the same range?

A If it were ho --

Q Or would you expect them to have as wide a variance as we observed here between the two areas?

A If it were homogenous which it is, and the permeability the same which it is not, you should have the same deliverabilities in either area, I would think.

Q You say there were variances in permeabilities within these areas?

A I would think so.

Q How about between these areas, would you expect there to be any variance in permeability there?

A I am sure it is.

Q Of significant size?

A What do you mean significant?

Q Well, enough to make the difference between a commercial and non-commercial well.

A Well, I don't think there is any way of telling just how the permeability is going to vary since you do have these. There is no way of knowing. It could, it could have an isolated barrier.

Q You heard Mr. Clausen's testimony about the trends in production that he is talking about, and he was saying, saying there is no structural barrier between them. Are you in position to state to us whether or not in your opinion there is a permeability barrier between them?

A Well, I wouldn't say it was a permeability barrier extending east to west all the way across that area.

Q Are you saying that you can't say there is one, or that you -- A (Interrupting) I can't.

Q (Continuing) -- or simply cannot say there is not one?

A I can't say either.

Q You do not know, is that correct, or have no opinion?

A You have no way of knowing what the permeability is in the section that hasn't been drilled. The Pictured Cliffs varies so much you can't tell what you are going to have from one location to the other.

Q You don't have such information based on the remainder of the Pictured Cliffs Pool in the San Juan area to carry over data from those other areas to this area, is that correct?

A Well, I hadn't made any comparison of the two.

Q In this three-weeks period which comprises your study of the area, you hadn't gotten that far into it?

A I just noticed the difference in pressures in the other areas which was my primary concern as to the wellhead shutin pressures which vary appreciably in the other areas within the

delineation of one pool or any of the pools. You have a varying pressure from one to two to three hundred pounds. I imagine I could pick you some out up here within the same pool where you have two or three hundred pounds difference.

Q I want to go back now, if I may, to ask you some of the questions I asked Mr. Clausen and see if we can get the information on them. I asked Mr. Clausen, I ask you also, whether or not the method of stimulation of a well upon its completion, or whether or not it was artificially stimulated, will materially affect its initial shutin pressure in your opinion?

A Well, now comes the question, of course if you have the same, if you stimulate a well by hydrofracting it it depends on how much you blow it off. You might produce a 24 hours in blowing it down. Of course, you would have a different shutin pressure the same length of time, where if you would shut a well, if they blow it off two hours you might have that same pressure seven days.

Q Are you aware of anything which would tend to indicate that these hydrofrac or sandfrac wells in area B have generally speaking been blown longer upon completion of the stimulation than were the wells in area A, or vice versa? A I do not know.

Q Mr. Ratliff, are you familiar with what the cost of these wells has been to Skelly?

A I have not made a study of that.

Q Would such information be readily obtainable, or would you be willing --

A We could furnish you with any information you would like to have as to any cost.

MR. SELINGER: These two wells were drilled below 6,000 feet

and plugged back to the Pictured Cliffs. It would be hard to give you the dope. We will be glad to give you the information that you want.

Q Are you familiar with the terms of the Huerfanito Unit agreement?

A I am not familiar with it.

Q So that you don't --

A (Interrupting) I have no interest, at least of course I have interest, this company does, but I have not discussed the Huerfanito Unit in detail, and I could not give you any possible accurate information as to any terms in the agreement.

Q So that you don't know whether the entire cost of drilling the wells to the 6,000 foot level would or would not be cost to which the other operators would have to contribute under the terms of the unit agreement, or whether they would be required to contribute only a portion of it down to the Pictured Cliff?

MR. SELINGER: We wish to object to that question. The witness said he didn't know the terms of the --

MR. GREINER: (Interrupting) I will withdraw the question.

MR. SELINGER: As we particularly said at the outset, this is a nomenclature hearing and we didn't expect to go into the unit agreement.

MR. GREINER: To me the information is rather pertinent in this hearing. I would like to request that the information be made available and on this theory, Mr. Selinger, that if the treatment afforded the parties in this hearing by the Commission, is of material financial advantage or disadvantage to any of the parties, it seems to me a matter tending to go to the bias of all their

witnesses, and their entire position in the case, and is a matter which is properly and should be properly brought to the Commission's attention for their consideration in weighing the sincerity and honesty of the contentions put forward.

A That is why I am under oath.

MR. SELINGER: As long as this is a hearing on nomenclature, we don't think the material on the cost of drilling wells is pertinent. As a matter of fact, we don't think the Huerfanito Unit Agreement is any part of this hearing. We think this is exclusively a nomenclature hearing and nothing else. Therefore, the cost of drilling the wells and what the agreement says or doesn't say is no parcel of this hearing. This is a nomenclature hearing only. We presume everybody is going to present the correct information as to nomenclature to the Commission without respect to bias.

Q Mr. Ratliff, do you know why Skelly petitioned the Commission to hold this hearing?

MR. SELINGER: We object to that question. We asked the Commission, we didn't file the original application. The original application was filed in March for the April hearing to extend the Ballard-Pictured Cliffs to take in a portion of the Huerfanito Unit, and we opposed it at that time on the grounds that the extensions did not include all of the one pool.

MR. MACEY: What was your question?

Q Do you know why Skelly Oil Company filed its request in this case that the Commission initiate a nomenclature hearing?

A All I was asked to do was prepare the pressures and show the comparison and show the connection.

MR. SELINGER: We didn't initiate the nomenclature hearing.

A I don't know anything about that angle, in particular.

MR. SELINGER: Actually I initiated it.

MR. MACEY: Mr. Greiner, Mr. Selinger's letter is in the case file in this case.

MR. GREINER: I was trying to arrive at the motivation behind the letter. If Mr. Selinger is in a position to state that to us as attorney of record.

MR. SELINGER: I will be glad to.

MR. MACEY: I think it would be appropriate for us to know the facts.

MR. SELINGER: I don't think it is pertinent. I have objected to it, but I don't mind arguing with you. In this particular area you have wells classified in the South Blanco, the Aztec and the Ballard-Pictured Cliffs. This hearing was originally started on the part of the Commission, not on our part, wherein they were extending south to extend the Ballard-Pictured Cliffs into the Huerfanito Unit for the first time. In addition to those three classifications you have wells that are unclassified. In addition to that you have got wells in the south end that are producing in area B for example, in the last three months they produced over six hundred million cubic feet of gas. The north end is being classified in the Aztec and South Blanco-Pictured Cliffs and prorated. Our policies have always been throughout the State of New Mexico, that wherever a common pool is present we think that everybody in that pool should be treated alike.

It is our point that you have a pool part of which is prorated and part of which is not prorated, and therefore that is what motivated us from objecting to the original application to be held on

April 20 for extension of the Ballard-Pictured Cliffs into this unit. Heretofore we had no interest in the Ballard-Pictured Cliffs. We have an interest now in that we think that the pool is one pool, a portion of which is prorated and a portion of which is not prorated. It has been our policy to have everybody in a common source of supply treated alike.

Q Mr. Ratliff, in the light of Mr. Selinger's statement of position here, do you feel there is any drainage at the present time as between area A and area B?

A I would not think there would be any drainage between the two areas.

Q So that --

A (Interrupting) I wouldn't say there would not be either.

Q In the future, but you do not see any now. So --

A (Interrupting) It is pretty hard to tell unless you take interference tests over a period of time, exactly what is draining what.

MR. GREINER: That is all.

MR. MACEY: Anyone else have a question of the witness?

MR. HOWELL: Mr. Howell, representing El Paso Natural Gas Company.

By MR. HOWELL:

Q Referring to Skelly's Exhibit 8, Mr. Ratliff, I will call your attention to the Aztec Jernigan Well in area A. Now, the date of completion of this well is in June 20, 1952, therefore the first well completed in the entire pool, is it not?

A That is right.

Q And the actual amount of production up to March 1, 1955 was

almost the smallest of any well that you have listed there, was it not?

A That is correct.

Q So that it would be a fair statement, would it not, that this well is not representative of wells in either group?

A Well now, you have the same difference in the cumulative production. For instance, in the J. Turner Crandell Well you have a 159 million feet that is produced as compared in that same general area, 56 million, which is a difference of one hundred three plus a million. Whereas, the four million produced from the Jernigan Well is comparable as much so as that down there in the area B.

Q Well, actually the first well completed in there has next to the lowest cumulative production of any well in the field, hasn't it?

A Well, what field are you speaking of now? You mean in the area A?

Q I mean in all the areas, area A and B. There is one well --

A (Interrupting) No, you have wells down here, one, three million one hundred ten cumulative production.

Q That has been producing ten days?

A That is correct.

Q So that there seems to be a great deal of difference between these Jernigan Wells and other wells that are under consideration? Isn't that a fact?

A Difference with respect to cumulative production, but you can't very well remove it from area B, it is there.

Q From area A you mean.

A Area A, excuse me.

Q If you take the average original pressures of all the wells in area A, what is the average of all of them?

A Haven't calculated that because I don't think it could be used in making any comparisons since they were completed on different dates.

Q I have attempted to calculate and reach the figure of 190.1, would that appear to be reasonably correct?

A It is reasonably correct if you take the six figures and total them and divide by six, it is not a comparable pressure as to any one date which is the only time you can compare pressures.

Q It was the initial pressure when this well was first completed, was it not? A That is true.

Q Then, if you eliminate the Jernigan well and you have five wells, you have a total of 3,542 and divide that by five you come up with a result of 708. Would that appear to be a correct arithmetical calculation?

A Well, if you calculated it correctly.

Q So that then comparing the average of the wells other than the Jernigan in area A with the initial pressures in area B, there is a substantial difference of 50 to 75 pounds, is there not, in the initial pressures?

A I haven't calculated the averages in area B, so I can't say.

Q If you will look down the list, I believe you will find that the highest pressure is 666 of any one well in area B, is that correct? A That is correct.

Q After wells are tied into the line and produce against a line pressure, they do tend to level off, do they not, as to the wellhead pressures?

A Well, they are producing against the same pressure, you

would think they would.

Q Are these wells in area A and B producing against the same pressures?

A I am not positive what pressures they are producing against.

Q Is there more than one line there that they are producing into?

A I think you have two different lines for the two areas; El Paso might know that.

Q You wouldn't purport to say there is any difference in the line pressures that they are producing against?

A Not unless I went up and checked them myself.

Q At this particular hearing you are not prepared to state that there is any difference? A No, I am not.

Q Where wells are producing into a line with the line working pressure, the wellhead pressures of the wells over a period of time will level off, will it not?

A The producing wellhead pressure of the well would level off in some cases if it is a strong enough well. I understand, I don't know for sure, that there is quite a bit of variance in the actual volumes produced against a constant pressure. I am not positive of that.

Q Any leveling tendency would not be counteracted by just a seven-day shutin, would it?

A What do you mean counteracted?

Q Well, it wouldn't build back up to the full shutin pressure within seven-days will they? A I wouldn't think so.

Q So that a pressure taken after seven days shutin will necessarily show a leveling effect between wells that have been

producing against the same working pressure in the pipeline, won't it?

A I wouldn't think so. I don't think that has any bearing on it. I would think it depends on the volume that was producing prior to shutin, and the time it had produced.

Q Did you give any consideration to the volume that had been produced and time produced when you figured these arithmetical averages?

A I didn't consider that. If you had considered the rates, you will observe --

Q (Interrupting) You can answer the question. You didn't give any consideration to those factors in making these arithmetical averages, did you?

A No, I just made arithmetical averages. I don't think those factors can be considered with any accuracy.

MR. MACEY: Any other questions of the witness?

MR. UTZ: Yes, I will ask one question.

By MR. UTZ:

Q In order to get off on the right foot, I would like to make an inquiry as to the purpose of Exhibit 6.

A Six?

Q Exhibit 6 and 8. A What does it show?

Q Area A and area B?

A Well, one purpose was to show the seven-day wellhead shutin pressures, and to show the comparison in the wells that have not produced, showing their wellhead shutin pressure and the date taken.

Q Was the purpose of it to be construed that the purpose of it was to show that area A and area B were in the same formation,

same producing area?

A Well, you would on the more or less producing area. I am not saying all the area within each area is productive. I would say the areas on which there are wells is productive.

Q Why did you show the average seven-day pressures in area A versus the average seven-day pressures in area B?

A To make some comparison, I don't know of any other way to compare the two.

Q Why were you comparing them?

A To show that they could be andprobably are in the same reservoir.

Q Then why did you use seven-day shutin pressure rather than original shutin?

A Because the seven-day shutin pressure would be more comparable. An original shutin pressure, you can't compare one original shutin pressure with the other without considering the volume produced during that interval of time between taking the two pressures.

Q I notice in area A all those wells were completed in 1954.

MR. SELINGER: Area A.

A Well, most of those were completed in '53.

Q The date the pressure, shutin pressures were taken?

A The date the shutin pressures were taken too, and that is something to point out in Skelly G. R. Gentle No. A and the Turner No. A. The shutin pressure was taken a year prior to the shutin pressures taken on area B, which in that case I gave no consideration to volume produced during that time interval, which would undoubtedly draw these pressures down considerably. I think that would be in our favor as to average pressure. That is to bring them

closer together.

Q Are you aware, I am sure you are, that in a smaller volume well, which usually is lower permeability well, it takes a longer time to build up pressure? A In a lower?

Q Reservoir pressure.

A In a lower volume well, it also depends on the amount of volume you have been taking out of it. That is not necessarily true.

Q And the seven-day pressures would not necessarily be representative of the original pressures?

A Let's repeat the previous question and then go into the second question again.

Q The previous question was this, I asked you if you were aware of the fact that a lower permeability well, a well which had a lower permeability which usually is a smaller well, in seven-days it will not build up as near a stabilized reservoir pressure as a higher permeability well or larger?

A I disagree with you on that, it is determined by the volume produced during the time before it is shutin also. That is a fact to consider. If you have a low permeability well producing only 30 M.C.F. per day, then the time required to equalize reservoir pressure in that particular well would be proportional to the volume produced prior to that time the shutin pressure was taken, and inversely proportion to the permeability. It is possibile that the two might balance each other out. You can't consider one factor and not consider the other.

Q Well, doesn't it come down to the proposition that the seven-day shutin pressures are not necessarily representative of reservoir pressure?

A It comes down, that is all we have to go by, and I think it is as representative comparing any pool in the Pictured Cliffs.

Q You do recognize the fact that seven-day shutin pressures aren't stabilized?

A Well, it is far from being an equalized pressure, I realize that, but I assume that when you delineated all these pools it was primarily on the way, that way Mr. Arnold did it, it looked to me like it might have been on the pressures in addition to the geology of it.

Q My thought behind the question was the original shutin pressure since they were taken the same year, would have been more representative of whether the area A and area B was in the same producing zone.

A I wouldn't say that any original pressure is reliable. There is too many factors. It depends on how much you blow it down, how much water you lost in the formation, how you completed it. It is the variables you have to contend with. You can't evaluate unless you consider all of them. The date, also the date each pressure was taken. I can't see that we should compare the original shutin pressure, with those factors working against us. I would think a seven-day shutin pressure would be just as accurate after the wells had produced for some time. Of course, you have factors there you would have to consider also.

Q It is a matter of degree of reliability then?

A That is what it amounts to any of these fields here.

MR. UTZ: That is all.

MR. MACEY: Mr. Webb.

RE-CROSS EXAMINATION

By Mr. Nash:

Q You are purporting to tell this Commission that the north part of the Huerfanito Unit and the south part of the Huerfanito Unit are one of the same pool and field, is that correct?

A I am purported to say in area A and area B you have a comparable wellhead shutin pressure.

Q I am restating my question.

A Let me continue, and that indicates to me that you could have a continuous, contiguous Pictured Cliffs formation under both areas and still you might possibly have a permeability barrier in one portion, yet it would not cover the entire unit. You could have communication. You might go round and round there before you ever get to the other end, that we don't know.

Q There is a slight possibility of a permeability barrier there?

A There is always a possibility of permeable barrier.

Q Area A and area B, based upon your shutin pressures, are one reservoir? A Well, the only way --

Q (Interrupting) Have you introduced any other evidence to show that they are? A That they aren't?

Q That they are one reservoir beside the shutin pressure?

A I haven't. All I can do is compare. When I started to determine whether two different areas are in communication, I can observe the other fields, the differences in pressures and take into consideration the geologist viewpoint, and then draw my conclusions accordingly. In this case the continuity of the Pictured Cliffs formation as presented by the cross sections, indicate that there could be a permeable porous section across from the CC cross

section. If the pressures are comparable, I would think that could be connected.

Q You were unwilling to tell Mr. Greiner a few moments ago that the percentage of depletion of area A and B was the same, were you not?

A The percentage of depletion of area A and area B? I don't think we can evaluate the reserves to determine the percentage of depletion at this time.

Q I believe your testimony was that you were unwilling to state whether or not in your opinion the percentage of depletion was the same.

A That is right, because we don't know what the reserves is, so how can we say what the percentage of depletion is?

Q How can you compare the shutin pressures then?

A Because that is all we have to compare, just like you made the comparison.

Q They don't mean very much do they?

A I think they mean as much as any field, when you determine the field limits in any of these fields, I think it means just as much in this case as it does in the other. Probably more since it is so close.

Q Just one further question, I believe you stated in testimony to Mr. Greiner, or Mr. Howell, that you could point out several places in these Pictured Cliffs fields where the pressure variance in a field was as much as a hundred pounds. Would you go to the map and point out a couple of those?

A Well, here is one right here, 595, 880.

Q Those are in what field? A That is in the South Blanco.

Q Pick out one in the Ballard-Pictured Cliffs.

A 544, 645, 601.

Q Where is the 544 well?

A The five, I didn't say 54 -- yes, I did. It is in Section 33, 26, 8.

Q Which well is that?

A It is in the southeast quarter. It is on your exhibit, Skelly's Exhibit No. 7.

Q What was that location again?

A Southeast of Section 32, 26, 8.

Q Do you know the name of that well?

A No, I don't.

Q Can you determine the name of that well by asking any of your associates?

MR. SELINGER: Is it one of your wells?

A Is that pertinent in here? I thought we were comparing pressures, not names of wells. You asked for a difference in a hundred or greater pressure and there it is, 544 and 645.

MR. HOWELL: Our records show that as 644. We would be happy to have the well identified to see which is correct.

MR. SELINGER: That is the map we got from the Commission. I have it here as 544 in 34 days, I may be mistaken.

Q Do you know if the well has been shutin to build up the pressure, pressure buildup? Do you know if any pressure buildup tests had been taken on the well?

A No, I don't. It had been shutin 35 days.

Q Do you believe that to be the true reservoir pressure of the Ballard Pool?

A I doubt it seriously since you have higher pressures right next door.

MR. MACEY: Anyone have any question?

By MR. GREINER:

Q Have you made any comparisons between these well logs that are shown in Skelly's Exhibits 3, 4 and 5 to determine whether the section of sand between the stringers are continuous?

A No, I have not.

MR. GREINER: That is all.

MR. MACEY: Anyone else?

MR. SELINGER: I have one question.

RE-DIRECT EXAMINATION

By MR. SELINGER:

Q Mr. Ratliff, both Mr. Howell and Mr. Greiner has asked you about that Aztec Jernigan Well shutin pressure of seven days being abnormally low at 475 and should be thrown out, raising the arithmetic average. I will ask you in Area B, is not the Turner Crandell Federal No. 2 Well of a seven-day shutin pressure of 444 pounds also unusually abnormally low? A It is.

Q If you will extend the same courtesy to me as a lawyer as you did to Mr. Greiner and Mr. Howell and my computations, if you drop that pressure of 444 pounds from your arithmetic average, my records show that the pressure for that area B would be raised from 537 to 544. That would compare with the 572 or 74 pounds that Mr. Howell computed for area A by dropping the Jernigan well, or a difference of around 30 pounds instead of 21 pounds between the two areas.

A I believe that 444 is probably in error. It should be

higher.

Q Would your answer be the same if you dropped the 475 and the 444 from both areas, your arithmetic average would be in the neighborhood of only 30 pounds difference?

A I take it that is correct.

Q Extend me the same courtesy as the other lawyers?

A That is right.

RE-CROSS EXAMINATION

By MR. REIDER:

Q I would like to ask, Mr. Ratliff, after we have culled out all these wells and when we get through weighing where there has been so much production and how long before the well was shutin, what do we have left, When we start throwing out wells and we can't rely on the pressures?

A We haven't thrown out but two wells. That is not very many.

Q I believe you said you couldn't actually weigh this seven-day shutin unless you could figure how much was actually produced just before the shutin, I think we are in agreement --

A (Interrupting) Let me make this statement. You can't weigh, it is hard to weigh any pressures unless you know all the various factors which I am not qualified to go into the details of, the many many factors that should be considered on a reservoir of this type. I think with what we have got we can make a comparison as well as anything, and as much as a comparison that has been made in the other fields. That is the only point I am making.

MR. MACEY: Anyone else have a question. If not we will continue the case until tomorrow morning. We have case 696 on the docket. The first thing in the morning, upon the completion of that case we will continue with this matter.

MR. MACEY: The next case is Case 908 which was continued from yesterday.

MR. SELINGER: In deference to the Governor, I might make sort of an opening statement. This is a nomenclature hearing in which the notice covered seven townships and Skelly has presented yesterday afternoon another engineer and geologist for express purpose of showing the same pool in what we have designated as area A and area B, by virtue of a connecting well between. Our testimony was with respect to these two immediate areas being part and parcel of the same pool. We have concluded our direct testimony with those two witnesses and that is the situation as it exists now.

MR. GREINER: May Mr. Ratliff please be recalled?

B A R T O N W. R A T L I F F

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

RE-CROSS EXAMINATION

By MR. GREINER:

Q If I correctly remember your testimony, I believe you stated that you began the work informing yourself about this area, or these areas A and B, approximately three weeks ago, is that correct?

A As far as collecting data, three weeks ago.

Q What caused you to commence that collection of data?

A I was instructed by Skelly Oil Company.

Q Who instructed you in Skelly Oil Company?

A Mr. Selinger and the Chief Engineer.

Q Did --

A (Interrupting) The Chief Engineer instructed me personally.

Q Did they tell you why they wanted you to collect this data?

MR. SELINGER: We object to that question as being immaterial

and irrelevant to the matter of the nomenclature.

MR. GREINER: If it please the Commission, we went into this matter to some degree in our hearing yesterday evening.

MR. SELINGER: The Commission sustained my objections too yesterday.

MR. GREINER: I don't recall what the ruling on the matter was, very frankly, Mr. Selinger, but if they want to sustain it again it is their privilege to do so.

MR. SELINGER: The question as to why the hearing was called was gone into on your request to which I objected and the Commission sustained it.

MR. GREINER: The point I am trying to get here, I am trying to arrive at what the economic motivation, if any, was of Skelly in its course of procedure in this case and in the presentation of testimony that the Skelly Company put on. If it has no economic motivation, I would be glad if you state so. If it has an economic interest, I think the Commission is entitled to know about that economic interest. Your witnesses have been very carefully chosen it seems to me, so that they know about only a few things you want them to know about. I am trying to broaden the thing a little bit so we can determine how it happens that they know so little about anything but the particular matters that you want them to know about.

MR. SELINGER: Are you through?

MR. GREINER: Yes, sir.

MR. SELINGER: You asked the same question yesterday and you asked me and I answered you at the time. You recall that. Did you not ask me at the time whether the witness or I could answer you, and

I volunteered to tell you why we had this application filed.

MR. GREINER: I never, I never--

MR. SELINGER: You don't recall that? The record will speak very plainly. I will say it again. I said at the time that we filed this application because there were two areas of a common source of supply that were prorated on two different bases, the north end was prorated on the South Blanco prorated schedule, the south end or area B was unrestricted. I even went so far as to tell that in the last three months over half a million feet of gas was produced from seventeen wells. Do you recall that?

MR. GREINER: I do indeed. We have still not got to the point why it is important to Skelly,if it is important to Skelly, that these two areas should be classified as one pool. You state that you want to show that they are one pool, but it still does not tell me why you have an interest in so proving.

MR. SELINGER: We will let the Commission make their ruling. We object to that question.

MR. MACEY: What exactly was your question.

MR. GREINER: The question was, why it is important to Skelly that these two areas should be classified as one pool.

MR. SELINGER: My objection was that the reason for filing the application was necessary as part of the nomenclature here.

MR. GREINER: I wasn't asking why you filed the petition in this case. I was asking why he was asked by the company official to collect the data.

MR. SELINGER: You mean the purpose or the reason?

MR. GREINER: The question speaks for itself.

MR. MACEY: Your objection is overruled and the witness

may answer the question if he understands it.

A Why did they direct me to collect the information?

Q Did they tell you why?

A Did they tell me why, no, they told me as an engineer to prepare testimony to show the connection between these two areas. They didn't go into the detail of why.

Q They did not tell you why they were showing a connection; they merely asked you as an engineer to prepare testimony that would indicate that they were inter-connected, is that correct?

A That is right.

Q So you do not know, or are not in a position to tell us as to what the motivations were of Skelly in desiring this proof that the areas were inter-connected, is that correct?

A I, all I was told was to prove they were connected.

Q Outside of what they told you at that time, do you have any other knowledge as to why they are interested in this matter?

MR. SELINGER: We object to that question as being entirely immaterial and irrelevant.

MR. GREINER: My answer is much the same as to the proceding objection.

GOVERNOR SIMMS: Are you asking him to stipulate or asking if he has actual knowledge?

MR. GREINER: I am asking if he has any actual knowledge as to if these areas are, A and B, are inter-connected. He has, I am asking if he has any other knowledge that would tell him about that same fact.

A I can gather from Mr. Selinger's statement that its pool nomenclature and you have a non-prorated section out here and prorated

section up there, and I guess that would be one reason.

Q You don't know what difference it makes to Skelly whether they are classified as the same pool or as different pools?

A I haven't made a study of that, no.

Q What will the effect be upon Skelly if they are classified as the same pool? Will it be economically beneficial or economically detrimental?

A I haven't made a study of that.

Q I thought you had made a study. I withdraw the question, Mr. Selinger.

A I have not made a study.

Q You are here testifying without knowing what the purpose of your testimony is, is that correct?

A I am here testifying knowing the purpose of my testimony is to prove that the two areas are connected.

Q But not knowing the purpose of why that proof is desired?

A As an engineer that was my purpose, that is the only one I was concerned about.

Q Is your statement that you are here not knowing why Skelly desires these two fields to be connected, to be given the same weight and credence as your other testimony in this case?

MR. SELINGER: We object to that question as being entirely immaterial and irrelevant.

MR. MACEY: Sustained.

MR. GREINER: That is all.

MR. MACEY: Anyone else have a question of Mr. Ratliff?

RE-DIRECT EXAMINATION

By MR. SELINGER:

Q Mr. Mathiff, as an engineer, is it your testimony, despite whatever credence Mr. Greiner might elude to, your testimony, is it your testimony that area A and area B is the same common source of supply insofar as the Pictured Cliff formation is concerned?

A That is correct.

MR. SELINGER: That is all. May he be excused now?

MR. MACEY: Anyone else have a question of the witness. If not he may be excused.

(Witness excused.)

MR. MACEY: Does that conclude your case?

MR. SELINGER: That is all the testimony we have on direct.

MR. MACEY: Mr. Webb.

MR. WEBB: Call Mr. Greer. I believe he has been previously sworn.

ALBERT R. GREER

having previously been sworn, testified as follows:

MR. WEBB: William G. Webb, representing J. Gene Turner and Benson Montin.

DIRECT EXAMINATION

By MR. WEBB:

Q State your name please.

A Albert R. Greer.

Q By whom are you employed?

A Benson and Montain.

Q What is your occupation?

A I am Field Superintendent for our San Juan Basin operations.

MR. WEBB: Are Mr. Greer's qualifications acceptable without going into a lot of detail?

MR. MACEY: They are.

MR. SELINGER: As an engineer?

MR. WOOD: engineer and geologist.

MR. SELINGER: Are you both, Mr. Greer? Where did you get your degree?

A I have a degree of Bachelor of Science in Petroleum from New Mexico School of Mines.

MR. SELINGER: We will admit his qualifications to testify as an engineer.

Q Are you familiar with the Ballard-Pictured Cliffs Pool located in the San Juan Basin in northwestern New Mexico?

A Yes, sir.

Q Are you familiar with the area covered thereby as presently defined by the Oil Conservation Commission?

A Yes, I am. I have followed the development of this pool since its discovery about a year and a half ago, and have personally supervised the completion of the wells within the pool, approximately half of them.

Q Are you familiar with the area covered by the proposed extensions to the Ballard-Pictured Cliffs Pool?

A Yes, I am.

Q From an engineering standpoint, what factors govern the delineation of the Pictured Cliffs Pool in the San Juan Basin?

A The Pictured Cliffs Pools in the San Juan Basin are separated by relatively impermeable barriers within the sand. These impermeable barriers in some cases are easy to determine from an inspection of logs and the drilling of dry holes.

Q Is a variance in pressure indicative of pool delineation?

A The most important factor in determining the limits of the pools are the original stabilized pressures within the pool.

Q Have you made a study of the available pressure data in the Ballard-Pictured Cliffs Pool? A Yes, I have.

Q I hand you what has been marked Turner and Benson Montin Exhibits B and C, Exhibit B being initial well potentials and initial shutin pressures of wells in the Ballard-Pictured Cliffs Pool. Both the currently defined limits and the limits as proposed to be extended. Exhibit C being the initial well potentials and the initial shutin pressures of recently completed outpost wells in the field as now defined. Directing your attention first to Exhibit B, what is shown by this study?

A Exhibit B is a schedule which shows information taken from potential tests of wells completed in the Ballard Field showing initial potential, initial shutin pressure in the length of time the wells were shutin. It also has some additional shutin pressures which were taken by myself personally, or under my direction by Benson-Montin personally.

Q Does that exhibit indicate a close correlation of pressures in the field, in the pool?

A This shows that as the wells were shutin long enough to approach stabilization, the pressures tended to equalize such that we have throughout the length of the field, which is approximately twelve miles, and the width of the field with its extensions to approximately four miles and equalized pressures within a few pounds of 669 pounds. This pressure of 669 pounds I consider to be the original stabilized pressure in the Ballard Field. I would like to point out in particular, Benson and Montin No. 1 McManus on page 2 of Exhibit B which showed its initial pressure of 668 pounds after being shut in 67 days. After shut in 67 days, the well was

potentialed, during which time it was open three hours and then shutin for an additional 264 days. In this additional 264 days the well built up one more pound from 668 to 669 pounds. All of the original wells as they were shut in increasingly longer periods of time, showed pressures which tended to approach the 669 pounds, which is the stabilized pressure within the pool.

Q In your opinion, Mr. Greer, if the wells were shut in long enough, would all of them tend to reach the maximum of the well that you just discussed?

A It is my opinion that if all the wells were left shutin long enough to reach stabilization, they would very nearly approach 669 pounds.

Q Did these shutin pressures then, in your opinion, show a correlation of the shutin pressure of the wells in the pool?

A That indicates to me that the wells within the presently defined limits of the Ballard-Pictured Cliff Pool with its currently proposed extensions, are within one connected reservoir.

Q Directing your attention to Exhibit C which I believe is a schedule of stepout wells, do these wells show a correlation insofar as pressure is concerned with wells within the presently defined limits of the Ballard-Pictured Cliffs Pool?

A Yes. These stepout wells show pressures which are reasonably close to the 669 pounds found in the Ballard Field.

Q Based upon both Exhibits B and C then, Mr. Greer, do these exhibits and your studies thereof indicate that the wells listed thereon which are situated within the Ballard Pool indicate the same are producing from the same reservoir?

A It does.

Q Have you reduced then the data shown on these schedules to a more graphic form? A Yes.

Q I hand you what has been marked Turner and Newsom-Montin Exhibit A.

A Could I interrupt a minute? We have missed one pressure on Exhibit C. There should be added to that another pressure for Southern Union for No. 1 Newsom shutin 39 days, measured 668 pounds.

MR. SELINGER: You want to add that to your Exhibit?

MR. MACEY: This Exhibit C shows the No. 1 Newsom on shutin pressure from the potential test, 39-day shutin, in 668?

A There it is. We had it in the wrong place. It is already on there.

Q Directing your attention then to Exhibit No. A, would you indicate to the Commission what is portrayed by the different colored acreage?

A The acreage colored in brown is the presently defined limits of the Ballard-Pictured Cliff Pool. The area colored in green is the currently proposed extension area to the Ballard Field. The area colored in blue shows the south and southwest limits of the South Blanco-Pictured Cliffs Pool.

Q Have you indicated on this map certain key wells which in your opinion are key wells insofar as their shutin pressure is concerned?

A I have taken from Exhibits B and C certain key wells and shown them with red circles on Exhibit A. It is apparent at a glance from this exhibit that the pressures within the Ballard Field were reasonably well equalized on initial shutin pressures. The McManus No. 1 in the approximate center of the field, is the

well that was shut in the longest and represents more nearly the true reservoir pressure as reflected at the wellhead, which I will repeat again, 669 pounds.

Q What is the pressure of that well which is outside of not only the presently defined limits, but also the proposed extension?

A That is Southern Union No. 1 Nickson in the southeast quarter of Section 23, Township 26 north, Range 8 west on 39-day shutin pressure measured 668 pounds. These pressures were taken with Benson-Montin deadweight tester which probably will agree within one or two pounds of any of the other testers used out in the Basin.

Q In your opinion, Mr. Greer, is this well, Southern Union Nickson well producing from the same reservoir as the acreage colored in brown and green even though the same is now within the proposed extension?

A I feel certain this well is producing from the same reservoir as the Ballard Field in its currently proposed extensions.

Q I hand you what has been marked Turner and Benson-Montin Exhibit D which is a study of the initial well potentials and initial shutin pressures of wells in the South Blanco-Pictured Cliffs Field. Will you explain to the Commission, Mr. Greer, what is shown by this sketch?

A This schedule shows the information taken from the available records and covers the initial completion data of wells drilled in the southwest part of the South Blanco-Pictured Cliffs Pool. The important facts to me, which I gather from this exhibit are that the pressures in this area are unquestionably higher by some 40 to 50 pounds than the pressures in the wells in the Ballard Field. I do not have the number of days these wells were shutin,

but for the most part they were probably seven days or less, and probably do not represent complete buildup pressures.

Q In your opinion, Mr. Greer, assuming for the purpose of the record that the wells were only shutin seven days, if they were allowed to build up to their maximum, would they build up to the pressures shown in the present Ballard Pool?

A Since their pressures are already some 50 pounds higher on a short shutin time, it is obvious that if they were allowed to be shutin long enough to stabilize, that their pressures would be even higher. If anything the pressure differential between the Ballard Field and this south part of the South Blanco Field would be at least 50 pounds and possibly in excess of 50 pounds.

Q In other words, Mr. Greer, the fact that the same conditions did not prevail on taking the two sets of pressure, the one in the Ballard Pool and the one in the South Blanco Pool, the difference would be aggravated rather than diminished, is that true?

A That is correct. We should point out that it is important that we use maximum pressures and not short-time shutin pressures or average pressures of high wells and low wells in order to determine the original reservoir pressure. As can be seen on this exhibit, Southern Union No. 1 Jernigan showed a pressure of only 599 pounds, which is some 100 to 120 pounds less than it probably measured in the area. This is the small well and probably had not reached its stabilized pressure. To use a pressure such as that either by itself or as an average in determining the pressure in the South Blanco Field, would be to introduce information which would give us an erroneous conclusion.

Q Mr. Greer, have you made a study of the Ballard Pool in

comparison with the South Blanco Pool based upon the electric logs of wells in the two different pools?

A I have made such a study.

Q I hand you then what has been marked Turner, Benson-Montin Exhibits E, F and G. Directing your attention first to Exhibit E, will you explain to the Commission what is shown by that exhibit?

A Exhibit E is a map of the Ballard Field showing its relation to the south part of the South Blanco Field and the colors on this map for field designations are the same as on Exhibit A. We have also shown the location of two cross sections which I have prepared from Schlumberger electric logs, which cross sections move from the Ballard Field to the South Blanco Field, or toward the South Blanco Field. These cross sections cross an impermeable barrier in the Pictured Cliffs formation which prevents the migration of gas across it, and this impermeable barrier is rather well demonstrated on Exhibit F.

Q Would you explain in detail Exhibit F to the Commission then, Mr. Greer?

A I would like to point out on the map that Exhibit F, commencing with the lefthand well, starts in the approximate center of the field with Benson-Montin No. 1 McManus, which has a comparatively thick productive sand section. As shown on Exhibit F, the Pictured Cliffs formation, all of which is colored in yellow and red, the part colored in yellow is non-productive Pictured Cliffs formation, and the part colored in red is productive Pictured Cliffs sand. The little strip at the top colored in brown indicates wells located in the Ballard Field, the strip in green indicates a well located in a currently undesignated area, and in blue a well in the

South Blanco Field.

Q Would you now trace the other wells that are shown on the electric log exhibit through our map showing their location?

A I would first like to explain this exhibit a little bit. It is important to realize that the Pictured Cliffs formation is not productive throughout its entire thickness, only those sections which are colored in red can produce gas, and as we move from the Ballard Field toward the South Blanco Field we can see from this cross section that there is a deterioration in the productive members, sand members of the Pictured Cliffs formation.

Going from Benson-Montin No. 1 McManus to its No. 1 Quitzau, to Southern Union No. 3 Hodges there is a very marked decrease in the amount of productive sand. The thickest sand member which is productive in No. 1 McManus and No. 1 Quitzau decreases to about half its thickness in No. 3 Hodges and drops lower in the Pictured Cliffs section; as we go to No. 1 Nickson that section is dropped almost to the bottom of the Pictured Cliffs formation. It is easy to pick the top of the Pictured Cliffs sand and to recognize its thickness throughout the Basin. This I have done, and correlated the tops of the Pictured Cliffs formation in each well on a horizontal plane on this cross section. We can see from this that the Southern Union No. 1 Nickson there is an interval of 70 feet from the top of the formation to the first productive sand. Now, as we get over into the South Blanco Field, the productive sand has picked up to the top of the formation again and is not only separated by an intervening dry hole, the Pictured Cliff sand produces from a different part of its section. This cross section clearly represents how Pictured Cliffs reservoirs are separated within the San Juan Basin. They are not always as clearly marked as this and cannot always be determined quite so clearly from a cross section. However we can always determine the separation

from pressures. In this particular area we have an equalized pressure covering some four miles from the well on the left hand part of the cross section Benson-Montin No. 1 McManus Well, and then on down to No. 2 McManus, which is not shown on this cross section covering the distance of four miles, to the Southern Union No. 1 Nickson. This pressure is equalized within just a few pounds of 668 pounds to 669 pounds and yet for the same distance of about four miles from Southern Union No. 1 Nickson to the wells in the South Blanco Field, there is a difference in reservoir pressure of some 150 to 250 pounds.

Q Then, in your opinion, based not only on the differential in pressure, but the lack of any productive member of the Pictured Cliff sand between the Southern Union No. 1 Nickson, the . Ralph E. Davis No. 2, Luthy demonstrates a break in the pool?

A That is correct.

Q And that the two wells I last mentioned are in fact in different pools, is that correct?

A That is correct. They are producing from separate reservoirs. The exact location of the non-productive area between the two pools is very difficult to determine without drilling a number of wells between the two pools. The fact that it exists, however, is relatively straightforward and easy to see.

Q There is no doubt in your mind that the location of the J. R. Sharp No. 3 Luthy, the Pictured Cliff, was non-productive?

A That is correct. The particular well was drilled through the Pictured Cliffs formation and was shot with nitroglycerine, and in my opinion is a bonafide dry hole.

MR. SELINGER: We don't have the benefit of any exhibits,

so when you mention a well, will you please give the section, not the township and range, so that we can attempt to follow it without the benefit of any exhibits? A I see.

Q The J. R. --

A The J. R. Sharp No. 3 Luthy?

MR. SELINGER: Just the section is all.

A Northeast of 12, Township 24 north. I point that well out on the map, Exhibit E, and I think we should go into, at this time, the fact that we have shown on Exhibit E approximate location of the non-productive zone which is this impermeable barrier between the Ballard Field and the South Blanco Field.

Q That is indicated on your map as a checkered green line, is that correct?

A That is correct. Checkered green cross hatch, of which one point showing the location of this impermeable barrier is determined by the J. R. Sharp No. 3 Luthy.

Q What is the location of that well?

A That is the one I just read into the record.

Q I now direct your attention to Exhibit G. I would like to know what is shown by that exhibit.

A Exhibit G is another cross section from the Ballard Field toward the South Blanco field, and is shown on Exhibit E as cross section V-W.

Q Did you give the location of the wells which are shown on that exhibit?

A Commencing in the Ballard Pool, the wells represented are Benson-Montin No. 2 McManus, the next one is Southern Union No. 2 Hodges, the No. 2 McManus is in the northwest of four, Township 25

north and 8 west. The second well, Southern Union No. 2 Hodges, is in the southeast of 28, Township 26 north, Range 8 west. Southern Union No. 1 Newsom is the third well southeast of 9, 26 north, 8 west. And the last well is Southern Union No. 2-A Newsom, Section 4, Township 26 north and Range 8 west.

Q Does the exhibit which you are exhibiting show the same thing as Exhibit F insofar as the colors and the other portions of the exhibit are concerned?

A This is a similar exhibit. The only difference being it is prepared on different wells.

Q Does that exhibit show an impermeable barrier between the wells located thereon or wells shown thereon?

A Yes, we can see it starting from the Ballard Field and moving north, the deterioration of the productive part of the Pictured Cliffs formation in Southern Union No. 2 Hodges, there is only one-half as to one-third as much productive sand as in Benson-Montin No. 2 McManus.

Moving further north to Southern Union No. B Newsom, all that is left of productive Pictured Cliffs sand are very small thin remnants which probably would be non-productive. It was undoubtedly the opinion of Southern Union representatives that it would not produce and they did not set pipe on the well and did not attempt to complete it.

Q In your opinion, based upon the study of the log, would the well be non-productive?

A If the well would be drilled by our company I would have recommended plugging it the same as Southern Union Gas.

Q What is shown by the last well on the right?

A The last wells on the Southern Union No. 2-A Newsom, shows productive Pictured Cliffs sand in the top part of the Pictured Cliffs formation. Again we can see progressing from south to north the deterioration of the Pictured Cliffs sand, and also the fact that it drops lower in the section as you move north; as we cross the impermeable barrier we pick up productive Pictured Cliffs sand in the top of the section, and again we have a difference in pressure in the wells in the Ballard Field as compared to the Southern Union No. 2-A Newsom. We took some buildup tests on Southern Union No. 2-A Newsom. I believe we should put those in. This Southern Union No. 2-A location.

Q Location of that well?

A That is in the southwest of 4, Township 26 north, Range 8 west. This well was completed April 5th, of this year, for an initial potential of 926,000, and its shutin pressure at the time it was potentialed was 700 pounds. That was a seven-day shutin pressure after shutin nine days it had 709 pounds, and on May 3rd, shut in twenty-seven days, it had 716 pounds.

Q In your opinion, then, would that well be in your opinion located in the Ballard Pool or in the South Blanco Pool?

A This well is unquestionably producing from a reservoir separate from the Ballard Field and is probably producing from a reservoir, from the reservoir, from which the well in the southwest part of the South Blanco Field produces. As shown on Exhibit D, pressures of wells in that part of the South Blanco Field were on the order of 715 to 719 pounds, which is pretty close to the 716 pounds we measured on twenty-seven day shutin pressure on this well.

Q I now direct your attention, Mr. Greer, to the so-called

Huerfanito Unit area. I ask you to point out on one of the maps, the southern boundary of that unit area for the Commission.

A The southern boundary of the Huerfanito Unit Area is in Section 10 and 11, 27 north, 9 west at the junction of the brown coloring and the green coloring on this map. North half of the Section 10 and 11, being within the Huerfanito Unit.

Q The unit area extends to the north from that area?

A It extends to the north and goes beyond the limits of this map. It also takes in Section 12 in Township 26 north, Range 8 west, this section which I point to.

Q Based upon your study, Mr. Greer, is there a difference in pressure between the wells located in the southern portion of the Huerfanito Unit and wells located in the north portion?

A Yes, there is approximately 50 pounds difference in initial reservoir pressure, or at least 50 pounds difference in initial reservoir pressure of wells in the two areas.

Q In your opinion then, that difference in pressure indicates that the wells are producing from different pools or different reservoirs?

A They are definitely producing from different reservoirs. We have traced approximately the location of the impermeable barrier separating the wells in the Ballard Field from the South Blanco Field and this impermeable barrier extends all the way across Township 26 north, 8 west, and commences diagonally across Township 27 north, Range 9 west as shown on our Exhibit E.

Q It enters the unit area at what point as indicated on that map?

A It enters the unit area at approximately on the eastern

boundary between Section 36, Township 27 north, Range 9 west, and Section 1, Township 26 north, Range 9 west.

Q Based upon your studies, it extends in a northwesterly direction through the unit area from that point, is that true?

A That is correct. We have shown a relatively narrow band of non-productive area and of course we hope that it will be a narrow band, but it could extend over an area as wide as one or two miles in some parts of the area between the two fields.

Q Do you have any definite knowledge or otherwise are there any dry holes drilled within the unit area which you have taken into account in locating this green band? If so, what are the locations of those wells?

A There is a dry hole in the northwest quarter of Section 26, and one in the southeast quarter of Section 26 in Township 27 north, Range 9 west. I will point to those two wells. This one and this one.

Q Were any electric logs of either of those two wells available to you in making your study?

A There were no Schlumberger electric logs on those two wells.

Q If the same had been taken they were available for your study, do you believe they would show the same type of formation as you have indicated on Exhibits F and G for the Southern Union No. 1-B Newsom and the J. R. Sharp No. 3 Luthy?

A The samples from those or from one of those wells, showed the sand to be very silty and to have the same characteristics as we find in wells which exhibit non-productive intervals such as are shown on cross sections F and G. However, I base my opinion on the fact, that the area is non-productive there, on the fact that the

well was drilled to the top of the sand, pipe was set, was drilled in and shot with nitroglycerine and both wells were shot with nitroglycerine and one of them was even sandfracted and still was nonproductive. This gives us then, within our impermeable barrier as we have shown it on Exhibit 4, four dry holes which were drilled to the Pictured Cliffs formation and another well which was drilled through the Pictured Cliffs formation, and no attempt was made to complete it in the Pictured Cliffs. The fifth well is the Sharp No. 5 Luthy in the northeast of Section 13, 26, 8.

Q Based upon your knowledge of the area, Mr. Greer, and your study thereof as reflected by these exhibits, does the Ballard Pool as presently defined by this Commission, and the proposed extensions thereof, represent a separate and distinct pool or deposit?

A Yes, it does.

Q Separate then from the South Blanco Pool?

A That is correct.

Q In your opinion is there any geologic or engineering data available at this time to support a consolidation of all or any part of the Ballard Pool with any other designated pool in the area?

MR. SELINGER: Just a minute. Before you answer, we object to the word geologic.

MR. MACEY: You may strike the word geologic.

Q Any engineering data available?

A There is no engineering data available.

Q To support such a consolidation?

A To support the premise that they might be in one reservoir. They are definitely in two separate reservoirs.

Q And conversely, your study does reflect that there is a

continued separation of those pools is both logical and engineering-ly sound? A Yes, it is.

MR. WEBB: That is all.

MR. MACEY: Any questions of the witness?

MR. SELINGER: First we would like to get a complete set of the exhibits that have been introduced.

CROSS EXAMINATION

By MR. SELINGER:

Q Mr. Greer, do you represent Benson and Montin and J. Glenn Turner at this hearing, or who are you employed by?

A I represent both J. Glenn Turner and Benson and Montin.

Q You are employed by both of them at this hearing?

A That is correct.

Q You have made rather an exhaustive study of the San Juan Basin as a whole, have you not?

A I have studied it, particularly the Pictured Cliffs formation and wells producing from it with a very conscientious effort to determine the mechanics of the reservoir production over a period of thirteen or fourteen years.

Q Mr. Greer, are you in a position to advise the Commission the general condition of pressures as they go from the northeast to the southwest?

MR. WEBB: We object to that; if he is referring to the Ballard Pool or anything that Mr. Greer has testified to, he can ask the question, but otherwise we object to the all inclusive nature of such a question.

MR. MACEY: Mr. Selinger, I didn't hear your question.

MR. SELINGER: My question is whether or not, since he is

familiar with the area for fourteen years, whether or not he is familiar generally with pressures going from the northeast to the southwest. If he is, he can so state. If he is not he can so state.

MR. MACEY: You are referring to the Pictured Cliff formation?

MR. SELINGER: Pictured Cliff formation only, because he qualified as expert in the Pictured Cliffs.

MR. MACEY: How did you state your objection?

MR. WEBB: If the Commission please, I believe that as Mr. Selinger stated, time and again, this is a nomenclature hearing based on small and minute area and he carefully confined his witnesses' testimony to that, I believe we are due the same consideration. We are talking about one area. If you want to ask about that area that is fine. I don't believe it has any material bearing on this hearing as to any general trend in the San Juan Basin.

MR. MACEY: The objection was sustained.

Q Mr. Greer, were you here yesterday when Mr. Ratliff testified? A I was.

Q Do you or do you not agree with his interpretation of pressure differential going from the northeast to the southwest?

A It was pretty clear from Mr. Ratliff's testimony that he was not familiar at all with the pressures in the area or how they behaved.

Q That wasn't the question, Mr. Greer. The question was, do you or do you not agree. If you don't agree just say you don't agree and we will go on with it. A I don't agree.

Q You talked about the south Ballard-Pictured Cliffs, that pool goes beyond your exhibits, do they not?

A As presently defined, no.

Q Do they go, do they include all of the South Ballard-Pictured Cliffs?

A You are referring to the Ballard-Pictured Cliffs?

Q Excuse me, I don't mean the South Ballard, I mean the South Blanco.

A Yes, it extends beyond the South Blanco.

Q Do your exhibits include all of the South Blanco-Pictured Cliffs? A No, sir, they do not.

Q Since you have brought in the South Blanco-Pictured Cliffs, what are the pressures in the northeast part, the central part, and the southwest part of the South Blanco-Pictured Cliffs?

A For the area we have covered on our study, pressures, seven-day pressures and three-day pressures which were reported, vary from somewhere on the order of 700 pounds to 850 pounds.

Q Which were the 700 pounds and what direction, and the 850 from each other?

A The 700 pound pressure wells were in the southwest part of the South Blanco Field.

Q The 850 were toward the northeast?

A That is correct.

Q Is that the maximum pressure in the South Blanco-Pictured Cliffs or the maximum pressure of the portion of the South Blanco-Pictured Cliffs that you have on your exhibit?

A I don't know that any of those pressures are maximum pressures. We did not take any buildup tests, and I do not know of any that were taken in those immediate areas.

Q Well then, your 700, 850 pound difference is based on what

original pressure or seven-day shutin?

A We were talking about the seven-day. I believe I said the seven-day and three-day. I believe some of them were only shutin three days. Some of them possibly even less.

Q Are there any seven-day shutin pressures in the Blanco-Pictured Cliffs that are in excess of 850?

A I believe there are. I do not, it was not necessary to determine that for the purpose of our study. The important fact is that there is a pressure difference of at least 50 pounds between the Ballard Field and the South Blanco Field which shows that our Ballard Field is producing from a reservoir separate and distinct from the South Blanco Field, and it doesn't matter if the pressures in South Blanco are 750 pounds or 850 pounds or 950 pounds, we are still in a separate reservoir.

Q Let's get back to the questions and answers, Mr. Greer. The pressures as you have just stated, do go from 850 in the, from the northeast direction to 700 in the southwesterly direction in the South Blanco-Pictured Cliffs, is that correct?

A On the three-day and seven-day shutin pressures, that is correct.

Q Can you furnish us with the same information with respect to the original pressures?

A That is what I am referring to is the original three-day and seven-day shutin pressures taken on initial potential.

Q Do you find that the pressures going from the northeast corner of your exhibit southwesterly, declined in the southwesterly direction, on your exhibits do those pressures decline?

A The pressures within the Ballard Field are quite well

equalized within, well, within ten pounds approximately for wells which have been shutin long enough to have a reasonably stabilized pressure over a distance of four miles. I believe as I pointed out from southwest to northeast, from Benson-Montin No. 2 McManus to Southern Union No. 1 Hickson with the only pressure difference of two or three pounds.

Q Would the fact that the wells in that portion of the South Blanco-Pictured Cliffs on your exhibit in blue, would the fact that they are prorated under the orders of the Commission and the fact that the wells in the Ballard-Pictured Cliffs are not prorated, have any effect on the equalization of pressure in one pool as compared to a differential of pressure in the other pool?

MR. HOWELL: Are you referring to the initial pressures?

MR. SELINGER: He can take whatever pressures he desires.

MR. WEBB: He has testified as to initial pressures.

MR. SELINGER: He has been talking about three days pressures and seven-day shutin pressures.

MR. HOWELL: We are asking if this is initial or some other pressure. I purely asked for clarification.

A I would like to know too.

Q Give me your answer with respect to the original and give me your answer with respect to the seven-day pressure.

A I believe you are confused, Mr. Selinger.

I have been talking about initial shutin pressures. By that I mean pressures taken at the completion of the well before it has produced into the pipeline. Those are the only pressures that have any weight whatsoever in the determination of the delineation of pools in the Pictured Cliff formation.

GOVERNOR SIMMS: Are they all one and the same?

A Yes, sir.

MR. MACEY: For nine days and three days they are still the initial pressures?

Q You have initial pressures in the Ballard Pool only, but no seven-day shutin pressures, is that correct?

MR. WEBB: He has already testified he is only talking about initial pressures.

MR. SELINGER: I am asking if you have any seven-day shutin pressures on it.

GOVERNOR SIMMS: That is what the initials are.

MR. MACEY: You are referring to pressures taken on the deliverability test?

MR. WEBB: He has only testified as to initial tests when the well was originally shutin.

MR. HOWELL: Sometimes it is shutin seven days and three days.

Q Have there been any deliverability tests taken on the Ballard-Pictured Cliffs?

A We are currently taking deliverability tests now. There have been some deliverability tests taken on the wells in the northwest part of the Ballard-Pictured Cliffs Pool, but I have not used pressures taken during that deliverability test for the purpose of determining whether the reservoirs are connected. The pressures taken after the well has produced into the pipeline will be affected by the stage of depletion at which those wells are when the pressures are measured, and it would have no bearing whatsoever on the original pressure or giving us a factor for determining the

separation of pools.

Q All I am asking from you, Mr. Greer, is the facts, are there any deliverability tests taken on any of the wells in the Ballard-Pictured Cliffs?

A There were some taken on the wells in the northwest part of the field.

Q Do you know how many? Do you have the results of them?

A I don't have them with me, no, sir, they were not pertinent.

Q Do you know whether or not there have been any deliverability tests taken on the wells in the South Blanco-Pictured Cliffs?

A I am sure there have.

Q You have made no comparison of the two?

A As I pointed out before, Mr. Selinger --

Q (Interrupting) Just answer the question. Have you made any comparison? If you haven't, why we will let you explain your reason. I am just wanting to know if you have made any comparison. If you haven't we can go on.

A I have not. It was not pertinent.

Q All right. Mr. Greer, on your cross sections you have indicated the producing pays in red and where they are not producing, in yellow, is that correct? A That is correct.

Q Have you on all occasions used the Schlumberger logs on your cross section?

A We have found the Schlumberger logs to be more representative of the character of the sand than any of the other logs or logging services available.

Q My question was did you use the logs on all the wells shown on those exhibits? Every well shown on there, is there a log

indicated for the well?

A There is one well I didn't have a log on. J. R. Sharp No. 3 Entry. A Schlumberger shows no record of having a log on that well.

Q You don't know whether there is a log available for that well or not?

A I don't know, I couldn't find one.

Q With the exception of that well you have used Schlumberger logs on all the wells indicated on your cross section?

A That is correct.

Q Are you able to, since you made these cross sections, are you able to correlate these particular sands from one well to the other?

A Generally you can correlate them. As I pointed out, the sands show a deterioration going from the south to the north and they tend to drop down in the section. There is a thickening of the sand and a thinning in some directions. The fact that the sands are not continuous, the productive sands are not continuous throughout the entire area is the reason you have separate pools and separate reservoirs.

Q Stratographically, the Pictured Cliffs is traceable across the entire Basin, is that correct?

A The Pictured Cliffs is easily traceable throughout the greater part of the Basin both from logs and sands.

Q That condition that you have illustrated by your cross section exhibits, is that common throughout the Pictured Cliffs in the Basin? A Yes, sir.

Q Now, you notice on your exhibit D, if you will get that in

mind, on which the line of cross sections are indicated. Your cross section I-S goes from the, shall we say the south part of the Hallard to the southwest corner of the South Blanco Pool, is that correct? A That is correct.

Q How far is that line of cross section from Section 36, Township 27 north, Range 9 west?

A Oh, it is about one township east of it.

Q It is about six miles? A Yes.

Q Is your answer approximately the same with respect to Section 1, Township 26 north, Range 9 west? A Yes.

Q Now, on your cross section marked V-W, how far is that cross section from those two particular sections that I have talked to you about?

A About two miles, two and a quarter miles.

Q Do you have any cross section that gets closer than two and a half miles to Sections 36, 27 north, 9 west or Section 1, 26 north, 9 west?

A The wells in that area to which you refer, were logged generally with radioactive logs and it is very difficult to determine the character of the Pictured-Cliff sands from those logs, so I did not make a cross section in that area.

Q My question, Mr. Greer, was do you have any cross sections that go through Sections 36 and Sections 1, or any cross sections that go through any area closer than two and a half miles?

A I believe I answered that.

MR. WEBB: If we had them in the possession we would certainly give you the benefit of them.

MR. SELINGER: If he doesn't have any, let him so state.

A I said I didn't make any.

Q You don't have any cross sections?

A No.

Q Would a cross section based on data other than a Schlumberger log be possible?

A Yes, sir, we could draw a cross section showing producing wells and dry holes, and it would effectively show the barrier between the north area and the south area which we are now talking about.

Q Can you show such a barrier between the north well located in the northeast quarter of Section 12, Township 27 north, Range 9 west, Section 12, Township 27 north, Range 9 west, and the well in the northeast quarter of Section 6, Township 27 north, Range 8 west.

A You have just referred to producing wells?

Q Yes, sir.

A The cross section from two producing wells would of course show production on each side of the cross section. We have pressure data which indicates there to be an impermeable barrier.

Q We will get to the pressure, we are talking about cross sections or structural emphasis that you have put on those two cross sections as to whether or not you have any information available upon which to make a cross section between those two wells I mentioned.

A We have, as I say, the two wells which would show productive sand on one side and productive sand on the other, and it would not show that it was connected or disconnected because we don't have the intervening wells, which if drilled and were either productive or dry, would show what we are attempting to determine.

Q How far apart are those two wells?

A About --

Q (Interrupting) Point that out to the Commission so they can see the two wells.

A Approximately a mile and a half.

Q Are there any dry holes in between those two wells?

A There are no wells at all between them.

Q In view of those two producing wells a mile and a half apart, what is your opinion as to whether or not the acreage in Sections 6 lying between those two wells is productive.

A It is my thought that the southwest part of Section 6 would be a very poor place to drill a well.

Q How far from that southwest corner of Section 6 is the producing well to the southwest?

A About, well from the corner it is about, oh, a quarter of a mile.

Q What is the original, do you have the capacity of that well in Section 12, when it was originally completed?

A Yes, sir, it is on Exhibit B. It has an initial potential of 1,150,000 cubic feet per day.

Q What was the original or the I.P. on the well in Section 6, Township 27 north, Range 9 west?

A It is Southern Union No. 1 Starr. It had an I.P. of 1,615,000 cubic feet per day.

Q As an engineer, would you say those I. P.'s were comparable?

A They are relatively same magnitude, million and million and a half.

Q Then what do you base your opinion that the southwest

quarter of Section 6 is not protective of Pictured Cliffs?

A I didn't say it was not protective. There is an impermeable barrier between those two wells and I would be very reluctant to drill a well in the southwest part of Section 6 until we can determine more closely the exact location of this impermeable barrier.

MR. MACEY: It is five o'clock. We will recess 'till morning.

MORNING SESSION, FRIDAY, MAY 20, 1955, 9:00 A.M.

MR. MACEY: The Hearing will come to order, please.

At the conclusion yesterday I believe Mr. Greer was on the witness stand. You were cross examining him, is that correct?

MR. SELINGER: If the Commission please, there are a number of questions that lawyers normally would ask witnesses on cross examination with respect to the exhibits that they have presented. There are a number of errors in our opinion on those exhibits. The area involved is some seven miles distant from the area that we have brought to the attention of the Commission. In our opinion it would, insofar as our particular interest is concerned, it would be impossible, so in the interest of brevity and time without admitting the accuracy of those exhibits, we are going to forego cross examination and questions on those. We are going to ask the witness a few questions with respect to what he calls the west end of the South Blanco Pool and the north end of the Ballard Pool.

MR. WEPP: If the Commission please, if Mr. Selinger is going to cross examine Mr. Greer on anything he has testified to with reference to the west end of the South Blanco, that is alright, but as far as going into something he hasn't testified to on direct, we object as being improper.

MR. SELINGER: It is being confined to direct examination.

MR. WILSON: As long as he keeps his questions confined to the direct examination.

MR. SELINGER: Yes, yes indeed.

CROSS EXAMINATION (Continued)

Q Referring to your Exhibits A and E, they are practically the same basic map. Each shows different information with respect to pressure though, is that a fact?

A One shows pressure data, that is Exhibit A, and the other shows the location of the cross sections, that is Exhibit E.

Q I want to interrogate you only with respect to what you have indicated as in a green hatched line, as the impermeable barrier. You have got yourself located just as to these parts here of these two exhibits, haven't you? A Yes.

Q Will you tell the Commission what control you have, what points of control you have on the hatched green line on both Exhibits A and E?

A The points of control are at the northwest end of the cross west hatching are two dry holes in Section 26, Township 27 north, Range 9 west, progressing southeast, a dry hole in Section 9, 26 north, 8 west.

Q How far a distance is those two points?

A Oh, about five miles.

Q Do you have any wells intervening between those two wells?

A No, there are no wells.

Q What is the nearest well that lies on that direct line?

A The closest well is Southern Union No. 1 Starr just north of the cross hatching, that is in Section 6, Township 26 north, 8 west. I will point to it on the map.

Q What is the nearest producing Pictured Cliffs well to the south of your line?

A J. Glenn Turner No. 3 - 12, Ballard, in the northeast quarter of Section 12.

Q That is just south of that line?

A 26, 9, I am sorry.

Q What points of control do you have as to the width of that impermeable barrier?

A As to the width, I believe I explained yesterday, we don't have information definitely determining it. We hope it to be very narrow.

Q Since the distance between the two first points of your control that you say are five miles apart, on what do you base your information that the distance between those two points of five miles is impermeable?

A The fact that the wells on each side of the barrier have relatively the same pressures, and the pressures across the barrier are different.

Q Are there any wells in Sections 35 and 36 in Township 27 north, Range 9 west, or in Sections 1 and 2, Township 26 north, Range 9 west, or in Sections 5, 7 and 8 in Township 26 north, Range 8 west? A No, sir.

Q With some six to eight sections without any wells drilled at all with no points of control, are you telling this Commission that there is an impermeable barrier in that area?

A It is a reasonable interpretation of the information that we have to date that that impermeable barrier exists.

Q Not withstanding the fact that the nearest wells to that

area are producing Pictured Cliffs wells?

A That is correct.

Q I am interested in the direction that you indicate on these exhibits. Starting from the right side you have your barrier going from the southeast to the northwest, is that correct?

A I will explain again, it just covers approximately the area that we think to be impermeable.

Q That is your best judgment? In making this picture up for the Commission on these exhibits, you start the impermeable barrier on the extreme east end with direction going from the southeast to the northwest, is that right? A That is right.

Q Then at some point in Section 11 you immediately make a right angle of 90 degrees going due west and southwest. What point of control do you have there running your impermeable barrier in such a rapid change?

A The dry hole in the northeast of Section 12, and then an approximate line between this dry hole in Section 12 and this dry hole in Section 9, and we might point out that it is entirely possible that the width of this impermeable barrier may later be expanded to be as wide, most of the way across here as it is in Sections 12 and 13 in 26, 8.

Q What information do you have that the impermeable barrier doesn't continue in a northwesterly direction in Section 2 and 3 where you have no production in Sections either 2, 3, 10 or 11?

A I have not tried to determine, in fact as I said before, it is impossible to tell the exact location of the impermeable barriers until they are completely drilled. I know there is an impermeable barrier that has an approximate location as that shown on the map.

Q In the absence of drilling in Section 7 and 8, Township 27 north, Range 8 west, why does your impermeable barrier shown on these exhibits abruptly change direction from the westerly to a northwesterly direction?

A Because of the control we have of the difference in pressures.

Q Geologically you have what information to show that impermeable barrier, the direction of that?

A Geologically that impermeable barrier is determined upon the nature of the sand and the change in the permeability of this sand as we go from one area to another. That change, if I might --

Q (Interrupting) What -- sorry.

A That change is pretty well shown in these cross sections F and G and they are not particularly controlled. Let me say again, the impermeable barrier is not particularly controlled by the structure of the top of the Pictured Cliffs formation.

Q Do you have any pressures on any well in Section 5, 7 or 8 in Township 27 north, Range 8 west? Do you have any pressure on any production in those sections?

A We just reviewed that. There are no wells.

Q No wells? A That is right.

Q So that you are telling this Commission that your impermeable barrier is indicated by pressures rather than by geology, but despite the fact there is no production, no wells in either Section 7 or 8, you nevertheless change radically your direction of your impermeable barrier from westward to northwestward, is that correct?

A That is correct. The pressures, as I said before, are far more important as to locating the limits of the field than is the geological top of the structure of the formation.

Q Now, I want to go to both exhibits F and G which are your cross section, and I believe yesterday you stated one was some seven miles, six to seven miles from the area of Section 30, Township 27 north, Range 8 west, and Section 3, Township 26 north, Range 9 west, is that correct? Some six to seven miles?

A One cross section is about six miles and one is about two and a half miles.

Q You had no cross section with respect to any area in Range 9 west?

A Yes, sir, as I said, I don't believe the typical logs which were taken in that area show the character of the sand as well as these others, and for that reason I did not prepare a cross section.

Q Are there any Schlumberger logs available on any well in Range 9 west?

A Oh, yes, sir. There is one on Magnolia No. 1 Grandell in Section 3, 27, 9 for instance.

Q Are there any in Township 27 north in Range 9 west?

A That well is in 27, 9.

Q Are there any other wells?

A Yes, sir. There are a few down here. I don't recall exactly which ones.

Q Mr. Greer, did you make these cross sections F and G in the extreme east area of Range 8 west, for the purpose of showing separation between the South Blanco and the Pictured Cliff in this area, South Blanco-Pictured Cliffs, and the Ballard-Pictured Cliffs in this area, to indicate that there is a connection in the extreme west area of the South Blanco-Pictured Cliffs?

A Those cross sections very well show the separation of the

two fields in the location of the cross sections as they were prepared. They show how the reservoirs might be separated. The final factor in determining whether the reservoirs are separated is pressure. I would like to go just a little bit further in that. For instance, we have classified, or I believe Southern Union No. 1 Dickson, which is the fourth for across section A' to be in the same reservoir as the Ballard Field. Now, just from the cross section alone we can see there might be a break in the productive sands from the No. 3 Hodges to the No. 1 Dickson. It is on the pressure data which I base my thought that that well is in the same reservoir.

Q If there are Schlumberger logs available on wells in Range 9 west, will you explain to the Commission why you did not make a cross section to indicate the two closest points of the so-called Ballard and South Blanco? Why didn't you make a cross section in that immediate area which is the area, I might explain, that Skelly has recommended for connection, and that is the only recommendation we have made?

A The closest wells do not have Schlumberger electrical logs.

Q But there are Schlumberger logs available in wells in Range 9 west. Why didn't you make a cross section?

A The wells which were logged with those Schlumberger electrical logs, none of them were within the impermeable barrier, and they would show simply the situation such as this. Production from the top of the Pictured Cliffs sand in one area such as we had in P. Montin No. 1, McManus, production from the top of the sand in the Blanco Field such as in Ralph Davis No. 2 Luthy. If you assume there is nothing in between, the cross section could give an entirely false conception of the nature of the sand in that area.

Q If you made a cross section which went from the west end of the South Blanco-Pictured Cliffs which we have indicated as area A and the north end of the Ballard pool which we have indicated as area B, and made a cross section across there, it would show continuous production insofar as both ends are concerned of that cross section?

A Yes, just like there is production on the end of the cross section F and production on the right side of Exhibit F.

Q If you have a cross section with production on both ends, how can you assume there is an impermeable barrier between those two points? We have no drilling in that area.

A Because of the difference in pressure, the pressure data is far more important than two wells.

Q Now we agree then that you have made your deductionof the separation of this two areas which we have designated as area A and B, entirely on pressures, is that correct?

A Not entirely. That is the final factor in determining it.

Q What other point did you use in making your determination?

A The nature of the sand and how the reservoirs can be separated, are quite adequately shown on Exhibits F and G.

Q Exhibits F and G are not in the area we are talking about, are they?

A They are in the trend of the Pictured Cliffs in that immediate area, yes, sir.

Q One is seven miles away and one is two and a half miles away.

A That is true.

Q What information do you have with respect to the sand in area A and area B?

A Well, sir, we have the same type information that we have on the other wells.

Q What type of information do you have about this particular area, just answer the question, Mr. Greer.

A I have studied the logs, the completion records, the production data and the pressures.

Q I thought you said we didn't have any logs, Schlumberger logs on the north end of the Hallard?

A The logs I studied were the radioactive logs which were run in those wells.

Q Do radioactive logs give you any information about sand?

A A little.

Q Could you have made a cross section on radioactive logs?

A I could have, but the information would not show the nature of the sand as we find the character of it shown by the electric characters indicated by exhibits F and G.

Q It would give you a little information, as you said, and it would be better than nothing.

A I am not sure of that, and I might explain why.

Q All right explain it.

A Let's take, for instance, Southern Union No. 1 Nickson.

Q When you say Southern Union No. 1 Nickson, will you tell us the distance of that well from Sections 36 and 1 so we get the correct perspective? A Well, sir --

Q You can make your explanation.

A It is about five or six miles from this area that we are talking about. What I would like to talk about is the nature of the formation and how it is reflected in the different type logs.

We have shown approximately 90 feet of Pictured Cliffs formation in the Dorcheat Unit No. 1 Well. That formation, the Pictured Cliffs is sand from top to bottom. It is a porous sand, the porosity in the top of that sand may be just as high as the porosity in the bottom of the sand. Nevertheless, only the bottom of the sand is productive. The top of the sand is not productive. The type logs which I have used pretty clearly show that difference.

Now a radioactive log is dependent more on porosity alone. We have in this formation production determined by permeability. A radioactive log might show the same character in the top of this well as in the bottom. For that reason it would be immaterial to use it. It would not show the nature of the formation and would not be helpful in this case.

Q Now, your cross sections F and G indicate wells in which you have Schlumberger logs on all wells but one, is that correct?

A Yes.

Q That one is a dry hole? A That is correct.

Q Why did you put that well in when you use as a basis for a cross section on all the other nine wells, Schlumberger logs?

A It was a dry hole. Very definitely a dry hole in my opinion.

Q Do you have a log available on that log?

A We don't need a log to determine that well was a dry hole.

Q For the purpose of this cross section, you used as a basis Schlumberger logs except on that well. Do you have a Schlumberger log on that well? I believe you said yesterday it was unavailable?

A That is correct.

Q You mean it was not run or you do not have it?

A I don't know if it was run or not. Schlumberger's office di

not know, they don't have a record of it.

Q Is that a relatively old well? If you don't know, if you can't recollect, that is all right.

A I believe it was two or three years ago.

Q Without getting off this cross section, based on Schlumberger logs alone, what do you base the fact that this well was non-productive, just without getting off the two cross sections?

A The fact that the well, the casing was set, completion was attempted, the well was shot with nitroglycerine and was abandoned.

Q Then it was in the completion methods that you are saying that this is a non-productive Pictured Cliffs well rather than the Schlumberger log or any picture taken of the hole?

A Oh, yes, sir.

Q If you use the same basis on this cross section of Schlumberger logs only eliminating this well and putting this well over here, would you say then that there is an impermeable barrier across there?

A I would say it shows very clearly the possibility that an impermeable barrier could exist, and if the pressure data shows the pressures to be different in the two areas, it would pretty well confirm the fact there is an impermeable barrier between them.

Q When you say possibility, you don't know definitely one way or the other, but there is a possibility?

A I believe I said you cannot determine from cross sections alone when wells are, in the Pictured Cliffs, are in the same reservoir or not.

Q Assuming this goes clear across without these lines that you have put in indicating the well, what information do you have from the Davis Luthy Well No. 2 insofar as the bottom part of that zone

is concerned?

A I don't have any information. There were other wells in the field which were drilled to a depth which probably would have included all of the sand and did not show production in the bottom part of it, and so I imagine this operator felt that there was probably not production in the bottom part of that area of the Blanco Field, so he did not drill that deep.

Q Do you know if the well was drilled to a total depth there or through the zone?

A I think it was not drilled deeper.

Q It stopped short of the completion of the bottom of the pay there? A I think so.

Q If the lower part of this zone is productive, would that not correlate with the well immediately to the left there as you face it?

A It could, yes, sir, if the pressures were the same.

Q So that is a possibility? A Yes, sir, a possibility.

Q I notice that in this cross section, the bottom of the casing is in the Pictured Cliff zone but you have assumed the top of the Pictured Cliff to be the bottom of the pipe in this Sharp well?

A I didn't qualify all my exhibits and information yesterday. It was rather clear because of the total depth that this well was drilled that it probably penetrated the entire section of the Pictured Cliffs.

Q You just assumed?

A I checked the top of the formation on the adjoining wells, and it is quite reasonable to assume that that well tested to the Pictured Cliffs formation.

Q Now, going on to Exhibit G, can you tell the Commission whether or not the Southern Union No. 1-1 Newsom was tested?

A It was not tested.

Q It was not tested. All right. I notice on this Exhibit G that you have six question marks on the Schlumberger log here. Will you explain those question marks to the Commission? Just a minute.

MR. REIDER: May we ask Mr. Webb for a copy of the exhibits?

Q Now, I will repeat the question. Will you explain to the Commission the question marks, the six question marks on Exhibit G on the Schlumberger log on the Southern Union No. 1-1 Newsom?

A Those represent the remnant or possibly the remnants, of productive sands as they exist in that area. It is my thought that they probably would not produce, if they did produce it would be in, I think extremely small amounts, and it certainly would not be my recommendation to try to complete a commercial well from that type sand.

Q Then why did you put the question marks in there if you don't feel that it was productive?

A As I said, they might produce a little bit of gas, they might not produce anything. If they do produce I think it would be exceptionally small.

Q Then there is the possibility then these zones are productive of small amounts of gas? A Extremely small.

Q Now, on the top part of the Pictured Cliffs which is one of the zones, you have a question mark. Doesn't that sand streak carry clear across the cross section?

A It is a pretty good marker as to the top of the Pictured Cliffs sand. It is not always productive, however. It is very

difficult to tell either from the samples or from the log itself as to whether it would be productive. The sand is often a hard carbonaceous sand and its resistivity characteristics are quite similar for this hard sand as for a soft one that carries gas.

Q Mr. Greer, yesterday I think you and I agreed that the pressure gradient decreases as you go from the northeast to the southwest, is that correct?

A I don't feel there is a pressure gradient as such, across the area. We have higher pressures in one area and lower in the other.

Q The higher pressures in the northeast and the lower in the southeast? A Of pools, yes, sir.

Q You also stated that within the South Blanco Pool the pressures vary from 700 pounds to 850. I think in some instance it was in excess of 850.

A That was the initial three to seven day potential test pressures which --

Q (Interrupting) I believe you stated that the 700 pounds was on the west side and the 850 or higher was on the east side of that pool? A That is correct.

Q The 700 pounds is --, what we have designated as area A, is that correct?

A I believe so. Approximately, I believe I said 720.

Q The exhibits that Skelly has put in showed an arithmetical average of area A at 688, did you see that exhibit?

A Yes, sir, I saw it.

Q Referring to your Exhibit B, do you have a copy of it there?

A Yes, sir.

Q What is the pressure, the initial shutin pressure of the Turner No. 1-12 on that exhibit? A 620 pounds.

Q That is 620 pounds. Where is the well located, give the description.

A It is in Section 12, Township 26 north, 8 west, and is in the northwest quarter.

Q What is the initial pressure of the Turner No. 4-12 Ballard?

A 666 pounds.

Q What is the location of that well?

A It is in the same section in the southeast quarter.

Q It is in the same section, it is diagonally off the southwest quarter of No. 1, is that correct? A That is right.

Q What is the pressure? A 666 pounds.

Q That makes a difference of 46 pounds in the same Section 12, does it not?

A On the wellhead pressures for the times the wells was shutin, one seven days and one fourteen days, it is that difference.

Q 46 pounds difference, is that correct?

A Wellhead pressures. Don't confuse it to reservoir pressures.

Q That brings in an interesting point. Do you have any reservoir pressures in this area?

A We can pretty well tell what the reservoir pressures are as reflected by the wellhead pressures.

Q You don't have wellhead pressures except from calculations from wellhead pressures?

A The only factor to be considered in the difference in wellhead pressures and reservoir pressures is the weight due to the column of gas from the wellhead to the reservoir, providing there is

no liquid in the hole.

Q Then the answer is that you do not have any bottomhole pressure except from calculation from top hole pressures, is that right?

A Since the weight of the column of gas is almost exactly the same in the wells which are about the same depth, then wellhead pressures that are equal on the surface are almost certain to be equal in the reservoir, and so for the purpose of simplicity, we always use wellhead pressures, and I might go just a little further than that.

Q Before you go any further. I have asked you this question first time. I want to ask you again for the fourth time, do you have any bottomhole pressures other than those calculated from top hole pressure? A No, sir.

Q Now, if you have any explanation you are welcome to go ahead and make it.

A Okay, I would like to make it. The wells in this area vary in depth from around 2,000 feet to 2700 feet. The wellhead pressures will adequately and accurately reflect the reservoir pressure. As a matter of fact, we can more accurately calculate the reservoir pressure than we could measure it with a bottomhole pressure bomb. The reason being we can measure the wellhead pressure with a dead weight gauge which is quite accurate. The only error that can be introduced is the error in the column of gas which we can calculate it. The only thing we need to know is that the wells do not have any liquid in the hole, and this we determine when we take dead weight tests.

Q You telling this Commission that top hole pressures are

more accurate than bottomhole pressure?

A I am saying that the measurements of wellhead pressures with a dead weight gauge plus calculations as to the weight of the column of gas, give you a more accurate pressure of the reservoir than could be determined by running a bottomhole pressure test.

Q Your answer is yes, you say top hole pressures are more accurate than bottomhole?

A Let's not confuse the issue.

Q I asked you a question as to accuracy as to bottomhole and top hole pressures. I wish you could answer the question. Then you can make whatever explanation you want. Are top hole more valuable than bottom?

A Top hole can be measured more accurately than bottomhole.

Q You say they are then? A Yes, they are.

Q Is that true generally or is that just true of this area?

A It is true in all gas reservoirs which have approximate pressures as this and are approximately this deep, and have a small amount of liquids such as condensate.

Q Yesterday you said that the pressures, the initial pressures of the Ballard, I think the maximum was 669 or 668?

A Yes, sir.

Q And that the pressure throughout the Ballard Field didn't vary more than a magnitude of two or three pounds, is that right?

A Approximately that for wells that have been shutin long enough to reach their stabilization.

Q Yet the Turner 1-12 and the Turner 4-12 have a difference of 46 pounds?

A For the length of time they were shut in, that is correct.

Q What length of time is necessary to stabilize a well in the Pictured Cliffs?

A It varies quite a bit. We have taken bottom pressures on a number of wells. It depends partly on the capacity of the well and the area in which that particular reservoir is affected. For instance, we have tight spots, low permeability zones within a field. A well drilled into that zone might take six or seven months to build up to its maximum pressure. Sometimes we can get a comparatively good well in a spot within the field which has high permeability; in the course of completing the well we blow a certain amount of gas to the air and on shuting the well in, it builds up rather quickly to that pressure within the immediate vicinity of the well. It takes longer for gas outside the area to drain in and build up to the maximum amount. Just on a general picture, for comparatively good wells, 30 to 60 days will give us a reasonably good pressure.

Q Do you have any buildup pressure curves made on any of these wells?

A I haven't plotted the information. We have the buildup pressure data. A couple of points which I believe are adequate to determine the reservoir pressures I have.

Q That is statistical data. We want to see the curve to see whether or not in 284 days whether the stabilization occurred, it occurred in ten day, twenty days, twenty or twenty-five. If you don't have them we will just go on.

A I don't have any graphs of buildup curves.

Q All right.

A Could I make one explanation?

Q Yes, sir, to right there.

A I don't believe it takes a buildup curve to look at it to determine that a well that has built up one pound in 264 days was pretty close to stabilization at the time that the 07 day pressure was taken and build up one pound from that.

Q Mr. Greer, do you know whether or not any of the wells in area A are producing water or fluid?

A We don't operate any wells in area A and I do not know whether they are producing water.

Q You represent Turner, do you not?

A Area A. I am confused about your areas.

Q That is area A. Look on your map.

A I thought you were talking about your areas.

Q I am looking on your map there, Section 26 and up in the extreme west end of what you call the South Blanco-Pictured Cliffs, right there where you have your finger.

A Yes.

Q Yes.

A Yes, sir, I do not know whether any of those wells are producing water.

Q Do you know if any of the wells in area B or the north end of the Ballard Pool, whether any of those wells are producing water?

A A very small amount. There was one or two wells producing a little water. I forget which ones they are.

Q You have them listed on your exhibit, you might refer to them.

A I don't remember which well it was. I remember one or two.

Q Refer to your exhibits, then you can tell.

MR. LACEY: Which exhibit are you referring to?

MR. SCHUMAN: That is exhibit R. We pass it in front of him.

A I don't believe I remember showing any water production on Exhibit R.

Q You showed none being flowed intermittently?

A Oh, flowed intermittently?

Q Yes.

A Well, they were testing the wells.

Q Do you have any intermitters on any of your wells in the Ballard Pool?

A Let's don't get this confused. Where I have showed here flowed intermittently since completion, those are wells which have been completed and not tied into the pipeline, and they have been flowed for two or three reasons. One of them was for the purpose of taking tests. In fact, we lent our dead weight tester and critical flow prover to Southern Union to make the tests.

Q Why are some wells flowed and others not when shut down?

A The main reason those were flowed was because Southern Union had stepped out in the Township 26 north, 8 west and drilled a number of semi-wildcat wells. They own practically all of that township and they were quite interested in determining the availability of gas they would have from that township and I believe Mr. Weidekehr who is head of the exploration department, talked to me about testing the wells. His primary purpose was to determine the availability of gas from that area in planning a future drilling program.

Q Are there any wells capable of producing water that would have to be taken into consideration for the calculation of the top

hole pressure in the Ballard Pool, which you have indicated on your exhibits as the Ballard Pool?

A No, we have instructed our people, and when I take pressures myself at the completion of our shutin pressure test, say if it is 60 days or 20 days, we blow the well through the tubing to make sure there is no fluid in the hole at that time.

Q Do you do that with all wells?

A The wells which we tested, yes, sir.

Q The wells that you tested?

A That is the information shown as additional shutin pressures taken April and May on Exhibit B.

Q You said there were a few wells in the Ballard Pool that are producing water; which of those wells are they, if you know?

A On our company wells, McManus No. 7 produces water. Wilson 1, produces water, and Wilson 2 produces water.

Q Did you take into consideration that water when you calculated your pressures for those wells?

A Yes, sir, when we shut the wells in ordinarily the water tends to go back into the formation which it did on those wells. As a matter of fact, Wilson 1, over the period of time, built up to 668 pounds. That well makes about as much water. In fact it makes more water than any of the other wells we operate.

Q You say the water went back into the formation?

A Yes, it has a tendency which is unusual perhaps, but it is characteristic of nearly all Pictured Cliffs wells that when they are shutin, the water goes back into the formation, whatever water is in the hole. We have completed wells making as much as a barrel of water an hour and three hours of shutin there is no water in the

hole.

Q Does your [illegible] No. 4 make any water?

A A little bit. Not as much as Wilson 1.

Q Is that the well that you have initiated as being the stabilization well?

A McManus 4. It is one of those wells that is completed in an extremely tight zone and takes a long time to build up.

Q Is that the one that made 669 pounds in 2#4 days shutin?

A No. It made 664? McManus No. 1 showed 669 pounds in 2#4 days.

Q No. 1? A Yes.

Q What does No. 4 show? A 612 pounds.

Q In how many days? A 126 days.

Q That well makes a little water?

A Yes.

MR. SELINGER: Why not check the exhibit for that.

Q Refer to Exhibit B and give the initial shutin pressures of your Turner No. 1-11.

A The Turner No. 1-11 is 626, taken on potential shutin, 13 days.

Q Where is that well located? A In Section 11.

Q What part of Section 11?

A The southwest quarter. Hold it. The northwest quarter, I am sorry.

Q Where is your No. 2-11 in the northeast quarter? What is that pressure from your exhibit? A 650 pounds.

Q So the difference between the pressures initially there between those two wells, is 24 pounds? A In the wellhead pressure.

Q Do you know if either one of those wells make water?

A I am not certain.

Q How do you reconcile the statement that you made that there is approximately a two-pound equalization or difference in equalization or stabilization, in the Lallard pool, yet in the north end you have variation in pressures as much as 46 pounds?

A The wells were not shutin long enough to build up to their maximum pressures.

Q But the buildup of 620 pounds in seven days and 666 pounds in fourteen days is a lot better than 284 days in some instances, isn't it?

A Depending on the character of the well. Sometimes the wells buildup rather fast.

Q Well, if all wells shutin 284 days, would you have a different result than what you have indicated on your Exhibit B?

A Chances are if all the wells were shut in 284 days they would get pretty close to 669 pounds original pressure. There would be a few that wouldn't, some in the real tight zones.

Q Despite the 46 pound difference between your Turner 1-12 and your Turner 4-12 in the same section and the horrified look you had on your face with respect to a 50 pound difference between the area A and area B, there is not much difference between 46 pounds and 50 pounds, is there generally?

A When we talk about the difference in the pressures in area A and area B, we are talking about reservoir pressures.

Q You are talking about reservoir pressures?

A Reservoir pressures as reflected by stabilized wellhead pressure. That is the important pressure by which we must determine

the limits of the field. It is not a two-day or seven-day shutin pressure, which as you can see, vary considerably. What we must be concerned with is the equalized reservoir pressures which we can determine from wellhead pressures.

Q I understood you to say there was a 50-pound difference between the west end of the so-called South Blanco-Pictured Cliffs and Ballard-Pictured Cliffs, you said that yesterday.

A Yes, at least 50 pounds. We do not have the buildup data to tell how far the wells in South Blanco would have built up.

Q You had occasion to look at Skelly Exhibit, the data sheet which indicated the original shutin pressure in area A and area B?

A We did have one. Here is one here.

Q It showed the arithmetical average between area A and area B on the original shutin pressure of 50 pounds, and on the seven-day shutin pressure a difference of 21 pounds?

A Well, I don't see your average on the first, but I suppose that is right.

Q I will ask you to bear with me like the other attorneys, that was my calculation. So that the average between the area A and area B is 50 pounds and the difference of pressure of two wells in the Ballard-Pictured Cliffs in the north end of the two nearest wells to area A differed 46 pounds, and the difference between your Turner 1 and 2-11 is 24 pounds, is that correct from your Exhibit B?

A Yes, sir.

MR. SELINGER: That is all.

MR. MACEY: Anyone have any questions of the witness?

MR. GREINER: I have a couple of questions.

CROSS EXAMINATION

By Mr. Hall:

Q You recall a portion of Mr. Selinger's cross examination where he was discussing with you the basis for your continuation of your green cross-hatched impermeable barrier area over into Range 9 west, Township 26 north, and he was pointing out that your two cross sections in Exhibits F and G were some two and a half or more miles distant. You recall that portion of his cross examination?

A Yes, sir.

Q He was asking you what control you had in the western portion of your line, or rather the northwestern portion. Did you have any dry holes in that area to assist you in your determination that the impermeable barrier area did in fact continue over into Range 9 west, Township 26 north?

A Yes, sir. The two dry holes in Section 26 in that township.

Q So that you were not basing your opinion that the impermeable barrier continued through that area solely on these cross sections further to the east, but you were also taking into the account the two dry holes? A That is correct.

Q You felt those were significant data which needed to be considered, is that correct?

A That is correct. I believe at one time one of Skelly's witnesses indicated that the two dry holes might be just a local condition, but this indicates to me that it is not a local condition. It extends over at least ten miles.

Q You were here, were you not, when Mr. Clausen was testifying? A Yes, sir.

Q As one of Skelly's witnesses? A Yes, sir.

MR. SELINGER: You mean Mr. Clausen, our geologist?

MR. GRAHAM: That is right. You asked him about geological matters with --

MR. SELINGER: (Interrupting) Because he desired to go into it. Perfectly all right with me.

MR. GRAHAM: I don't think you will find this pertains too much to Mr. Clausen's qualifications as a geologist, if you will bear with me a moment.

Q Do you recall Mr. Clausen's testimony that in his opinion one of the primary reasons why these areas between the fields had not been drilled was because of surface topographical conditions, arroyos, canyons, mesas, et cetera, which made drilling difficult through this area? A Yes, sir, I recall that.

Q You have been out making tests on these wells I gather personally, or personally supervising them, is that correct?

A That is correct.

Q Are you generally familiar with the topography lying between the western portion of the South Blanco Field and the northeastern portion of the Ballard Pool? A Yes, sir, I am.

Q What is the surface condition through there? Is it any better or worse than the areas which have been rather closely drilled on either side of it?

A Part of it is exceptionally good terrain for the purposes of drilling. As a matter of fact, I think we established about twenty locations in that area.

Q So that you are aware, based on your personal familiarity with this, of no topographical condition that would impede the drilling of wells?

A There is one place, the Huerfanito mountain, that might

precludes the drilling of one of three or four locations, but that is all.

Q There is that limestone?

A I believe it is that in Section, around Section 34, 27 north and 9 west.

MR. GREINER: 34 or 36? A I believe 34.

Q That would knock out only three or four locations you say?

A That is correct. There is in Section 36 and Section 1 on part of 35 is excellent country for drilling.

Q How about moving over into the next range east, how about Section 31 of Township 27 north and Section 7 in Township 26 north?

A Yes, sir, those areas are accessible.

MR. GREINER: Thank you.

MR. MACEY: Anyone have any other questions of the witness? Mr. Reider.

By MR. REIDER:

Q Mr. Greer, on this log interpretation between the Southern Union No. 1-B Newsom and Southern Union No. 2-A Newsom, why do you place a different interpretation on the top of the Pictured Cliff in both wells? In other words, I believe you said the 1-B Newsom, it was due to carbonaceous matter and yet the log characteristics are essentially the same from one to the other.

A Yes, sir, that is why I put the question mark there. I don't know, it might be productive and it might not be productive in the first two feet or three feet in the top part of the section in the Southern Union No. 1-B Newsom that might produce.

Q It is possible?

A Yes, it is possible that it might produce a little bit.

Q Do you have any information on the Southern Union 2-A Newsom in Section 6, that well is drilling currently, is it not?

A I do, sir, that is a location that was established at the same time as about six or eight other Southern Union locations in that township. The other wells, which were established at the same time, which I think were three months ago, have been drilled now. For some reason Southern Union has not drilled this location which was established, this location in the southeast of 6, which was established at the same time as the others. Might be they are a little scared of it, I don't know.

By MR. ARNOLD:

Q I would like to ask one more question in regard to 2-A Newsom and 1-B Newsom. Why is it that you say there would be a maximum of two or three feet which would be productive in the top of the No. 1-B Newsom?

A I believe we have found that we have to have a pretty good self potential in this area on the order of twenty to thirty millivolts.

Q The point I would like to make, the millivolts on the 1-B as you do on the 2-A so far as the deflection of the shale line is concerned. Therefore, if you assume that the 2-A Newsom is all pay, it looks like you would also have to assume that the upper lobe on the 1-B was also pay.

A Well, it is a possibility. I don't know. I put the question mark there for that reason. It could produce and it might not.

MR. ARNOLD: That is all.

By MR. STANLEY:

Q Mr. Greer, are those two pools at the present time producing

natally?

A One pool is prorated and the other has not yet been prorated.

Q Which pool produces more gas than the other on a per well basis?

A Well, now, you are talking about the pool or this area that we are concerned with with Skelly?

Q Well, area A and area B.

A We might call it Skelly's area, is one of comparatively low capacity. I think we have one or two wells which produce as much by themselves as all the other wells in Skelly's area put together.

MR. STANLEY: That is all.

MR. MACEY: Anyone else?

By MR. UTZ:

Q I would like to ask one question. Mr. Greer, referring to your Exhibit A, this question is partially for clarification and partially for information. Should we get two producing wells in the south half of Section 6, 26 and 8, what would be your opinion as to separation there, would you say it still existed or would you change your impermeable barrier?

A No, sir, I really hoped that we can get some productive wells in that area. We hoped that the impermeable barrier may be as narrow as one hundred feet, and we can have production on both sides.

MR. SELINGER: Which area, Section 6?

A In the event we do obtain commercial production, let's say for instance that we drill just inside the permeable barrier and were fortunate in fracting it outside the barrier to where we did

establish commercial production, I don't believe we would have any difficulty in determining to which reservoir the well is open simply by taking its stabilized shut-in pressure.

Q Then you believe that the impermeable barrier could be between offset wells?

A Oh, yes, sir, very definitely it could be between offset wells.

Q And it would be vertical or horizontal separation?

A Well, it could be either one.

MR. MACEY: Or both?

A Or both. Of course it could be quite confusing if it is both.

MR. UTZ: That is all.

MR. MACEY: Mr. Webb, do you have any further questions?

RE DIRECT EXAMINATION

By MR. WEBB:

Q I want to clear up a couple of points; Mr. Selinger persisted in calling the area indicated in blue as the so-called South Blanco Field. That is not the so-called, it is the South Blanco Field as defined by the Commission, isn't it? A Yes, sir.

Q Going back to the type of pressures which you have taken in the Ballard-Pictured Cliffs Pool and the type of pressures which Skelly's witnesses testified to yesterday, there seems to be some confusion in Mr. Selinger's mind as to what pressures mean and what is the difference between initial pressures and what is the difference in a, say seven-day shut-in pressure after the well has been on the line. If you will explain that to the Commission.

MR. SELINGER: I object to that, if you will strike Selinger

is confused. I have been into this business long before you got into it, Webb.

MR. WEBB: I am sure you have.

MR. SELINGER: I would like to have that stricken.

MR. WALKER: It will be sustained.

MR. SELINGER: If you want to explain the two different pressures it is all right with me, but we don't have to have the snide remarks.

Q Go ahead, Mr. Greer.

A We went over our pressure data rather hurriedly yesterday and we didn't go into all the features of it. Perhaps now we might explain a little more fully. The pressures I have used are the initial stabilized reservoir pressures as near as I can determine them from stabilized wellhead pressures. Now, as set out on Exhibit B, we have recorded only the wellhead pressures. If we can determine the initial stabilized pressures in each of two reservoirs and can tell that the pressures are different by an amount which we have here at least 50 pounds, we can be reasonably sure that those two reservoirs are not connected. If they were connected such that offset wells could have interference and would be considered in the same pool, then over the course of millions of years of time the two reservoirs would have equalized in pressure.

The fact then that the initial stabilized pressure as distinguished from pressures taken after production has been obtained from the wells, is the pressure which we need to use in determining pool boundaries.

Now, I made the statement that the wells when stabilized, reached pressures that were within two or three pounds of each other.

Of course two or three pounds, we believe to be a reasonably close measurement of pressures as we take them. We take them with a dead weight tester and we try to keep our testers in good condition. Nevertheless, it is a mechanical instrument and it is subject to wear and it just takes a very small amount of wear to give it considerable error in a dead weight tester because of this we check them every once in awhile, and ordinarily two or more dead weight testers will check within two or three pounds. We have, in determining the reservoir, true reservoir pressure, we like to take wells with comparatively high capacity, especially high natural flow, artificial stimulation of the wells does not give us a true picture of the rate at which a formation can build up to its maximum pressure. Wells which are in that respect good wells to determine stabilized reservoir pressure, are for instance the Benson-Montin McManus No. 1, which had a natural flow on the order of, I believe three or four hundred thousand, and which well was drilled in with rotary tool and then shot and in a case like that we usually find that the natural flow is less than would have been had the formation not had drilling mud put on it.

We think that that well is a pretty good well. Then two other excellent wells are Benson-Montin No. 2, Quitzau, and No. 3 Quitzau. I believe No. 2 Quitzau is shown on Exhibit B to have after 83 days, a shutin pressure of 657 pounds. The Exhibit C shows No. 3 Quitzau to have 656 pounds after 60 days. Those wells had initial natural flows on the order of one million to two million cubic feet per day, and after shot, let's see, No. 2 had a potential of five million one hundred thousand, and No. 3, I believe we tested last Saturday and was about four and a half million. Those wells are unquestionably

good wells to determine initial reservoir pressure.

We notice that the pressure there is about 12 pounds less than we had in our McManus No. 1. It is interesting to note that those two wells were drilled on top of a mesa about 70 feet higher than the McManus No. 1, and the weight of the column of gas of 70 feet from the top of the cliff to the valley, putting it on the same elevation and the No. 1 McManus would be about 12 pounds. If we add this 12 pounds to the weight of the column of gas to put the well at the same elevation, we would then have 668 pounds for No. 3 Quitzau and No. 2 would be 669, 668 and 667 which check within about 100 pounds of No. 1 McManus.

I would like to say just a word about the comparison which Skelly's engineers used. He compared pressures after production was taken from the wells and wells which are about three or four miles apart. There are some fields, some gas fields perhaps, which after having been produced and being shutin seven days, might equalize over that distance of three or four miles. But such a comparison might have a little validity in such a field as that. We know in Pictured Cliffs Fields with permeability of the sand such as we have here, that it would take not a few weeks for pressures to equalize across that distance. Even though they were in one reservoir and connected, it would take at least two and maybe three years for the pressures to equalize. The comparison that Skelly's engineers made in that respect is of utterly no value in this attempt to distinguish one reservoir from another.

Q Then based upon your study of the area and the comments you have just made, is it your opinion then that the Ballard Pool as presently defined, and as proposed to be extended, is definitely

separate and distinct from the present limits of the South Blanco Field?

A That is correct.

Q I believe you testified on cross examination that there was some thirty or forty pounds differential in the pressure indicated on your exhibits between the Ballard Federal 1-12 and 4-12. If those wells were shutin for a sufficient length of time, do you think there would be a material difference in their shutin pressure?

A That is correct. They probably would have built up on the order of the other wells. We should point out in this particular area the natural flows of the wells are quite small and it takes a considerable amount of time for the reservoir to build up to its true pressure around one of these wells.

Q One other thing, Mr. Selinger questioned you very closely on the distance of your cross sections from the boundaries of the Huerfanito Unit. If you drew, if information was available to draw a cross section within the Huerfanito Unit, would the same indicate an impermeable barrier?

A If we drew a cross section from the productive wells in the northeast part of the unit to the southwest part of the unit, we would cross over Section 26 in which there are two dry holes which would show an impermeable barrier between the two.

MR. WEBB: That is all.

MR. MACEY: Anyone else?

RE-CROSS EXAMINATION

By MR. UTZ:

Q Referring again to your Exhibit A and Section 26 of 27 north and 9 west, the two dry holes you show, and on which you base your impermeable zone, I notice that you drew in on this exhibit the

impermeable zone to the south of those two wells. Would it not be true that it would go through the middle of those two wells?

A Well, of course, we don't know exactly where it would go. It probably should be extended to go northeast of those wells, and it might even come south and west clear across Section 27. Perhaps I should have drawn it through the center of the wells.

Q Would you have any opinion as to how wide the impermeable zone is between those two wells?

A No, sir, I don't. We certainly hope it would be thin, and we will have a big productive area and a small non-productive area.

Q What I am wondering, how much of the acreage in the Gentle l-A is non-productive acreage due to that zone?

A I think it could either be all productive or possibly only partly productive.

Q It is possible that we are allocating too much acreage to that well?

A Well, of course I feel that is probably true in all of the edge wells on our fields.

MR. UTZ: That is all.

RE-DIRECT EXAMINATION

By MR. WEBB:

Q Directing your attention to Exhibit A and the J. Glenn Turner 3-12 Ballard that is in the northeast quarter of Section 12, 26 north, 9 west, and this Southern Union well, I am not sure what the name of that is.

MR. SELINGER: Starr.

Q In the northeast quarter of Section 6, 26 north, 8 west, what is the difference in pressure between those two wells?

MR. SELINGER: You mean initial or seven-day shutin?

MR. WALSH: Initial pressure.

A I have some pressures on the No. 1 Starr on one of these exhibits. Perhaps we had better read into the record the pressures we had on it. No. 1 Starr was Southern Union No. 1 Starr in the northeast of Section 6, Township 26 north, 8 west, was completed October 6, 1954 with initial shutin pressure of 692 pounds, and after shutin fourteen days. That well has been flowed and tested intermittently from that time, and another pressure we took, Benson-Montin took, on April 15, showed 686 pounds. Then I believe the well was shutin from April 15 to May 3rd although I am not certain, it may have been produced a little during that time and on May 3rd of this year it was 690 pounds. So we do not have a good stabilized pressure on that well yet. We do know that it has a pressure of at least 22 pounds, or 21 pounds, we have a pressure of at least 21 pounds greater than the pressure of wells completed in the Ballard Field reservoir.

MR. SELINGER: How many pounds?

A Twenty-one pounds, at least twenty-one pounds.

Q If the well was shutin for a longer period of time, you believe that difference would be increased?

A It probably would increase.

Q You have indicated that well to be on the one side of the impermeable barrier on the Ballard Field on the other?

A That is correct.

Q Based on that differential in pressure?

A Yes.

MR. REIDER: That data on the Starr is in your Exhibit E.

A Thank you.

MR. MACEY: Any further questions of the witness? If not the witness may be excused. We will take a short recess.

(Recess.) (Witness excused.)

MR. WARE: We would like to introduce our exhibits A through G.

MR. MACEY: Without objection they will be received. Anyone have anything further in this case?

MR. GREINER: Yes, we have one witness, please.

F. N O R M A N W O O D R U F F

having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. GREINER:

Q State your name please. A F. Norman Woodruff.

Q By whom are you employed?

A El Paso Natural Gas Company.

Q In what capacity?

A I am a member of the operating group presently in charge, among other things, gas proration and related matters, for my company.

Q What is your professional background, are you an engineer or geologist?

A I am a graduate petroleum engineer.

MR. SELINGER: We admit his qualifications.

MR. GREINER: Are his qualifications acceptable to this Commission?

MR. MACEY: They are.

Q In connection with your duties with El Paso Natural Gas

Company, are you familiar with any studies which have been made by that company with the Pictured Cliffs formation, and production therefrom, in this San Juan Basin Area?

A Yes, sir, I am.

Q To what extent have you personally participated in those studies?

A Prior to the first of February, I was a member of the reservoir group in Houston, whose duty it is to make continuing studies of all the pools in the San Juan Basin. I was the coordinator of engineering and geological evidence in those pools.

Q The studies up to that time, which have been made of this area, had been under your direct supervision?

A That is correct.

Q Since that date, what has the situation been?

A Such studies continue on the same basis or similar basis as it was established during my stay there.

Q You have seen the results of those studies so that you know they have been continued on the same basis that they were being made when you were there, is that correct?

A That is correct.

Q In Case 729 before this Commission, did you testify in that case as to pool delineation of the San Juan pools?

A Yes, sir, I did.

Q Was that testimony based upon these continuing studies which you have referred to as they stood at that time?

A Yes, sir, they were.

Q Generally speaking, what were the data upon which those studies were based, or which they took into account?

A At the time of the hearing we testified as to the indication of separateness of these pools on the basis of pressure, on the basis of net effective pay, on the basis of initial potential, and as indicated by the dry holes or non-commercial or abandoned wells in the vicinity of these pools.

MR. GREINER: We would like to have incorporated in the record of this case so much of the testimony in Case No. 729 as related to pool delineation matters. That was the case involving both pool delineation and proration formula and units and other matters, and particularly El Paso's Exhibit No. 2.

Q What was El Paso's Exhibit No. 2 in that case?

MR. SELINGER: Did you make your offer?

MR. GREINER: I want to know more fully what your offer is.

A El Paso's was a map on which was outlined the recommended pool limits of the Pictured Cliff Pools under the call of that hearing as well as the West Kutz Pool. Represented on that map was representative pressures of the various pools outlined.

MR. GREINER: Thank you. We now ask that the matter referred to be incorporated by reference into the record.

MR. MACEY: Any objection to Mr. Greiner's motion?

MR. SELINGER: No objection.

MR. MACEY: If no objection, the record will so do.

Q That Exhibit just referred to in Case 729 bore on it recommended pool outlines, is that correct?

A That is correct.

Q Were those pool outlines substantially followed by the Commission in its order in that case? A They were.

Q There were some areas of variance, but substantially the pattern was followed, is that correct? You said, I believe, that these continuing studies have been brought up to date. Have you reviewed the results of these continuing studies as they now stand?

A Yes, I have.

Q Have the results of those studies been set forth in exhibit form?

A Yes, sir, they have.

Q I would like to have this map marked as El Paso Southern Union Exhibit No. 1.

(Marked El Paso Southern Union Exhibit No. 1, for identification.)

Q State for us, if you will, Mr. Woodruff, the data which appears on this Exhibit No. 1.

A Located on Exhibit No. 1 are the wells completed in the various formations in the San Juan Basin, as of May 20, 1955.

Q In addition to the outlines of the pools as presently indicated --

A (Interrupting) Excuse me. I had better correct the record. It reflects a condition as of May 4th, 1955. The original base map was prepared on May 20, 1953.

Q Thank you. You state, I believe, that the present pool outlines are indicated by solid lines, is that correct?

A That is correct.

Q What do the dotted lines indicate on the map?

A The dotted lines indicate, or include, wells drilled recently

which have not been included in any designated Pictured Cliff Pool. I might state that the areas for the most part, are covered in pending hearings of the Commission concerning pool delineation, and further that I find after checking it upon arriving here, that we are in almost complete accord with the area in which the pool should be placed.

Q So that the dashed lines then represent recommended additions to the present boundaries of the various pools, is that correct?

A That is correct. I might add also, Mr. Greiner, on this map I have placed some pressures, original reported wellhead pressures which are shown in different colors. I have just shown them on the perimeter of the pools and some down the main corridor of the pools, and have indicated an estimated average pressure for each of the pools.

Q In this Case 729 that we have referred to, was the Ballard-Pictured Cliff Pools within the scope of that hearing?

A No, sir, it was not.

Q Was the pool in any way discussed in that hearing, or were you present at that hearing?

A I was present at that hearing.

Q Was the Ballard-Pictured Cliff Pool discussed in that area?

A The area which is now called the Ballard-Pictured Cliff Pool was discussed at that hearing.

Q Did you make any recommendation with respect to that pool?

A I did.

Q What?

A I indicated that there was no indication of communication or connection between that area and the existing pools, and recommended

to the Commission that zoning additional development and studies which would indicate connection, that that area remain separate from the then existing Pictured Cliff Pools.

Q Was the action taken by the Commission in that case consistent with your recommendation? A It was.

Q You have been present during previous portions of this hearing, have you not, Mr. Woodruff? A Yes, sir.

Q You have heard the emphasis placed by Mr. Selinger on the relative proximity of some of these wells which Mr. Greer has indicated he thought were in the one hand, in the Ballard Pool and in the other on the South Blanco Pool, is that correct?

A Yes, sir.

Q Approximately how far apart were those wells, the closest of them that Mr. Greer was talking about?

A Distance I believe of a little better than one mile. I do not recall Mr. Greer's exact testimony on that.

Q You do recall the wells and have now looked at the map and see they are about a mile apart? A That is correct.

Q Elsewhere in this area, are there other situations in which pools as delineated by the Commission, approach each other within a distance of one mile or less?

A You mean in the San Juan Basin area?

Q In the San Juan Basin area and the area generally embraced by the pools which are the subject matter of this hearing.

A Yes, they are.

Q Would you point out one or two of those for us, merely by way of illustration?

A On El Paso Exhibit No. 1, El Paso and Southern Union

Exhibit No. 1, we find an area of close proximity in the southwest extremity of the West Kutz Pool, and the southwest extremity of the Fulcher-Kutz Pool in the vicinity of Section 32 of Township 27 north, Range 10 west. We find a similar condition to prevail in the southeast portion of the Fulcher-Kutz Pool, and the southwest portion of the Aztec Pool in the vicinity of 26, 28 north, Range 10 west.

MR. SELINGER: Mr. Greiner, you know that you are going outside the seven township area indicated in the notice, but we don't have any objections if you go outside the area.

MR. GREINER: My impression of the notice was that it was a general nomenclature and delineation hearing on the Pictured Cliffs Pool.

MR. SELINGER: Insofar as the seven townships are concerned. We are not raising that jurisdictional question.

MR. MACEY: Just a minute. Let me read the notice for everybody's information. You don't have to copy this.

(Notice read.)

MR. SELINGER: We withdraw our objection.

MR. GREINER: Will you read the last question, please?

(Question and answer read.)

Q Now, Mr. Woodruff, referring to these two situations again, which you just mentioned to us, do you feel that the Commission was on sound ground in dividing into two pools in those two areas and separating the delineation there so they would not be in the same pool even though they closely approached one another?

A I do.

Q On what basis?

A On the basis of the information available within the pools

and for the wells in the area, the term connecting of these pools.

Q And that information includes the various matters that you say were embraced in the continuing studies that your company has conducted, that is the pressure data, sand thickness studies, and potential studies, is that correct? A That is correct.

Q So that do you or do you not find anything unusual in this area in having two pools approaching one another within as little as a mile or less, and still being recognizeably separate pools?

A No, sir, I don't.

Q This is not then the only situation in this area where the condition emphasized by Mr. Selinger, has been found to exist and recognized by the Commission? A That is correct.

Q Mr. Selinger, in his cross examination of Mr. Greer, brought out the fact that within the western portion of the South Blanco Pool there was a greater variance in pressure between wells than the variance between the pressure in the wells on the southwestern flank of this South Blanco Pool, and the wells in the Ballard-Pictured Cliffs Pool. Does that fact indicate to you that the two pools should be combined into one? A No, sir, it does not.

Q How would you reconcile that in your view, that the two pools should not be combined with this variance in pressures to which I have just referred?

A First, my company has taken cognizance of the fact that there is considerable, if that is the way it was expressed, pressure differential between some portions of the South Blanco Pool and the area under consideration in which may be described as the northeast portion of the Huerfanito Unit. El Paso Natural Gas has wells in this northeast portion of the Huerfanito Unit and surrounding area

presently that area is carried, or a portion of that area is carried, in the South Blanco Pool, and prorated in that pool. We have no indication that such action is not appropriate, and we are recommending that it be continued. There is a question in my mind that that area is connected to the South Blanco Pool proper. It may be necessary after we have additional development and information to set that particular area separate and apart from either the South Blanco or the Ballard-Pictured Cliff Pool setup to the south.

Q In other words, as I understand you, you are saying that perhaps what is now that western or southwestern flank of the South Blanco Pool, will prove itself in time to be a different reservoir from what is the larger bulk of the South Blanco Pool as presently delineated by the Commission?

A I believe that very well may be true.

Q Is it your conclusion that the Ballard-Pictured Cliffs Pool and this area along the southwestern flank of the South Blanco Pool as presently defined, are in fact separate pools?

A It is my belief that they are.

Q On what do you base that, Mr. Woodruff?

A Primarily on the pressure differential existing between these two areas.

Q The same data which was referred to by Mr. Greer in his direct testimony, is that correct?

A That is correct. As reflected in our continuing studies of my company.

Q Are your conclusions in that regard, weakened by the data presented by Skelly witnesses with respect to the present relatively small differential in existing wellhead pressures as between those

two areas? A No, sir, it is not.

Q Why not?

A The seven-day shutin pressures taken during the deliverability test period, among other things, would have reflected the stage of depletion of the reservoir, the rate at which the well had been produced prior to the time of shuting in, and the line pressure against which that well was producing rather than reflecting reservoir or stabilized reservoir pressures, which may or may not have indicated a common pool. I might go further on that, as an example, to say that if we had two pools, say one was a thousand pounds initial pressure and the other one five hundred pounds initial pressure, and the one pool depleted itself until its remaining stabilized pressure was five hundred pounds, and then that there were tests taken on the wells in the two pools which would indicate a comparable buildup in seven days, that it would certainly not indicate in that instance, or do I think in this instance indicate communication between the two pools.

Q You will recall the Turner-Benson and Montin Exhibits where Mr. Greer outlined in green cross hatching, his interpretation of the probable approximate location of an impermeable barrier between the Skelly area A and the Skelly area B?

A Yes, sir. I have viewed that exhibit.

Q Do you agree with Mr. Greer's interpretation of the data in that regard?

A I agree to the reasonableness of his interpretation and conclusion.

Q Do you agree to the probability of his interpretation?

A I do. I might add that since arriving here, I have studied

the exhibits, the cross sections which I believe were Exhibit [illegible] presented by Mr. Greer, and I concur with his conclusion that there is indication of the permeability barrier between these two areas.

Q Now then, speaking about these two areas particularly, did your company drill one of these dry holes that has been referred to?

A No, sir, but we acquired said well.

Q That is the El Paso Gentle No. 1 as currently designated?

A That is correct. That well is located in the southeast quarter of Section 26.

Q What efforts were made to stimulate that well so as to make a producer out of it?

A Prior to acquisition by El Paso, that well was shot. Subsequent to acquisition, and hoping to qualify or to justify our acquisition, we did sandfract that well.

Q Did your investment look any better after you sandfracted it?

A No, sir, we found no increase in indication of gas productivity after having sandfracted the well.

Q Are there any other recognized stimulatory methods in this area that have proved useful?

A None any more so than the sandfract or hydrofract that is still in use.

Q You are satisfied that your company has done everything possible to bring that well into producing status, is that correct?

A That is correct.

Q It is still a dry hole? A Yes, sir.

Q Has it been plugged and abandoned?

A I am not familiar with the well record on that well. However, it is indicated to be an abandoned well on my map. I assume

it has been.

Q If it hasn't been, it ought to be shortly. Referring again to Exhibit 1 presently on the board and to the dashed line areas which you say are recommended additions to the present pools, would you go to the map please, and explain to the Commission the various recommended extensions there shown, and outline briefly the reasons therefor? Incidently, before you start on that, let me ask one question. You are at no point recommending any delineation, are you, from presently designated pools?

A No, I am not.

Q Or are you recommending any change of an area from one pool to another? A No, I am not.

Q All we are concerned with here is recommended extensions?

A That is correct.

Q Now, if you will go ahead with the requested explanation as I first asked you.

A In all instances the area included in the dotted lines are for wells drilled more recently than the latest pool delineation order that I was acquainted with. I include on to the northeast side of the Aztec-Pictured Cliff Pools, Section 34 and 35, Township 30 north, Range 10 west so as to include the El Paso Natural Quigley. I believe that is No. 1 well located in the northeast quarter of Section 35. Continuing on down the east side of the Aztec Pool, I am recommending the inclusion of the west half of Section 7 and the west half of Section 8 located in Township 28 north, Range 9 west.

May the record show that it is the west half of Section 8 and the west half of Section 17. Continuing on to the west side of the Aztec Pool, I am recommending the addition of Sections 11, the west

half of Section 12, Sections 14, 13, the north half of Section 23, all of Section 24, and of Section 25 in Township 28 north, Range 10 west. The southeast quarter of Section 34 and the south half of Section 35, Township 29 north, Range 10 west, as indicated by the productive wells on the tracts therein.

I might add that there are some so-called tracts which do not have wells. I will outline, if it is the desire of the Commission, the wells which prompt me to make these recommendations.

Q They do, however, appear on the exhibit?

A Yes, they do appear on the exhibit by name.

MR. UTZ: I think we included that in this month's recommendation.

A That is correct. Also on the west side of the Aztec Pool I have recommended the addition of the southeast quarter of Section 5, Township 29 north, Range 11 west. Going to the Fulcher Kutz; in addition I am recommending the addition of the southeast quarter of Section 19, the east half of Section 30, and the south half of Section 29, Township 29 north, Range 10 west.

Q That is to the Aztec Pool?

A That is correct. Going to the Fulcher Kutz Pool to the southwest, I am recommending on the eastern boundary, the inclusion of the south half of Section 23 and all of Section 36, Township 28 north, Range 10 west, and on the west boundary the inclusion of Section 14, Township 29 north, Range 12 west.

Again my statement to the presence of productive wells exists in the areas that I have recommended to be included in the existing pools. It is my recollection that the West Kutz Pool is not in the call of this hearing; unless the Commission desires I will not

enumerate the extensions. In the South Blanco Pool we are recommending the southwest portion, the east half of Section 31, Section 32, 33 and 34, Township 27 north, Range 6 west, be included as well as the northeast quarter of Section 5, the north half of Section 5, and all of Section 4, Township 26 north, Range 6 west. In the southeast portion of the South Blanco Pool we are recommending the addition of the south half of Section 28, 27, 26, 25 and the northeast quarter of Section 33, Township 26 north, Range 6 west. As well as the south half of Section 30, the southwest quarter of Section 29, the northeast quarter of Section 31, and all of Section 32 in Township 26 north, Range 5 west.

We are recommending the following additions to the Ballard-Pictured Cliff pool. The southeast quarter of Section 3, all of Section 9, north half of Sections 10 and 11, all of Section 12, north half of Section 13, the northwest quarter of Section 16, the remaining portion of Section 16, that is not already included in a designated pool, the northeast quarter of Section 21, north half of Section 22, northwest quarter of Section 23, and the southeast quarter of Section 23. All being in Township 26 north, Range 9 west.

In addition we recommend the inclusion of the south half of Section 15, 16, 17 and all of Section 18, Section 20, 21, 22 and the south half of 23, Section 26, 27, 28 and the north half of Section 29, the north half of Section 33 and 34, and all of Section 35, and all such tracts being in Township 26 north, Range 8 west, and the northeast quarter of Section 2, Township 25 north, Range 8 west.

Q Now, all of these recommended extensions of pools are based on drilling subsequent to the last pool delineation order of the

Commission, of which you were aware at the time that you prepared this study, is that correct?

A That is correct. Either it is due to drilling, there may have been some wells in this area already drilled, but to the additional drilling of wells that we have now considered it to be appropriate to connect those wells.

MR. MACEY: I think you made one mistake, in order to clarify the record right now, the Township 26 north, 9 west you said the southeast quarter, where you meant the southwest quarter, is that correct?

A That is correct. I may point out for the record that on my map I have indicated additions to pools, and to pools that are not under the call of this hearing.

Q In the event of any variance between your oral recitation of these sections and the map, you intend the map to control, is that correct? A That is correct.

Q Do you have any further comment you desire to make in this case?

A It is significant, I believe, in the determination of separateness of pools as the initial pressure, referring to reservoir pressure which as has been testified here, is well indicated by the stabilized wellhead pressure. It is my firm belief that if Mother Nature didn't permit the pressures to equalize in geologic time, that certainly there must have been a permeability barrier effective preventing such stabilization, and think that alone is sufficient to cause the establishing of separate pools.

Q The pressure data upon which you are basing that opinion you have just expressed, is it confirmed or weakened by the other

data which these engineering studies of the area have made available to you, that is to say the core and tolerance studies, the potential studies, and the location of the dry holes or non-commercial wells?

A It is generally confirmed by the availability studies.

MR. GRAHAM: That is all.

MR. MACEY: Any questions of the witness?

MR. SELINGER: Yes.

CROSS EXAMINATION

By MR. SELINGER:

Q Mr. Woodruff, was the Southern Union Starr well completed and the information made available to you since the date of the hearing in Case 729? A Yes, sir.

Q And there have been additional wells drilled in your extension of the Ballard that you recommend since that date?

A Yes.

Q I believe you stated that your pressure differential is the best indication of the separation of pools?

A I don't say necessarily that it is the best. I think it is a very indicative condition which leads you to believe there is a separate pool.

Q Which is the better method?

A I think that with adequate data, that the decision would be supplemented by the introduction of cross sections such as has been done in the record here.

Q Which is your most important single factor in determining pool separation? We all admit a combination of everything is the best, but I say which is the most important single factor?

A I believe in this, these pools, the pressures is the most

important.

Q All right. How much of a pressure differential would you have to have in your opinion, to indicate a pool separation?

A There is no set amount that I know of, Mr. Dalinger.

Q Would it be 150 pounds, or 20 pounds, or 5 pounds, or what?

A I said that I don't believe there was any set amount that you can say is indicative of separation in the pool.

Q If you have an area that has no production whatsoever and the two closest wells are separated by 21 pounds pressure differential, would you say that is a pool separation?

A I would certainly want to investigate other things before saying definitely that it was.

Q What other things?

A Any other information on those wells.

Q Suppose there is no wells producing except the two wells in which there is a 21 pound difference, no other factors, would that be sufficient for a pool separation?

A If those were stabilized pressures I believe that it would be.

Q By stabilized pressure you mean your initial pressures?

A Yes, sir, I do mean the original stabilized pressure.

Q If your original stabilized pressure is 21 pounds difference and no other wells in that intervening area except those two wells, would you say that is a pool separation?

A Excuse me. Would you read that to me?

(Question read.)

A I believe that would be indicative of pool separation.

Q Do you base that on 21 pounds?

A Pressure differential, yes, sir.

Q Suppose that there is a 42-pound difference of wells in the same pool, would you say that is a pool separation?

A You are referring to original stabilized pressures?

Q Yes. A That may well be.

Q You have recommended that the South Blanco Pool, in which we have no interest other than the extreme west portion, should be extended by this dotted line on your exhibit, is that correct?

A I have recommended that it be done at this time.

Q What is the difference in pressure between the two nearest wells of the area which we have called commonly in this hearing, area A and the nearest westerly most well in the South Blanco Pool?

A I believe the difference to be somewhere in the vicinity of 150 pounds.

Q And you feel then that you have so indicated that probably the area A as we indicated here, is separate from the South Blanco Pool?

A I think there is a good possibility that the gas contributing to that well, or to those wells indicating that pressure may be separate and apart from the South Blanco Pool proper.

Q Now at the present time, referring to your area in dashed lines which you recommended for extensions to the South Blanco, though it is in the extreme west edge, you have indicated half of Section 31, all of Section 32, all of Section 33, and all of Section 34. I will ask you whether or not there are any producing wells in those sections? A There are not.

Q Would you recommend that the Commission take in acreage which is not productive into the pool delineations?

A Yes, sir, I think that is correct.

Q In Section 24, down in the heart of the Ballard Pool, there isn't any production is there?

A It is indicated to be correct on my map.

Q You would recommend that the Commission take that acreage in the pool delineation?

A Yes, sir, such is my recommendation.

Q Mr. Woodruff, I want to refer you to Turner and Benson-Montin Exhibit E in which there is a hatched green line indicated thereon as a permeable barrier. Do you agree with that interpretation?

A I agree to the reasonableness and likelihood of that interpretation.

Q Suppose there is a 21-pound difference in the original pressure between the Southern Union Starr well in Section 6 and the Turner No. 3-12 Ballard in Section 12 of 21 pounds. Would you say that is sufficient to indicate a pool delineation?

A I believe it to be if they are stabilized initial pressures.

Q In Section 12, the initial pressure between the Turner Well No. 1-12 and the Turner No. 3-12 is in the neighborhood of 24 pounds, would you say that is sufficient for pool delineation?

A What did you indicate that those pressures represent?

Q 24 pounds initial pressures.

A Initial reported pressures?

Q Yes.

A As I previously believe I testified to a similar question, that if they were stabilized pressures it may be indicative of a separate pool.

Q If the information indicates that the difference in pressure

between the Turner No. 3-12 and the Turner No. 2-2 is in the neighborhood of 42 pounds, would that indicate a good connection?

A My same answer goes to that, and I might say that any other similar type example you might point out to me, that it may be indicative if it is a stabilized reservoir pressure.

Q The distances that you have indicated, and Mr. Greer has indicated, is approximately a mile between the two wells across the barrier between the recommended South Blanco of your recommendation, and the recommended Ballard extension under your recommendation of a mile with no intervening dry holes, what do you base an impermeable barrier information on?

A The pressure differential between those two areas.

Q The lack of drilling between those two wells a mile apart, your information for impermeability is based exclusively on pressure differential? A That is correct.

Q And you say that the 21 pounds between those two wells is of sufficient magnitude to indicate pool separation?

A If the 21 pounds is indicative of initial shutin pressures, stabilized, I do consider it to be.

Q Mr. Woodruff, you have gone outside of the particular area that Skelly was concerned, that is area A and B as we indicated by our exhibits? A That is correct.

Q Would you say that you have gone on to the entire field of South Blanco-Ballard-Fulcher Kutz, would you say that the pressures are higher to the northeast and accordingly decrease as they go southwesterly?

A That is generally correct.

Q And you would normally find differences of pressure of the

main South Blanco Field to the northeast as compared to the intervening area and the Gallard going southwesterly?

A I believe that is correct.

Q Since, in your opinion, there is a probability of separation of what we have designated as area A in our hearing, from the main part of the South Blanco Field, why do you not recommend the pool separation there with at least 150 pound differential in pressure?

A It may have been reasonable for me to do so, Mr. Selinger. I have in effect, concurred with the recommendations as they now stand, qualifying my recommendation as I did --

Q (Interrupting) In other words --

A (Interrupting) May I continue?

Q Excuse me.

A There is not data other than the pressure, to indicate separation which may be adequate. I do think that with the drilling of additional wells, and if we are fortunate to obtain Schlumberger logs, so that we may correlate productive horizons between various areas, that we can then definitely establish separation or communication between those areas. We find now, as has been previously indicated in our testimony, a lack of logs which may be readily correlated as far as productive horizon is concerned, in the vicinity, in the area in which El Paso and Skelly's wells are located, that being area A as referred to by Skelly.

Q Now, Mr. Woodruff, you would recommend to this Commission then, that two areas of at least 150 pounds differential, be continued to be considered as one pool for the present and that an area of 21-pound difference be considered by the Commission as separation. Is that your conclusion? That is the way you recommend

the Commission to do at the present time, to continue the creation of two areas of 15. pound differential and recommend the separation of two areas with 21 pound differential?

A I believe that your statement, with the additional qualifications that I made in my recommendation, is correct.

MR. SELINGER: That is all.

MR. MACEY: Anyone else have a question of the witness?

By Mr. WEBB:

Q Mr. Woodruff, I believe you stated that in making your recommendations to the Commission, that there were a number of factors which you took into consideration?

A That is correct.

Q Namely the sand condition, the pressure, the presence of any dry holes or non-commercial wells. In taking all those factors into consideration, then, you made your recommendations?

A That is correct.

Q You didn't base your recommendations solely on pressure, but you took into consideration all of the data available to you?

A That is correct.

Q Mr. Selinger has referred you to two wells located in Section 12, being the Turner Ballard, rather two wells in the north half of Section 12, 26, and 9. He has referred to a differential in pressure of 21 pounds between those two wells and the Southern Union well located approximately a mile to the north. Do you know whether or not the pressure he had reference to of the Southern Union well was the initial stabilized pressure of that well?

A No, sir, I do not. I just answered as a more or less hypothetical case which he presented, not knowing what the pressures were.

Q In other words, the pressure may be more or less upon stabilization than 21 pounds? A That is correct.

Q Your testimony wasn't that you knew what the pressure was?

A That is correct.

Q Mr. Selinger likewise referred to Section 24 in 26 and 9 which does not have any wells located on it at the present time. Are there wells located all the way around it or there just doesn't happen to be any wells on Section 24?

A There are wells to the west, there are wells on all sides except to the south of Section 24, referred to by Mr. Selinger in his cross examination.

Q But you reasonably assume that if wells were drilled on Section 24, they would be productive? A Yes, sir.

Q That is why you included it in there?

A That is correct.

MR. WEBB: That is all.

MR. MACEY: Does anyone else have a question of the witness?

MR. UTZ: I have one question.

By MR. UTZ:

Q Referring to the south edge of the South Blanco Pool in 27 north and 8 west, I note that you have recommended the inclusion of Sections 31, 32, 33 and 34 and also the Starr well, Southern Union Starr Well in 26 north and 8 west, and northeast quarter of Section 6. That, according to my map is an extension of about two and a half miles from the nearest producing well. If it should develop that a dry hole was drilled in between those two wells, what would then be your recommendation?

A I would recommend that that area be set separate and apart

Let me think and qualify that possibly. I might say that it may well be indicative of a separate area apart from the South Jones Pool. I would think aside from it being a dry hole, that we should have a log to make a study on and I certainly, well, I think that is sufficient. Did I answer your question?

Q Yes, I think you did. But I would like to ask you one more question. In areas such as this where there is considerable doubt and controversy, would it be your recommendation that the Commission approach these areas as far as pool delineation is concerned, with considerable caution and not make extensions over that long an area, say just make extensions on the weight and as the basis of set wells?

A I think the Commission may be using good judgement in approaching that policy as indicated in your variation from my recommendation in the original hearing 729, in which I testified as to pool delineation. It may well be in the Commission's judgment not to follow my recommendations in this instance and leave it until such time that additional new development indicates connection or separation.

Q The effect of not including such a well as that would merely be that the well would not be prorated and be undesignated for a longer period of time? A That is correct.

Q Whereas, if we went ahead and included it, it would immediately become a prorated well and it might develop that you were wrong in extending out there and you would have to drop the prorated well from the schedule? A That is correct.

MR. WEBB: That is all.

MR. MACEY: Anyone else?

By MR. ARNOLD:

A There were not.

MR. MACEY: Anyone else?

MR. SELINGER: Yes.

RE-CROSS EXAMINATION

By MR. SELINGER:

Q What is the distance in the undrilled acreage between the area A and the undrilled South Blanco part of the pool? What is the distance? Four miles, isn't it?

A I would say that the closest well in the South Blanco Pool from the area under consideration, is approximately two miles. It is three miles.

Q It is three miles, isn't it?

A If you want to specify two wells, I will measure the distance. My finding is two miles between the nearest South Blanco Pool well and the area A or the wells that I consider to be in area A.

Q The two easterly wells in area A is the two Southern Union wells in this area right here, is it not?

A That is correct.

Q How far is that from the most westerly South Blanco well on a direct line eastward?

A If the location of the wells are correct, it is approximately minus 1200 feet.

Q What?

A He asked me for horizontal on an easterly direction. I call the Commission's attention to the fact that there is a well in the northeast quarter of Section 12, Township 27 north, Range 9 west, and there is a well in the southeast quarter, Section 1 of same

township and range which are as far west or further east, than the well that you mentioned.

Q Those two wells that you mentioned, how far are they from the nearest South Blanco wells to the southeast?

A So far as my -- may I before answering that question view my map to see if, to see the pressures on some other wells? As I said, I have just taken a few wells. It may be that a well which is closeins the pressure indicative of South Blanco.

Q Just a minute now. Let's refer to your Exhibit 1.

A All right.

Q How many miles are there from the wells in Section 28 in this township and range, Township 27 north, Range 8 west, and the well in Section 26, Township 27 north, Range 9 west?

A I believe approximately three miles.

Q All right. You stated on direct and cross examination testimony, that the difference between the Southern Union Starr and the well in the northeast quarter of 12, was approximately a quarter of a mile, didn't you? A That is correct.

Q Are there any dry holes drilled on those two wells in that mile? A Not to my knowledge.

RE-DIRECT EXAMINATION

By MR. GREINER:

Q If the Commission, in consequence of this hearing, were to decide to redelineate the South Blanco Pool so as to separate it into two separate pools, sort of a southwest Blanco and a South Blanco, would you feel that they were on reasonably sound ground in so doing? A I believe that they would be.

Q You would not feel that they had made any mistake in doing so?

A No, I would not.

Q You wouldn't feel, on the other hand, that they had made any particular mistake in leaving things as they are?

A That is correct.

MR. GREINER: Thank you.

MR. MACEY: Anyone else have a question of the witness? If not, the witness may be excused. (Witness excused.)

MR. GREINER: May we introduce El Paso-Southern Union Exhibit No. 1, introduce in evidence?

MR. MACEY: Without objection it will be received. Anyone have anything further in this case? I would like to know if we should not conclude Case 864 in this matter, which is a nomenclature case, pertaining to Pallard-Pictured Cliffs.

MR. SELINGER: We would recommend that case be dismissed because it has been superceded by this case.

MR. MACEY: Anyone object to dismissal of Case 864, that portion of case 864 remaining on the docket? The case will be dismissed.

You have a statement, Mr. Selinger?

MR. SELINGER: We have no statement. We don't think it is necessary.

MR. MACEY: Mr. Greiner, proceed.

MR. GREINER: If it please the Commission, the testimony of Mr. Greer and Mr. Woodruff in this case, as it seems to me, is based in each instance on far longer experience in this area and far more extensive studies than those which have been indicated to have been made by the Skelly witnesses. Merely to illustrate that in one particular, there was the suggestion made by one of the Skelly

witnesses that the reason for these large undeveloped areas between pools was due to surface topographical conditions, a conclusion which is rather effectively refuted by Mr. Greer, who has been physically on that ground off and on through the years, and particularly in recent weeks and months. That, in my opinion, is a fair indication of the entire calibre of the testimony on the two sides.

In one instance we have men who have been long and personally familiar with this area and are expressing views based on thought and study over, in Mr. Greer's case, of as many as fourteen years, and Mr. Woodruff's several also. In the course of my examination of the Skelly witnesses, I endeavored as best I could to develop what the economic interest of Skelly Oil Company is in this matter, and found myself confronted with a situation where their witnesses either by design or otherwise, knew or had been given information which would not enable them to answer those questions.

MR. SELINGER: Are you alleging by design they have falsely testified under oath?

MR. GREINER: No.

MR. SELINGER: I wish you would state by design.

MR. GREINER: I was stating by design or happenstance, they had left out such information so that they were unable to --

MR. SELINGER: (Interrupting) It was under my instruction not to gather anything on economics. It had nothing to do with nomenclature.

MR. GREINER: That was the impression I got.

MR. SELINGER: I told you that three times.

MR. GREINER: I wasn't certain of that, so that we have here, have some witnesses who were very carefully, then, instructed

not to know anything about what the economics of this situation were as far as Skelly was concerned, or what Skelly might have to gain, or lose, as a consequence of the action of the Commission in this case.

Most of the rather limited matters in which I have participated before this Commission, all of the parties have been quite frank in their expression of economic position. I have never attempted to conceal from the Commission what they hope to gain or lose by action of the Commission one way or the other. This is one of the very few matters that I recall where the motivation of any of the parties has been so carefully concealed. I think that the Commission, in considering this matter, should take into account the provisions of the Huerfanito Unit agreement, which as I remember, was introduced by reference into the record of this case by Skelly Oil Company, and particularly consider what the effect of the Commission's action will be under the terms of that unit agreement if these two areas in question are thrown together or are not.

As I understand the terms of that unit agreement, and of course the unit agreement speaks for itself, a participating area may not embrace lands in more than one pool so long as those pools are separately defined by this Commission, they remain separately effective participating areas within the limits of the unit. From the exhibits introduced by Skelly in this case, particularly their Exhibit B, it will be apparent that the deliverability of these wells in area A and the production of the wells in area A has been materially less than those in area B.

I suggest to the Commission the possibility that Skelly Oil Company's motivation in this case is by means of enlarging that participating area to cut themselves a melon. To come in on some

considerably better by their producing wells to the south, wells which we know nothing about the cost of in the north because again, the Skelly witnesses were uninformed on that matter, but which I think the Commission may fairly conclude at least might have cost materially more per well than the better wells further to the south.

It seems to me that these facts should all be taken into account in weighing the weight to be given the Skelly testimony in contrast to the weight to be given these far more experienced and more broadly knowledged witnesses appearing on behalf of Southern Union - El Paso J. Glenn Turner, and Benson and Montin.

MR. MACEY: Anyone else have anything further in this case?

MR. WEBB: I would like to state briefly our position in summary form, concurring with the very forceful, and I think otherwise incisive analysis of the situation made by Mr. Greiner, and point out to the Commission that we have attempted to demonstrate, and I think conclusively so, that the Ballard-Pictured Cliffs Pool as presently defined, and its proposed extensions, is completely divorced from not only the South Blanco Pool, but any other pool in this area, that it is a separate and distinct reservoir, that while it may approach the South Blanco Pool in various locations, that our evidence has demonstrated, that it is still a distinct and separate reservoir.

As Mr. Woodruff stated, if Mother Nature didn't see fit to equalize those pressures through millions of years of geologic time, that it is hardly up to us to say that they can be equalized within a few days. Which is approximately the net of Skelly's testimony. We have not attempted to confine ourselves to a small area as have Skelly, but have attempted to present to this Commission the entire

picture of the entire pool, which I believe is what the hearing called for and what was the intention of this Commission in creating the hearing for. That the pool is one distinct and separate reservoir, and that it should be treated/by this Commission as such.

Shelly has made some reference to the fact that this pool is not prorated, true it is not. But I believe within the next few months the Commission will see fit to call a proration hearing, and while we won't willingly and gladly embrace that decision with open arms, nevertheless we believe it is coming and quite properly justly so. But the fact that it is not prorated at this time has nothing whatsoever to do with whether or not it is a separate pool.

In conclusion I would like to thank the Commission for their patience with the lengthy and time-consuming case which we initially did not believe would take so long. They have been very nice to us, and we do appreciate their courtesy.

MR. MACEY: Anyone else have anything further in this case? If not, we will take the case under advisement.

C E R T I F I C A T E

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings in the matter of Case 908, were taken by me on May 18, 19 and 20, 1955, that the same is a true and correct record to the best of my knowledge, skill and ability.

Ada Dearnley
Reporter

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 908, 944 & 955

TRANSCRIPT OF PROCEEDINGS

ADA DEARNLEY AND ASSOCIATES
COURT REPORTERS
605 SIMMS BUILDING
TELEPHONE 3-6691
ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
October 13, 1955

IN THE MATTER OF:

Case 908
(Rehearing) By provisions of Order R-672-A the Commission granted rehearing in Case 908 upon application of Skelly Oil Company. The Oil Conservation Commission seeks an order amending, clarifying and revising the presently established horizontal limits of the Ballard-Pictured Cliffs, the Fulcher Kutz-Pictured Cliffs and the South Blanco-Pictured Cliffs Gas Pools in San Juan and Rio Arriba Counties, New Mexico. Operators in these four gas pools are advised that the Commission will consider testimony relating to redelineation or consolidation of the presently defined areas, as evidence may indicate.

Case 944
Northwestern New Mexico nomenclature case calling for the extension of a pool:
(e) Extension of the Ballard-Pictured Cliffs Pool Boundary in San Juan County, New Mexico, to include:
TOWNSHIP 26 NORTH, RANGE 9 WEST
Section 1: SW/4
(d) Extension of the South Blanco-Pictured Cliffs Pool in San Juan and Rio Arriba Counties, New Mexico, to include:
TOWNSHIP 27 NORTH, RANGE 9 WEST
Section 36: NE/4

Case 955
Northwestern New Mexico nomenclature case calling for the following extension of a pool:
(c) Extension of the Ballard-Pictured Cliffs Pool Boundary in San Juan County, New Mexico, to include:
TOWNSHIP 26 NORTH, RANGE 9 WEST
Section 2: All
Section 3: N/2
Section 4: SE/4

BEFORE: Honorable John F. Simms
Mr. E. S. (Johnny) Walker
Mr. William B. Macey

ADA DEARNLEY & ASSOCIATES
STENOTYPE REPORTERS
ALBUQUERQUE, NEW MEXICO
TELEPHONE 3-6691

TRANSCRIPT OF HEARING

MR. SELINGER: George W. Selinger, representing Skelly Oil Company. Also, George W. Morrow.

MR. MACEY: Mr. Selinger, I believe it will be proper for you to go ahead and present your case.

MR. SELINGER: We have two witnesses. We would like to have them sworn.

MR. MACEY: They have been sworn in this case before.

MR. SELINGER: Yes, but, this is a rehearing, new advertisement.

(Witnesses sworn.)

MR. SELINGER: I might very briefly state for the record that as a result of innumerable hearings, our testimony here will be based on not only the past performance of the production, but also subsequent development since the May eighteen hearing. In order to give a preview to anyone concerned, we are recommending that the north area which we had heretofore designated as area "A" be deleted from the south Blanco field and be made part of the Ballard - Pictured Cliffs Field

MR. MACEY: Mr. Selinger, before we go any further, wouldn't it be proper to consolidate this case with the other two cases?

MR. SELINGER: If you recall, Mr. Macey, at the last hearing in which we asked postponement of 944, and 955, we asked that they be consolidated with 908 and all three be continued. It was so ordered at the time of continuance last month.

MR. MACEY; All right. Let the record show that we are considering cases 908, 944, and 955.

JULIAN CLAUSEN

called as a Witness, having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. SELINGER:

Q State your name, please. A Julian Clausen.

Q And you are with the Skelly Oil Company?

A Yes, sir, I am.

Q What capacity? A Geologist.

Q Have you heretofore testified in the original case 908?

A Yes, I have.

Q Did you, at that previous hearing May 18, present a map which was made part of the record of the original case 908?

A Yes.

Q What has been designated as Skelly's Rehearing Exhibit Number 1, which is placed on the board, have you taken the previous exhibit and merely supplemented it by the additional development since the hearing? A Yes, I have.

Q How have you indicated the original development or subsequent wells from the original hearing on this Exhibit?

A The subsequent development is shown on this Exhibit as the wells with the large circles around them.

Q For the purpose of correction, there is one large circle around a cross section; is that circle in error?

A The -- well, the circle around the well in S26, I believe, is an error.

Q And that should not be a circle? A No.

Q But the other circles indicated on that Exhibit are completed, producing drilling, or wells for which permits have been secured since the last hearing? A Yes, sir.

Q Are they quite numerous, or very scarce?

A There are quite a few in the area in question.

Q And also on this Exhibit, I have noticed that you indicate a line of cross sections in red. Is that correct?

A Yes, the red line indicates the cross section marking Exhibit 2, I believe.

Q The previous lines of cross sections, numbering A, A Prime, B, B Prime and C, C Prime, were indicated and filed at the original hearing, is that correct? A That is correct.

Q Now, referring to Skelly's rehearing Exhibit 2, is that cross section that you refer to --

A That is the cross section indicated in red on Exhibit 1.

Q Are all the wells on that cross section producing wells from the Pictured Cliffs?

A They are all producing wells, yes.

Q Now, on the Exhibit you have indicated some check marks. What does that indicate on top?

A The check marks are wells which had not previously been used in cross sections previously filed with the Commission on this case.

Q And the wells between what we have designated heretofore as area "A" and "B" have now approached each other to the extent of being part of one proration unit, is that correct? A That is correct.

Q How is that indicated on your Exhibit 2?

A The black space shown with a green cross mark is the one location unit not yet drilled and it is shown on the small sketch also on that sketch by a small green cross mark.

Q Now, the wells to the left -- as to that cross section, some of the wells are indicated by Schlumberger logs and some by Gamma Ray logs, is that correct? A That is correct.

Q Why did you use the Gamma Ray logs?

A Gamma Ray logs were used because no Schlumberger logs were available on those wells in question.

Q In order to ascertain the tops or the bottoms of the Pictured Cliffs, can you reasonably use the Gamma Ray logs as well as the Schlumberger logs?

A The Gamma Ray log is not as easy to use. However, it is satisfactory as a correlation unit in picking the top of the Pictured Cliffs.

Q So, that, in your opinion, it can satisfactorily at least pick the top of the Pictured Cliffs? A Yes, sir.

MR. SELINGER: We offer in evidence Skelly Rehearing Exhibits 1 and 2.

MR. MACEY: Without objection, it will be received.

MR. SELINGER: That is all of this Witness.

MR. MACEY: Any questions of this Witness? No questions of the Witness, the Witness may be excused.

BARTON W. RATLIFF,

called as a Witness, having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. SELINGER;

Q State your name, please. A Barton W. Ratliff.

Q Are you the same Mr. Ratliff that heretofore testified as an engineer in the original case 908? A I am.

Q Now, Mr. Ratliff, I hand you what has been marked as Skelly's Rehearing Exhibit 3 and ask you to state generally what that map proport to show.

A This is a map showing all Pictured Cliffs wells and showing the

initial pressures taken upon completion, also showing the number of days shut-in when these original pressures were taken, also in some cases, showing the date when these wells were completed.

Q Now, at the original hearing of 908, so much was said about initial pressures of the wells in this particular area and the surrounding area that you have prepared this Exhibit on this basis of utilization of initial pressures, is that correct? A That is correct.

Q Now, will you, by check mark, if you desire to refer to the Rehearing Exhibit 1, will you check mark those wells for which you had no pressures at the original hearing for which you have now initial pressures?

A In this general area, here, Mr. Selinger?

Q Just within that Huerfanito unit area, specifically.

A How about by circling them?

Q Circling will be all right. Have you done that, Mr. Ratliff?

A Yes, sir.

Q Now, at the previous hearing there was some several miles separation between the -- what is designated as the unit area A, and unit area B, at the original hearing, is that correct?

A That's correct.

Q Now, has subsequent development taken place to decrease the separation between the two areas?

A Yes. There has been three wells in particular completed. These three right here in Section 1, T 26 N R 9 W. There has been a well completed in the N W 1/4 and one well in the S W 1/4, S 3 6, T 27 N R 9 W. There has been one well completed in the N E 1/4.

Q Is it true or is it not true that the drilling has now brought these two areas together with the exception of one proration unit?

A That is correct, and that unit will be in the SW/4 of Section 36, T27N, R9W, right here.

Q Is there a well for which a permit has been given or probably in the process of being drilled in the S E of 35? A Yes.

Q Which is a direct west offset to this unit that you refer to as being the only unit not drilled between the two areas?

A That is correct.

Q Now, what is the initial pressure in the well of the NE 1/4 of Section 36, initial pressure?

A Initial pressure after eleven days shut-in is 642 pounds.

Q What is the initial pressure of the well immediately to the south or southwest, nearest well to it?

A The well in the NW 1/4 of Section 1, R 9 W, T 26 N, after eight day shut-in, was 666 pounds.

Q What is the pressure of the well in the southwest of 1?

A After seven days shut-in, 623 PSI.

Q What is the initial pressure shut-in of the well in the NE of Section 2?

A After seven days shut-in, 656 PSI.

Q What is the initial pressure of the well in the NW of 2?

A After seven days shut-in, 632 PSI.

Q And the initial pressure of the well in the SE of Section 2?

A After twenty-eight days, 648 pounds PSI.

Q Immediately to the west?

A After twenty-three days shut-in, 673 PSI.

Q Then, from the pressures of all these wells which you did not have at the original hearing, on May eighteen, could you say as an engineer that there is any basis for a separation on the part of anyone

between these two areas because of pressures?

A I would not think so.

Q As a matter of fact, the well in the NE/36 which was proposed to be placed in the South Blanco Pool is less than some of the pressures in the wells to the SW which are being proposed being placed in the Ballard-Pictured Cliffs?

A The original shut-in on this well is less.

MR. SELINGER: I believe that is all. We would like to offer Skelly's Rehearing Exhibit 3, and that is all we have of him.

MR. MACEY: Without objection, the exhibit will be received.

Are there any questions of the witness?

MR. CRENIER: A. S. Crenier, Southern Union Gas Company.

CROSS EXAMINATION

BY MR. CRENIER:

Q Just to refresh my recollection, Mr. Ratliff, in the last hearing you were also proposing then what you are now, that Area "A," the one to the NE, be put into the Ballard-Pictured Cliffs Pool, or were you then proposing that Area "B" be put into the South Blanco?

A At the last hearing?

MR. SELINGER: Just a minute. I don't think that is an engineering question, but I will be glad to answer it for this reason, that as the result of the hearing, particularly the testimony of Mr. Woodruff, of El Paso, we have come to the conclusion that he was right that this Area "A" is not part of the South Blanco-Pictured Cliffs and therefore we have adopted his recommendation as of delineating the Area "A" from the South Blanco-Pictured Cliffs and placing it with the Ballard-Pictured Cliffs.

MR. CRENIER: Thank you. I thought I understood it correctly

but I wanted to be sure. Now, can this Witness, or you, perhaps, Mr. Selinger, tell me this: Does your proposal to move areas out of the South Blanco Pool into the Ballard Pool embrace only the acreage within the Huerfanito unit area or does it also embrace those other lands immediately adjacent to it?

MR. SELINGER: Our proposal intends to take in all of area "A" which is all of the producing wells in this.

MR. CRENIER: I thought that area "A" previously had been limited solely to stuff in the unit area and didn't go outside, --

MR. SELINGER: No. We use the Southern Union wells to the east there outside of the Unit. We are recommending that all of the producing wells in this area here be made part of the Ballard Unit.

MR. CRENIER: Thank you. I just wanted to clarify what we were doing.

MR. SELINGER: I am glad you did. There was a lot of confusion about it.

MR. HOWELL: Ben Howell, representing El Paso Natural Gas Company.

CROSS EXAMINATION

BY MR. HOWELL:

Q Referring to Skelly's Rehearing Exhibit 3, will you tell me what are the pressures of the other wells that you now propose to withdraw from the South Blanco Pool and put into Ballard-Pictured Cliffs Pool, what are the initial pressures of the other wells?

A Well, the Turner General Well, I don't know the number, it is in that -- it would be Section 25 R 9 W, T27 N, SE 1/4, original pressure after eight days shut-in 715 pounds. In the NW 1/4 of that same Section 25, the original shut-in pressure after seven days was 688 pounds PSI.

In Section 26, R9 W, T27 N, in the NE 1/4, the original shut-in pressure was 719 pounds after after fifteen days shut-in; and Section 24, the same range, 9W, T27 N, SE 1/4, after three days shut-in, initial pressure was 599 pounds; in the NW 1/4 of Section 24, R9 W, T27 N, after one day shut-in, pressure was 700 PSI; in Section 14, SW 1/4, after three days shut-in, pressure was 710 PSI. I don't believe we had this well here -- let's see --

MR. SELINGER: Section 30 -- 18?

A Section 18, R9 W, T27 N, SW 1/4, after three days shut-in, 775 pounds; this well was completed in May, of 1953. I think those are the wells we proposed.

MR. SELINGER: Now, you left out the NE of 36, you might read that pressure, NE of 36.

A, The well on the NE 1/4 of 36, R9 W, T27 N, after eleven days was 642 pounds. This well was completed -- I don't know the exact day, but sometime in 1955, within the last three or four months.

Q Then there is a difference of fifty or more pounds pressure between this well which was recently completed in the NE 1/4 of Section 36, and all of the other wells that you seek to change except one which is somewhat of an anomaly, having about 500 pounds, is that not true?

A Based on the pressures listed here, that is true. With the exception of one well -- just a minute, now I think that would be true.

Q And the pressure of all of the other wells, with the exception of the two we have mentioned, one completed in Section 36, and one that has a very low pressure of 500 pounds, is more nearly that of the South Blanco Pool than the initial pressures of the Ballard Pool, is that not correct?

A Well, of course, it is hard to compare since they were taken

on different dates. You are talking about two years difference and the pressure we are comparing, that was taken roughly two years after the pressure which reflect that great difference you speak of.

Q That wasn't my question. I asked you, the initial pressures of all the wells, the other wells except the two that we have mentioned, taken at approximately the same time, as pressures in the Ballard-Pictured Cliffs Pool, have a differential of about 50 pounds, haven't they?

A You are speaking of these two?

Q I am excluding those two, the other wells with the exception of these two which you now speak of.

A That is -- these weren't taken at the time the wells in the Ballard-Pictured Cliffs Pool was taken.

Q They all represent initial pressures?

A They all represent initial pressures.

Q And there is a difference, is there not, of more than fifty pounds between the average pressures of that group than those of Ballard-Pictured Cliffs Pool?

A I will have to calculate all the wells in the Ballard-Pictured Cliffs Pool to see if that is correct.

Q Can you look at those and pick a rough estimate, I am not asking for an exact estimate?

A I don't -- if you take all pressures up here, the 599, 775, 710, -- I have forgotten what that figure was, as I recall, it was not 50 pounds difference. At the time of the last hearing we used the average pressure here and everything here.

Q The average of the wells, excluding these two, is probably over 700 pounds, isn't it?

A Oh, of course we can exclude the two low ones and come up with a higher average. That is simple arithmetic, but that doesn't convince me that that is the average pressure in this area.

Q But all the wells except those two the pressures compare with pressures in the South Blanco Pool, do they not?

A Well, the pressures in the South Blanco Pool, here is some 875, 962, 855, look to be in excess of 150 pounds greater than the wells you are speaking of in this north --

Q What about the wells directly to the north of those, what are the pressures there in the South Blanco Pool?

A Oh, they range from 750, 780, 850, which is still pushing a hundred pounds difference.

Q The number of them there that have 700 pounds pressure, there is a number of them, is there not?

A Yes, but we can compare those with the ones down here with 500 and 600 pressure, though.

Q Now, why would you say that the well in Section 36 which has an initial pressure of some 642 pounds, would be in the same reservoir as the wells immediately to the north, most of which have a pressure, an initial pressure, in excess of 700 pounds?

MR. SELINGER: We are not recommending that, the Commission in its original application asked that the well in the northeast of 36 be made part of the South Blanco-Pictured Cliffs. That wasn't our recommendation. That was the Commission's recommendation.

Q Mr. Ratliff, I understand today that you were recommending that your application was that the entire group be included?

MR. SELINGER: That is right, but that wasn't your question. Your question was, why did we put this in the NE of 36, we haven't

done that. The Commission did that in its case 944 in asking that the well in the northwest of 36 be made part of the South Blanco-Pictured Cliffs.

MR. HOWELL: Are you objecting to the question?

MR. SELINGER: In its present form, yes.

Q All right, in your opinion, does this well in Section 36 belong in the same reservoir as these wells immediately to the north?

A Oh, I think off-setting that by only a direct offset that they probably would be producing from the same formation.

Q Would you be -- would you express that as being your considred opinion that they produce from the same formation, or not?

A I think that is my opinion, based on what we have, based on the cross sections as has been presented. Until you had the -- until -- the pressure on the well directly offsetting this to the north, 715 pounds after 8 days, in October, 53, if wells south of that -- just a minute, if we took a pressure on this well in the southeast quarter of Section 25, we took a pressure on that well now, I think you would find it would be very close to the well on the northeast quarter of Section 36, and, of course, if you had that information, if you could take a long enough shut-in period, I think that you would probably find the pressures to be approximately the same, which would indicate communication and that they were producing from the same reservoir.

MR. HOWELL: That is all.

CROSS EXAMINATION

BY MR. WEBB:

William G. Webb, representing Jack Linn Turner.

Q Mr. Ratliff, would you tell me how many days these three wells had been shut-in when you gave us these pressures?

A The one in NE 1/4 of section 36 was shut-in 11 days; the one on the NW 1/4 of Section 1,8 days; on the SW 1/4 of Section 1, 7 days.

Q In your opinion, as an Engineer, does that short period of shut-in time truly establish the true pressure of reservoir from which those wells are producing?

A I would not think so, because even what was presented at the last hearing, we found that it takes months for these pressures to stabilize.

Q And those pressures you read into the record are not the true reservoir pressures, are they?

A No, I think they are the ones you used to compare the last hearing.

Q I believe you testified that in your opinion, these two wells shut-in long enough are producing from the same formation, Mr. Ratliff?

A I said they could possibly be.

Q Are they producing from the same reservoir or pool?

A That is hard to tell. If you left the wells shut-in long enough, and the pressures were approximately the same, I would say definitely that they were.

Q Do you believe this well will build up to any greater pressure than what you have shown here if it was shut-in longer?

MR. SELINGER: Who is the operator of that? You, you ought to know.

A I think that any well in this field would build up if shut-in longer.

Q How much do you think that will build up to?

A I have no way of knowing.

Q Do you think it would build up to 700 pounds?

MR. SELINGER: We object to the question. He has already said he didn't know. It is merely argumentative.

MR. WEBB: He did testify, however, that it would be his opinion that the wells would build up to some extent, exact extent, he is not willing to state. Is that right?

A Well, it is not that I am not willing to state, it is just that I don't know without having them shut-in over a long period of time, there is no way of knowing how they are going to act.

Q I didn't get your answer to Mr. Howell's question on the initial shut-in pressure on these wells up here. What was that?

A What was the question?

Q What is the initial shut-in pressure of these wells over here?

MR. SELINGER: Let's identify them by sections so we will know.

A In Section 12, NW 1/4, original shut-in pressure was 780 pounds; NE 1/4 of the same Section, Section 12, original shut-in pressure was 850 pounds. In Section 1, this -- these sections are in Range 9W, T27 N, in the SE 1/4, the original was 770 pounds, SW 1/4 770 pounds. You wish only these?

Q What is the initial pressure of this well?

MR. SELINGER: Identify it by location.

A In Section 24, NW 1/4, original shut-in pressure 700 pounds.

Q What is the distance between this well -- what is that?

A Section 24.

Q NW 1/4 of Section 24 and the NW 1/4 of Section 12?

A Mile and three quarters.

Q That would be three spacing units, would it not?

A That would be three spacing units separating the two wells, correct.

Q Down here there are two of the -- identifying the well in the NW 1/4 of Section1, and the well in the NE 1/4 of Section 36, there are two spacing units separating those two wells?

A Well, I wouldn't say so. You are talking about diagnal distance; I don't think you would consider it exactly 2, if you get down to brass tacks it will probably be 1⅓. If you are going to figure it that close, in other words, if it were 2, it would be a mile separating the two, however, here, I think it is only approximately a mile and a quarter.

Q Very well. it is my understanding that you're proposing that these wells were there is a mile anda half approximately, or two miles, should be separated, but where you have a mile and a quarter they should be thrown together; the pressure differential not being substantial?

A I meant the pressure differential here is not substantial, but I think it is up here; we are talking only about a mile and a quarter here and you are talking about a mile and three quarters here.

Q Half a mile difference, in other words?

A Another thing, you have a dry hole in here sitting between these two areas.

Q Very well. Are there any dry holes drilled in the intervening space between the area which you intended to incorporate in the north part of the Huerfanito Unit and the south part?

A There is no dry holes in between the two areas, there are two dry holes in the west portion of the area in the north, the north area; however, there is no dry holes or anything that would indicate we wouldn't get production between these two wells.

Q Haven't been any wells drilled? A That is correct.

Q But there are wells segregating the two, dry holes?

A No, I wouldn't say they would segregate the two at all; I don't

think you would refer to those dry holes as segregating in this area here.

Q As long as we are going in perpendicular lines, then, there is a well in the NE/4 of Section 26, 27-9, and a well in the NE/4 of Section 2, 26-9; is there a dry hole between those two wells?

A I wasn't going in perpendicular lines; the straight lines you speak of, if you want to look at it from a straight line, that is a dry hole in between the two. However, there is no dry holes between any of the producing wells going across that would tend to disprove that these two weren't or couldn't possibly be connected here, across these two wells here.

Q But there is --

A There is no dry holes separating this well directly norhteast of this well in Section 1.

Q My question, again, there has been no well drilled there, has there? A There has not.

MR. WEBB: That is all.

MR. MACEY: Does anyone else have any questions of Mr. Webb -- I mean Mr. Ratliff?

CROSS EXAMINATION

BY MR. ELDERS:

Q I will ask a question here, Mr. Ratliff; in referring to Section34, 27N 9W, we have two Pictured Cliffs Wells located in the S/2 of that section? A Correct.

Q It is my understanding that these wells are -- not testifying, but it is my understanding that those wells are drilled at the top of the Pictured Cliffs.

A It is my understanding that they are only authorized locations,

they may be drilling now, I don't know.

Q I believe those wells are drilling now.

A Are they?

Q I think I should take this at a little different angle; let's refer to Section 3, 26N, 9W, where we have 2 producing Pictured Cliffs wells in that Section, up in Section 28, and 29, we have some producing Pictured Cliffs wells which are in the SE extremity of Fulcher Kutz-Pictured Cliffs Pool? A That is correct.

Q Are there any dry holes in between those two locations?

A There is no dry holes at the present time between those two, those wells.

Q If drilling should prove that production is across that area, is continuous, what would be your recommendation there?

A Well, I don't think I could make a recommendation now as to -- well, if -- we will have to wait and see just what kind of wells they were, and have to give a little study to it. I don't think I could make a recommendation.

Q Assuming that there were wells capable of production?

A In other words, if they are developed, all across here, and the two areas connect, what would be my recommendation?

Q As to pool delineation?

A Well, I think they should be placed together, if it is proved beyond any doubt that they are connected, why, the same field throughout here.

Q Mr. Ratliff, that was your recommendation insofar as your area "A" in the present boundaries of Ballard-Pictured Cliffs Pool, is that correct?

A It was my recommendation that this be included in this, is that

what you mean?

Q That is correct.

A I don't think I recommended that they be placed in the same pool at the last hearing, Mr. Elders, I think that I confined my testimony attempting to show that they were probably producing from the same reservoir in communication; I don't recall having made any recommendation as including them in this Pool at that time. I may have, but I don't recall it.

Q Well, what are you now recommending, as far as area "A" in Ballard-Pictured Cliffs Pool is concerned?

A We are recommending nothing that they be included.

Q That will be on the basis of wells capable of producing, is that correct? A The wells producing.

Q On the basis of wells presently capable of producing?

A That is correct. That is all we can base it on, is producing wells.

Q Now, referring to the other situation, the connection was made between the present Fulcher Kutz and Ballard-Pictured Cliffs that if wells were drilled in there, wouldn't it be reasonable that Ballard-Pictured Cliffs and Fulcher Kutz would be connected?

A There is other things to be considered when you are talking about pool delineation, which, without a little study, I couldn't say, as far as -- offhand, I would say that they should be in the same pool, and classified as the same pool, but there is other factors running in to it that I can't speak of right now.

Q What other factors are you referring to?

A Well, the only thing I think that might enter into it might be from the marketing standpoint.

Q Marketing.

A I don't know. I just don't know in that respect.

MR. SELINGER: Mr. Elders, would you care to ask our geologist that question, rather than the engineer?

MR. ELDERS: If he has an opinion on it.

MR. SELINGER: I think you are asking geological questions from an engineer; the geologist would be more able to answer geological questions, I presume.

MR. ELDERS: If he can answer the question, I would as soon he did.

MR. MACEY: If he can answer the question, I would appreciate having an expression of opinion from him.

A What you would like, then, is a recommendation as to what we would do when something happens in the future with respect to this area here?

Q That is correct.

A I think we are being a little premature.

MR. SELINGER: Why don't you ask Mr. Clausen that question? Would you care to answer that question?

MR. MACEY: Go ahead, Mr. Clausen.

WITNESS CLAUSEN: On the basis of our present geological knowledge, there would be no basis to separate the two areas when they were drilled up and producing.

Q In other words, you feel that there would be just as much reason to connect both the Kutz and Ballard as there is Ballard and your area "A" now?

WITNESS CLAUSEN: That is correct.

MR. ELDERS: That answers my question.

JULIAN CLAUSEN,

a witness, having previously testified herein, resumed the stand and testified further as follows:

CROSS EXAMINATION

BY MR. WEBB:

Q Mr. Clausen, now, assuming, then, that wells were drilled in here --

MR. SELINGER: Let's designate the area.

MR. WEBB: He can see it.

MR. SELINGER: We want the record to show it.

Q T27N, R9W -- they don't have the sections marked.

A 12, 13, -- 11, 12, 13.

Q Assuming wells were drilled here in 12, 13, 14 and 15, would there be any reason then for separating this production from this production?

A Geologically, as far as we know, there is no separation between the two.

Q Then, it would all be one great big Pictured Cliffs Pool?

A That is correct.

Q You would treat it as such?

A Yes, from the geological basis.

Q And this pool continues right down -- wells produce a thousand pounds pressure or better? A Geologically, yes.

Q Is the line gathering gas from those wells the same --

MR. SELINGER: We object to that question as going outside the province of geology.

MR. MACEY: Agreed.

MR. WEBB: Was that an engineering question, Mr. Selinger?

MR. SELINGER: You want me to answer that question argumentatively

We say it is all one field. The whole Pictured Cliffs whether you are talking about the well in the northeast of Section 36 or southeast of that, it is all one Pictured Cliffs Pool. That is the only production you have of that field.

MR. WEBB: That answers my question perfectly.

MR. SELINGER: Thank you. I am not under oath.

BARTON W. RATLIFF:

a Witness having previously testified herein, resumed the stand and testified as follows:

DIRECT EXAMINATION

BY MR. SELINGER:

Q Now, Mr. Ratliff, you were asked about the well in the northeast of 36 in the north offset; are either one of those wells producing from other than Pictured Cliffs production?

A Not that I know of.

Q Are those wells relatively the same depth?

A Yes.

Q Can you, therefore, assume that it is producing from any other reservoir except Pictured Cliffs Reservoir? A No.

Q Now, with respect to the pressures that Mr. Howell was asking you about, is not the average pressure as depicted by the exhibits heretofore filed indicate that the average pressure in the South Blanco range in the neighborhood of eight to nine hundred pounds as compared to the pressures in area "A" being a hundred to a hundred and fifty pounds less?

A That is my observation and in calculating the average I think that is true.

Q Have you heard both previous witnesses, other than yourself,

as engineers testify that generally from the northeast southwesterly, the pressures deteriorate or decrease?

A Correct.

Q Is that anything unusual for Pictured Cliffs production in this entire San Juan Basin?

A What I have observed on the map, I think that is true.

Q Now, Mr. Webb has gone several miles to the northwest of what I term the critical area between "A" and "B" for the finding of dry holes; can you find any dry holes in the space of several miles in production here in T27 N, R9 W or T26 N R9 W?

A What are you talking about, George, in here?

Q Yes, where is the closest dry hole, if you know?

A To this?

Q To the critical area, Section 26.

A I assume the critical area we are speaking of here is in Section 36, Range 9 W, and 27 N, Section 1 and Range 9 W, T26 N, the two closest wells together there is about a mile and a quarter. The nearest dry hole to either of those two wells is approximately a mile and a quarter to a mile and a half.

Q Which direction? A A northwest direction.

Q Are there any dry holes in the Section 1,2,3, or 4, in T26 N, R9 W? A No, there isn't.

Q Are there any dry holes in sections 36, 35, 34, or 33, in T27 N, R9 W? A No.

Q Do you know of your own knowledge whether or not Turner has recommended an additional development program for wells in the Huerfanito Unit?

A As I understand, he has.

Q Now, take that off, look on Skelly Rehearing Exhibit number one, and indicate the wells that Mr. Turner has now proposed through the other operators for additional development there.

AThe wells indicated by the green circle are the wells that have been proposed by the Unit operator. There is one, too, three, four, five-- fifteen wells.

Q Is there a well proposed in the northwest quarter of 35?

A There is.

Q Does that lie between the dry hole and the well in the southwest of Section 35?

A Yes, approximately between the two.

Q Now, are there any dry holes east of that proposed location clear to the northeast of 36?

A No.

Q Do you have any indication of any dry holes in that area in the absence of an actual dry well? A No.

Q Are all the wells immediately adjacent to the northwest, southwest, and south all producing wells from the Pictured Cliffs, adjacent to 36? A Yes.

MR. SELINGER: I believe that is all.

MR. MACEY: Are there any more questions of the witnesses?

MR. ARNOLD: E. C. Arnold, Oil Conservation Commission.

JULIAN CLAUSEN,

a Witness having previously testified herein, resumed the stand and testified as follows:

CROSS EXAMINATION

BY MR. ARNOLD:

Q Would you say that general trend of the San Juan Basin extends

in a northwest southeast direction?

A There has been advance of permeability and porosity trend in a northwest direction, yes, sir.

Q Also, the area is a general run, also, extending northwest and southeast? A That is correct.

Q Now, wouldn't it then, if you were going to project permeability trend on the basis of future development, wouldn't you think it would be more reasonable to think that the connection was probably within the south end of the Fulcher Kutz and the north end of Ballard Field than it would to project it across from southwest northeast across an undeveloped area?

MR. SELINGER: Well, now, Mr. Arnold, are you asking that we recommend we follow permeability barriers? We are not making such recommendation, you may follow that, but we haven't recommended that.

Q Well, Mr. Clausen, didn't you testify that that is a fact?

MR. SELINGER: He was answering your question. He didn't say he was recommending that. You might ask him if he makes those, but --

MR. MACEY: He can answer the question. I think it is pertinent. Go ahead, Mr. Clausen, if you want him to repeat the question we will have him repeat it.

A No, I understand. In it, I think probably your basis for your northwest trend is more a matter of economics than quantity of productio perhaps, it is certainly true that there seems to be a northwest trend of better producing wells along with a northwest trend of not so good producing wells. However, they still are producing. Over the whole area, though, they are -- probably there is a difference in quantity that we would produce.

Q You wouldn't dispute the fact that there are areas within all

the Pictured Cliffs Pools where the dry holes have been drilled?

A There are quite a number of dry holes. However, many of them were drilled prior to the sand fracking process and many of them today might be made producing with technical knowledge developments.

Q But it is entirely possible that there are areas which have such a low reflective permeability that you couldn't make a well out of them?

A There would be -- well, there will be small areas which would not produce under any circumstances, that is correct, but they in turn could be entirely surrounded by producing areas.

MR. MACEY: Do you have any further questions?

MR. ARNOLD: I am through.

REDIRECT EXAMINATION

BY MR. SELINGER:

Q Along that line, I might ask you a few questions, Mr. Clausen. Let's get back closer to Section 36. Whether or not that, in your opinion, is an area of low permeability and impossible of production from the Pictured Cliffs.

A I don't think you can state that any individual area is an impossible area to produce until it has been drilled with the intention of producing.

MR. MACEY: Anybody else have a question of the witnesses?

MR. CRENIER: I would like to ask Mr. Clausen two or three more questions.

CROSS EXAMINATION

BY MR. CRENIER:

Q In the Pictured Cliffs area, now, which I understand that you are saying is all pretty much interconnected, what is the range in

I Crenier

initial pressures there which have been encountered in the Field today and I don't just mean individual isolated wells, but what would be the average I.P. of the lowest area of which you are familiar and what would be the I.P. in the highest area in which you are familiar?

MR. SELINGER: Potential or primary?

Q Initial pressure, I beg your pardon.

A I personally have not studied the detailed pressures of the areas.

Q Well, perhaps then, Mr. Ratliff could help us on that. Are you sufficiently familiar with the area, Mr. Ratliff, to know whether there are any Pictured Cliffs producing areas which have [illegible] initial pressures of ranges from about four hundred to four hundred and fifty pounds? I am not talking about where we are now, I am talking about in the Fulcher Kutz Field or the South Blanco, Aztec or any of them that are in this same general San Juan-Rio Arriba area.

WITNESS RATLIFF: I haven't studied the pressure on all those wells. I was thinking that there was a four hundred pound pressure in here somewhere, but I don't have the list, or one two hundred pound pressure in there.

Q In the South Blanco Field, have you made a sufficient study of that to know whether there are any areas in that as now defined which would average up pretty close to a thousand pound initial pressure?

WITNESS RATLIFF: No, I haven't averaged any pressures out in South Blanco; I haven't even averaged these. They are listed here but I haven't averaged them out.

Q Now, let me go back to Mr. Clausen. Mr. Clausen, what is the approximate age of the Pictured Cliffs formation? That is, to say, how long has it been since it was deposited initially?

A Well, it is a great age, and that is pretty old, quite a bit before my time.

Q A couple of hundred years, maybe, or something longer than that?

A It is in the neighborhood of several million years.

Q Now, are you sufficiently familiar with this area to recognize that there have been some pressure differentials within this Pictured Cliffs area, not the immediately localized one we are talking about here, but the general Pictured Cliffs production in the San Juan Basin?

MR. SELINGER: We object to that question as asking the geologist pressure, he can ask Mr. Ratliff, but we would like him to confine his questions to geology for the geologist.

Q I don't know but I hadn't thought there was any professional rule which required geologists to be ignorant of pressures.

MR. SELINGER: You heard the man say he wasn't familiar with pressure generally and you keep asking the question over and over again.

MR. CRENIER: I try to ask it a little differently.

MR. SELINGER: Well, you are saying the same question differently.

Q Let me go at it a little different way. If there were communication between all of these Pictured Cliffs producing areas that we have been discussing here, an effective communication, would you expect there to have been in a formation as old as this formation a fair degree of pressure equalization since they were laid down or isn't that a fair question to ask a geologist?

MR. MACEY: Mr. Clausen, if you can answer it all well and good, if you can't, all well and good. Just indicate what you can.

A If there were perfectly free communication throughout the whole area, with no undue influences on communication, they would. In the process of many many years, they would equalize.

Q Well, would you think there had been long enough since they have been laid down to have equalized or would it require yet further millions of years?

A Let's say that since gas has been discovered in this basin, there has been a good many disrupting influences to alter the pressures of the field.

Q Manmade, you mean?

A In generally, manmade.

Q And you feel that it is the manmade influences, rather than anything in nature, pre-man, that have caused these pressure differential or whatever pressure differential there might be in the field?

A No, sir, you can have your pressure differential partly due to the depth of the production itself, due to the hydrostatic pressure difference of the depth of formation.

Q And that would not carry over from one end of the field to the other, if you had, say, a formation with continuous communication, good communication, part of which was, we will say, five hundred feet underground and because of an uplift in the surface, part of a ten feet in the front, the pressure would be greater in the part of the pool under the ten than the five, is that correct?

A That is correct.

MR. MACEY: Does anybody else have a question of the witnesses? Nothing further, the witnesses may be excused.

MR. SELINGER: That is all we have. We would like to offer in evidence the Skelly Rehearing exhibits one and three.

MR. MACEY: I am not sure whether or not you have offered them, but in any event, let the record show that the exhibits are received. Do you have any testimony, Mr. Crenier? We will recess until 1:15.

(Whereupon the hearing was recessed until 1:15 p.m. the same day.)

MR. MACEY: Mr. Webb, you have some testimony? Mr. Greer, will you stand and be sworn, please. Mr. Howell, do you have a Witness?

MR. HOWELL: Yes.

MR. MACEY: We will prefer to swear everybody at once.

(Witnesses sworn.)

ALBERT R. GREER,

called as a Witness, have been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. WEBB:

Q Would you state your name, please, sir?

A Albert R. Greer.

Q You are the same Mr. Greer that testified in the original hearing on this case?

A I am.

Q The original hearing of this case, you introduced Exhibit F, which is now placed on the board behind you. Would you explain to the Commission briefly, in order that that they will be refamiliarized with what is shown in there, what you show on that Exhibit?

A Exhibit F is the cross section of the Pictured Cliffs Formation on which I have shown in yellow nonproductive Pictured Cliffs Sand and red I have shown productive Pictured Cliffs Sand; the cross section goes from the approximate south center of the Ballard Field, in Section 30, 26-8, southeast to Section 3, T25, 8, and north to Section 1 in 26-8.

MR. SELINGER: Mr. Greer, would you mind designating that on that exhibit so we will have a relative idea of what you are talking about?

A May I mark on your map?

MR. SELINGER: Yes, just take a pencil and mark it on that map, just draw a pencil line right through it. Thank you. Now, let me have my pencil back.

A For the purpose of this cross section is to show the relation of productive sands in one Pictured Cliffs Pool as compared to adjoining pools, and to show how the sand deteriorate from one area to the other and how production occurs in one part of the Pictured Cliffs Formation in one pool and another part of the other, starting with this here in the central part of the Ballard Field, you have three separate productive sands which compromise a large part of the Pictured Cliffs Formation; as we progress southeast and east the sands deteriorate until we reach Union 1 Nixon at which point the first productive sand interval is about sixty or seventy feet below the top of the Pictured Cliffs Formation; then progressing farther north we have another non-productive and Pictured Cliffs which is productive picks up in the top of the Formation in the South Blanco Field, as well as in this area; in the Ballard Field which show relatively continuous productive sands have an equally localized initial reservoir pressure as measured in wells which have had time to stabilize, pressures which are in two or three pounds of each other. In this entire area which is four or five miles wide has the same initial pressure, then as we move to the South Blanco Field and production is from an entirely different productive sand within the Pictured Cliffs, we have additional formation pressure as measured by shut-in pressures of wells.

Q A great deal has been said here this morning about a well known as the Huerfanito Unit 10 dash 36, located in the NE 1/4 of Section 36,

T27N 9W, would you tell the Commission from which segment of the Pictured Cliffs Formation that well is producing and how you determine that?

A The 10 dash 36 is this well I point to, is producing from the upper part of the Pictured Cliffs Formation, comparable to the upper part of the Formation as is shown in Davis 2 on cross section F, as well as to the southeast of 10 dash 36 -- I mean to the southwest, which are Huerfanito Unit 12-1 and 15-2, are producing from a productive sand which is lower in the Pictured Cliffs Formation. I would like to read those productive intervals into the record. Now, each of these three wells to which I refer were drilled by setting casing on top of the Pictured Cliffs sands and then drilling with cable tools, and, as we drilled five feet, we stopped and measured the gas and recorded it; from this information, we could tell where the productive sand intervals were: on Martin 10-36, the casing was set at 2,020 feet; at 2,033, which is 13 feet under the casing, we had eighty per cent of gas which we finally recovered; at 2,050 feet, we had all the gas; 2,050 feet. Now, this is 30 feet below the casing, and, from there down to the bottom of the formation, we found absolutely no more gas. Now, the Huerfanito 12-1 --

MR. SELINGER: How deep did you go in that well?

A 2,086 feet, 12-1; casing was set at 1,993 feet; this well was in the northwest quarter of Section 1, T26N R9W. The first show of gas in this well was at 2,030 feet, which is 37 feet below the casing point and 42 feet below the top of the Pictured Cliffs Formation; at 2,050 feet, we had all the gas in that well. In Huerfanito 13-1, which is south offset, to the 12-1, in the southwest quarter of Section 1, 26N, R9W, the casing was set at 1,889 feet, and the first Pictured --

first gas was found at 1,945 feet. That is 56 feet below the casing and 61 feet below the top of the Pictured Cliffs Formation. The well was drilled a total depth of 1,978 feet and last gas found at 1,960 feet. The 15- 2 Huerfanito Unit, in the NE of Section 2, T26N, 9W, was similar to the 12-1 in that it was 42 feet below the top of the Pictured Cliffs Formation to the first productive sand interval.

Q Now, by way of explanation, although this eminent Commission is well familiar with the matters of this nature, if you would just briefly explain manner in which the Pictured Cliffs sands were laid down in pre-historic times in order that we can correlate the information you have given us with the separation of pools, and deposits --

A Well, it is quite likely, that you see the -- the sea perhaps covered one third of this area here when deposition occurred in the bottom part of the Pictured Cliffs; this perhaps was along the coastal shore and coarser sands were deposited; farther out to sea we had the finer sands, there is no permeability, and perhaps the sea receded and a later date it came in and laid down additional sands and the shore line approximately the same. We had approximately the same deposition, when this occurred, perhaps when these sands were laid it is entirely possible that this part of the Formation which is represented by the west side of the cross section could have been above the sea level and at that time we had a new shore line and a new deposition. That is one theory, and it is probably about right.

Q In your opinion, the deposition, the different depths at which the productive portion of the Pictured Cliffs sand is encountered, illustrates to your mind that the reservoir is not interconnected, but constitutes different deposits due to this different time lag in the deposition?

A The only way we can tell that for sure is difference in initial stabilized reservoir pressure which we have found in the two areas, Ballard and South Blanco. The pressure as different and distinct reservoirs.

Q Just one more moment before we leave Exhibit F. If the 10-36 well placed on Exhibit F were -- if it were, where would the red line fall?

A It would fall in the upper part of the Pictured Cliffs Formation and it would look on a cross section such as this, it would look similar to the Ralph E. Davis 2 as shown in our Exhibit F. The other wells in the southeast part of Huerfanito Unit would have cross sections similar to the ones as shown on the left side of our Exhibit F. Now, the reason, I should point out, why we do not have a cross section of this nature in this area, the wells in the Huerfanito Unit were not drilled in the same manner as the wells shown in our Exhibit F, and it was impossible for us to make Schlumberger Electric logs such as this Exhibit represents. Had the well been drilled through,with the right tools and Schlumberger logs run, the cross sections across the Huerfanito Unit from southwest to southeast would have shown a pattern almost identical to this one which is about four or five miles southeast of the Unit.

Q Do you have anything else to add?

A About this Exhibit, no.

Q This morning there was considerable testimony and discussion about the various pressures of the wells in Skelly's area to the north and the pressures of the new and old wells to the south. It was brought out, I believe, on Cross Examination that most of the pressures as shown on Skelly's Exhibits are not stabilized shut-in pressures, but

rather constituted pressures of some seven or eight day shut-in. Do you have data which more nearly shows the stabilized reservoir pressure of the wells in the southern portion of the Huerfanito Unit?

A Yes, I do.

Q Would you give those to us, please?

A The pressure which Mr. Ratliff, with Skelly, referred to for the 10-36 Huerfanito Unit, 642 pounds as shut-in eleven days, this is a well in the northeast part of the Huerfanito, northeast quarter of Section 36, 27N 9W; he compared that to pressure on the 12-1 Huerfanito Unit southeast, and the 13-1 which is an offset to the 12-1 and perhaps one or two other wells; the 12-1 had an eight day shut-in pressure of 666 pounds. The 13-1 623 pounds. From this information, the fact that the 12-1 had a higher pressure than the 10-36, Mr. Ratliff assumed that the pressure in this area was higher, that the pressure in the southeast part around 12-1 was higher than the 10-36, and actually, the exact opposite is true. A hundred thirteen day shut-in pressure on the 10-36 shows six hundred and seventy-nine point one pounds.

MR. SELINGER: Will you repeat that?

A 113 days shut-in, 679.1 pounds. The thirty-two days shut-in pressure on 12-1 Huerfanito, 70.23 pounds, approximately ten pounds difference; with the 10-36 having higher pressure and the 12-1 having pressure within about about one pound of the maximum pressure in any of the wells in the Ballard Field. We have tried to point out before that it is absolutely necessary to deal with initial stabilized shut-in pressures in comparing reservoir pressures in one pool with another. I think it is elementary to see that we can obtain almost any pressure we would like to have by shutting the well in for the prescribed length of time. In other words, we can measure a one hundred pound pressure

in two or three hours, or a three hundred pound pressure in four or five hours, or five hundred pounds in a day, and these pressures as well as a seven-day shut in pressure, are not absolutely -- they are meaningless when comparing one reservoir pressure with another as to whether they are producing from the same reservoir. We have tried very conscientiously and made a lot of effort to determine true reservoir pressures in this area. We think we have pretty well worked out the pressure performance of the wells which we have drilled to date. We have followed their pressure history and their increase on build-up after completion and commence tracing their pressure decline as off-set wells have partially depleted their traps. We feel that we have a very clear understanding of the pressure performance and we can demonstrate that by difference in reservoir pressure that the wells are producing from sands which are not connected. When I say sands not connected, I refer to the wells in the northeast part of the Huerfanito Unit as compared to the wells in the southeast part of the Huerfanito Unit.

Q Then, in your opinion, Mr. Greer, the closest proximity of production in Huerfanito Unit 10-36, comparatively close proximity to the wells in the southern portion of the unit does not necessarily, and, based upon your studies, in fact show the opposite, the wells are not only not connected, but are producing from an entirely different reservoir?

A That is correct; we can have off-set wells producing from two separate reservoirs, and we hope we will have that situation in this dea. We hope that the well in the northeast of Section 1 will be productive. Frankly, we are quite worried about whether it will be. Nevertheless, whether they are half a mile or a quarter, it is entirely

possible to have two Pictured Cliffs wells that close together producing entirely from different reservoirs and such that during the entire producing life of the wells, one may not affect the other.

Q You believe you have obtained, in the wells drilled, the 12-1 and 15-2 and 13-1, those wells have been shut in long enough to reach their stabilized shut-in pressure and those correspond almost identically with the wells, the balance of the wells in the Ballard-Pictured Cliffs Pools?

A They very closely approach the initial pressures. That is the wells that have not yet been influenced by production from other wells to the south.

Q And those wells that have been influenced by production, there is a small pressure drop?

A They show a slightly lower pressure, yes.

MR. WEBB: That is all.

MR. MACEY: Any questions of the witness?

MR. SELINGER: I have a few.

CROSS EXAMINATION

BY MR. SELINGER:

Q Mr. Greer, that Exhibit F you are referring to is the same you filed May 18?

A That is correct.

Q What have you added to that Exhibit since that time?

A Nothing. We wanted to review --

Q But you haven't -- excuse me, go ahead.

A We wanted to review the principle of how the reservoirs can be separated though they are producing from the same formation.

Q That is the same Exhibit you entered May 18th?

A That is correct.

Q How many wells have you drilled, you and your associates, how many additional wells have you drilled in the Unit lying between the north part which we designate as the area "A" and the south part, which we designate as "B," how many wells have you drilled in the interim?

A Approximately fifteen or twenty. I believe we had a pipe set on about 18, and completed those.

Q Why haven't you considered any of the information disclosed by those fifteen or eighteen wells on any cross section?

A We definitely have considered the information as I read it a while ago into the record, and --

Q You mean the pressures that you read into the record?

A Not only the pressures, but the depth of occurrence of the productive sand stringers below the top of the Pictured Cliffs Formation.

Q Now, Mr. Greer, you are an engineer, are you not?

A Yes, sir.

Q You are not a geologist?

A I have had --

MR. WEBB: If Mr. Selinger wants us to qualify Mr. Greer as a geologist, we will be happy to do so.

Q Are you a geologist, Mr. Greer?

A I believe I had enough hours to obtain it when I was graduated from New Mexico School of Mines. I chose instead the Engineering degree.

Q When you graduated from the School of Mines, did you go into engineering work or strictly geology? A Both.

Q You have used a combination of both?

A Yes, sir.

Q It is your testimony that there is no connection between any of the producing intervals anywhere in the Pictured Cliffs Formation from top to bottom, that is your testimony?

A No.

Q Is that your testimony with respect to your Exhibit F of the well in the extreme right and the wells on the left of your cross section?

A Yes, sir, the Ralph E. Davis 2 Luthy is producing from a reservoir entirely separate and distinct from the wells in the Ballard Field; there is no doubt whatever of that.

Q And there is no connection between the Pictured Cliffs producing interval lying close to the top of the Pictured Cliffs and any of the wells, is that your testimony also?

A No, sir, in some wells it is connected across the Ballard Field.

Q And this cross section covers the area that you have designated on Skelly's Rehearing Exhibit 1 by penciled mark, is that correct?

A That is correct.

Q How far is the south, northeast-southwest line from the area under consideration?

A Approximately six miles.

Q Now, is it your testimony also that the pressures in this area which is the --

A Ballard Field.

Q Which is in Township 26 north, Range 8 west, that the pressures there are within a pound or two of each other in the Ballard Pool, is that your testimony?

A The initial stabilized pressures are within one or two pounds, that is right.

Q Now, at the first hearing, were you the one that put into evidence as illustrative of the pool separation, the matter of importance on initial pressures?

A We stressed that highly, yes, sir.

Q Then, you differ with Mr. Webb this morning that there is a

high regularity in considering initial pressures as to whether they are accurate or not?

A I don't recall Mr. Webb testifying as to accuracy.

Q You heard him testify when he was asking Mr. Ratliff on Cross Examination questions about the unreliability of using initial pressures, were you here when he was asking --

MR. WEBB: That was unsworn to, Mr. Selinger.

MR. SELINGER: Here is a man under oath. That is why we are going to get at that.

A Yes, sir, I was here.

Q All right, now do you agree with him as to the reliability or unreliability of using initial pressures?

A I would like to talk --

Q You can make all the explanations you wish, just answer the question. Go ahead.

A Initial shut-in pressures as taken on our potential tests, ordinarily reflect shut-in times of seven days on up to as much as a hundred days; ordinarily they are not true stabilized shut-in pressures.

Q Are they accuarate pressures, for studies as engineer or geologist?

A For the purpose of separating pools, and determining pool delineation, only stabilized pressures can be relied on.

Q Why did you use, at the May 18 hearing, then, prolific exhibits and a considerable amount of testimony as to the initial pressures of these wells, then?

A Because the wells to the north, even on their short time initial potential test shut-ins, showed pressures on the order of fifty pounds higher than the wells in the Ballard Field. Now, if we had allowed

those wells to stay shut-in until they had reached their maximum pressure, we know that their pressures would have been, would have had to have been at least fifty pounds higher. Chances are they would have been more. That is all we are concerned with, is reaching maximum stabilized pressures in our areas which is longer than even the short time pressures in the other areas.

Q Would you say then that your average initial pressure in area "A" was fifty pounds higher than area "B"?

A It was at least fifty pounds, because the wells in the northeast part were not allowed to stay shut-in long enough to stabilize.

Q Now, you and I, let's get this map over here and collectively put this up. A Okay.

Q Now, I am going to ask you about the pressures which you said in the Ballard varied one or two pounds or a few pounds -- I believe you said in this area which I asked you before in 26 North, Range 8 West, will you read the maximum pressure differential in this township here where your cross section starts? I am talking about initial pressure that you used at the May 18 hearing. Why don't you use this map and you can correct it with your Exhibit.

A Your maps don't show stabilized pressures.

Q I am talking about initial pressures. That is what you stated May 18 and that is what we are going to continue. Look in here and see what they are in this map.

A Mr. Selinger, we cannot tell from your map what the difference in the initial stabilized pressures are because your map does not show the initial stabilized pressure.

Q Now, you are going on initial stabilized pressures; did you use that in your May 18 hearing? A Certainly did.

Q How did you account for the difference in shut-in pressures in a well that was shut-in two hundred and seventy days and a well shut-in seven days, how was that?

A We told the pressures history through and I believe we filed with the Commission our pressure data. I will read into the record again some of them.

Q Mr. Greer, will you please step to the --

MR. WEBB: If Mr. Selinger wants somebody to testify as to his Exhibit, he can have his own Witness do so.

MR. SELINGER: He can say if they are not the initial pressures. These were checked with the Commission and as far as I know, Mr. Utz can recheck them, and they are the pressures we got from the Commission.

Q Will you again step to this map in Township 26 North, Range 8 West, and indicate the maximum initial pressures in the Ballard-Pictured Cliffs in that Township?

A Mr. Selinger, we are --

Q Mr. Greer, will you do it or won't you do it?

A Your map does not reflect the initial stabilized pressures.

MR. WEBB: I believe that that is improper Cross Examination.

MR. SELINGER: I won't press the point if he can't testify.

A I would like to say this --

Q Well, go on to another problem, Mr. Greer.

A No, this is very important to the determination of this case. Skelly's engineers throughout this entire case have used the first pressures which they could put their hands on, --

Q We did not use initial --

A -- and not made one effort to determine stabilized pressures. They have not tried to determine how the pressure performance of this

field occurred. They have taken unreliable information and tried to deduce conclusions, bring up conclusions and present them to this Commission on information which on its face has no value. We have tried very conscientiously and sincerely to determine these true pressures and we want to talk about true stabilized pressures. You, on the other hand, want to talk about whatever pressure you can grab out of the air and compare it against another field. We are talking about two different things.

Q You are talking about stabilized pressure?

A That is correct.

Q Now, I believe you said that the well in the NE 1/4 of Section 36, in 113 days had 679.1 pounds pressure?

A That's right.

Q Well, in the northwest quarter of Section 1, it had 670 pounds in 32 days shut-in, is that right? A That's right.

Q What is the stabilized pressure between the two?

A We think the well in the 10-36 is approaching very nearly its stabilized reservoir pressure. I would like to point out --

Q That is the one shut-in 113 days? A That is correct.

Q All right.

A I would like to point out at this time that that well was drilled as close to this north line as the Commission rules allow, 990 feet, we drilled it that close because we were afraid the interminable barrier in that Section --

Q What is the maximum pressure on the well in the northeast of Section 1 which reads 670 pounds in 32 days, what would it have been in 113 days?

A I would like to talk about this --

Q Very well, but you are going to get around to this sometime?

A This 113 days represents to us very nearly the present reservoir pressure in that area; it is probably not the initial reservoir pressure of that area.

Q What is it?

A There was a well drilled to the north of that which has been producing, I think, a couple of years, and the sand in that area is thin; there is no doubt in my mind that what gas is being drawn out under the tract of the 10-36 and its pressure is now less than it was when the offset was drilled. Nevertheless, it is still ten pounds higher than any of the wells in the Ballard Field and had it been drilled two years ago, I feel certain it would have been some thirty or forty pounds higher.

Q Are you ready to go to the well in the northwest --

A Yes, Sir.

Q What was the pressure? A 670.3.

Q How many shut-in days? A 32.

Q What would have the pressure been at 113 days?

A I would judge it would build up probably not more than two or three tenths of a pound, because the build-up to 668 pounds in eight days, and in 32 additional days, it built up four pounds. Now, the 10-36 built up in eleven days to 642 pounds and in 78 days to 678 pounds; that is a thirty pound build-up in sixty additional days, whereas this built up four pounds in about a month.

Q What is the pressure difference between a well shut-in 113 days and 113 days, what is the exact difference?

A At this time the difference is --

Q Let's see, it is less than nine pounds. Let's get a little more

specific.

A You realize now we are talking about instruments?

Q Everything you can talk about, but we are going to talk about those figures there. What is the difference there, in them?

A I would still like to say we are talking about instruments.

Q What is the difference between the two pressures, Mr. Greer?

A There --

Q Make whatever explanation you want after you give me the answer.

A Eight and eight tenths pound.

Q Now, you are the operator of both wells?

A As measured with instruments which we think are accurate within approximately a pound.

Q You are operator of both of your wells, are you not?

A Yes, sir, -- no, Mr. Turner.

Q Well,, you and your associates, then?

A Yes, sir.

Q Why didn't you take the same stabilized pressure for both wells for the same shut-in period?

A Well, the two pressures we were talking about were measured and the well in 12-1 is only that old.

Q Now, wouldn't it be, for comparison purposes, the best way of indicating stabilized condition to shut both wells in the same period of time?

A No, sir, we found some of the wells to take over a year to build up, some of them will build up to their pressure in just a few days.

Q Do you know what the pressure was of the well shut-in 113 days, what it was at 32 days?

A No, but we can approximate it. It would be approximately 670

pounds.

Q Would it be more or less than the other well in 1?

A It would be approximately the same.

Q Now, if they both have a hundred and seventy pound pressure then, there wouldn't be any difference in pressures, would there?

A Yes, sir. I would like to point out again, the same statement I made a while ago, the 10-36 in that thirty days would have built up approximately 28 pounds. That indicates approximately one pound per day increase in pressure; the well was building up comparatively fast. On the other hand, the 12-1 built up 34 pounds.

Q In more or less, with all your explanation, a 32 day shut-in, they both reached 670 pounds, is that right?

A Approximately.

MR. SELINGER: That is all, thank you.

MR. MACEY: Anybody else have any questions of the Witness?

MR. ARNOLD: I have a question about the cross section.

CROSS EXAMINATION

BY MR. ARNOLD:

Q Mr. Greer, I believe you testified that the permeability along the left side was probably due to a shore line condition at the time the sand was deposited?

A That would be one theory which could very easily explain it.

Q What would you say was the direction of the shore line at the time this was done?

A It could have been either direction.

Q It could have been either direction, but don't you believe that looking at the basin as a whole that it probably was one particular direction?

A I think so.

Q What do you think that direction was?

A Of course, we are getting into a geological controversy which I don't believe is pertient to this separation of the reservoir.

Q Well, I believe it is a problem that will have to be resolved sooner or later, and --

A Well, perhaps. I think I showed how it could happen that the reservoirs can be separated and it could, I say, be either direction.

Q Well, if the direction of that shore line was northwest ?

A Okay, northwest, southeast.

Q You would expect that the condition which existed to make this sand a permeable sand here would have also existed along that shore line?

A Yes, sir, for the same elevation, it could.

Q It could?

A Yes, depends part on your currents, of course.

Q If that direction was northwest and southeast, it would indicate the probability of permeability between Fulcher Kutz and Ballard Pictured Cliffs?

A Yes, it could, a reasonable possibility.

MR. SELINGER: That is all.

MR. MACEY: Anybody else?

MR. UTZ: I have a few questions.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Greer, in taking your stabilized pressures on your 10-36 and 12-1, at what intervals did you read your pressures?

A At whatever interval we could work an engineer loose to get out and take a pressure. We have been pretty busy, and whenever we could

get time we would send a man out and we would try to send the same man and the same instrument.

Q How many pressure readings did you take on each of those wells, do you have a record of that?

A Yes, sir, I have. Would you like me to read them?

Q Well, what I am interested in, mainly, is if you have information there to plot a build-up curve on each of these wells.

A Yes.

Q Would that information be available to the Commission?

A Yes, it would. I would like to read this on the 10-36 to you.

Q You are welcome.

A In eleven days, the pressure was 642 pounds, 78 days, 678.4; 91 days, 679.4 pounds, 113 days 679.1 pounds. Now, that shows between the last two pressures a pressure drop of3/10 of a pound. That is pretty close, and perhaps the pressures are about the same and the man just didn't read them any closer than three tenths of a pound. It is pretty hard to do. On the other hand, it is possible that we have reached the maximum pressure and the well is now starting to show a decline in pressure as its offset well is producing gas from the reservoir. Either one of those possibilities could exist. At this time we don't know, can't tell from the pressure because that is a pretty small pressure drop. It does indicate the well is pretty well stabilized.

Q And in the Huerfanito -

A We have an eight day shut-in pressure of 666 pounds. The well was in potential, opened up for three hours and tested and then its ten day pressure test showed only 660 pounds. Thirty-two day shut-in pressure was 670.3 pounds. From the initial eight day shut-in pressure,

at 666 pounds, to the thirty-two day 670.3 the build-up was four pounds.

Q Is that well still shut-in?

A I think it goes on the line this week.

Q You measured pressure on this well yesterday?

A Yes, sir.

Q I wonder if it would be possible for you to furnish us another pressure on that well before she goes on the line?

A Yes, sir, if it hasn't been turned on today, we will do it.

Q The pressure I see here doesn't prove to me that that well is stabilized.

A No, however, it only built up one seventh as much in thirty days as the 10-36. It is a reasonable conclusion to say that it is getting pretty close to its maximum pressure.

Q I am not questioning as to whether it is.

A No, it is not definite.

Q We are talking about stabilized, we ought to have two close together.

A I agree with you. We attempted, tried to get some stabilized pressures on some of the wells we have, and as you know, they were shut-in about a year.

Q You will furnish us another shut-in?

A Yes.

MR. UTZ: That is all.

MR. MACEY: Anyone else have a question of the Witness? Mr. Greer, on your well in Section 36, in the northeast quarter of Section 36, 27, 9, you gave some figures as to the -- where the casing was set?

A Yes.

MR. MACEY: Was the casing set at the top of the Pictured Cliffs?

A About five feet into it.

MR. MACEY: Now, you also testified, made a statement, rather, as to the possibility as to what the pressure would have been on that well had it been drilled and not been influenced by outside production. Would you say that that 679 would have been a true reflection or higher?

A I think it more than likely would have been higher, since the sands are thin and it wouldn't take much production from an offset well to reduce the pressure.

MR. MACEY: The well to the north of that well in Section 36?

A Yes.

MR. MACEY: What is that well?

A That is a Turner-Glenline. I don't see the well number.

MR. MACEY: I think it is number one, operated by El Paso. Now, is it not?

A Yes, drilled by Turner, I believe, and El Paso purchased it.

MR. MACEY: Do you know how much that well has produced?

A I don't have that information.

MR. MACEY: I think you will find that that well hasn't produced more than seventy million feet since it was completed.

A That would be adequate. I think in that thin sand, depending, of course, on how big an area that little permeability streak runs to reduce the pressure from 40 or 50 pounds or 10 or 15, whatever it was.

MR. MACEY: Does anybody else have a question of the Witness?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Greer, in your 10-36 in the northeast of Section 36, is that well still shut-in?

A I think it goes on the line the same as the other, they are scheduled to go on the line this week.

Q When was the last shut-in pressure you took on that?

A Yesterday.

Q I wonder if it would be possible for you to get a shut-in on that well, too?

A Yes, sir, we will certainly do it.

Q The well that Mr. Macey just referred to, the north offset of that, is that well in production?

A I think so. Yes.

Q It is now producing? A Yes.

MR. UTZ: That is all I have.

MR. MACEY: I have got one more question. Have you cored any of the wells in that particular area?

A In the Ballard Field we have cored two or three wells.

MR. MACEY: Have you cored the entire Section of the Picture?

A Yes, we have cored the entire Section.

MR. MACEY: Did you get pretty good recoveries?

A Yes, sir, about one hundred per cent.

MR. MACEY: Any evidence of a vertical fracture?

A No, sir.

MR. MACEY: Your answer is, none?

A No evidence of vertical fracture.

MR. MACEY: Does anybody else have anything further ? The Witness may be excused.

A Could I say one thing?

MR. MACEY: Yes.

A I would just like to make this point, point out this one fact

which I think may be pertinent, Skelly's Geological Department has prepared a cross section which is shown as their Exhibit 2 today, showing the Pictured Cliffs Formation. This cross section to which I now point to, we have prepared a cross section of the Pictured Cliffs Formation which is shown just above it, and is our Exhibit F, was, at the first hearing. I think it is pretty evident as to the amount of detail and time we spent in trying to analyze the Formation as prepared compared to Skelly's geologists. From their cross section, they say they cannot determine more than one reservoir in the Pictured Cliffs and I can agree with them. It would take more imagination than anything else to look at this cross section and try to determine productive sands and one reservoir compared to the other; perhaps that is adequate for Skelly's geological work in this area; for us, it is not. We are a small independent, most of our production comes from the Pictured Cliffs Formation in the San Juan Basin and we have to know what we are doing; we have to understand the formation. We can't go draw a cross section like this and say, "it is all the same, let's drill here." We have to study it, and choose our locations carefully.

MR. SELINGER: Keep your seat, Mr. Greer. I would like to ask permission for Mr. Gisburn, our geologist, to ask him some geological questions which obviously Mr. Greer has not made a complete study of and I would like to have permission to have Mr. John Gisburn of Skelly to ask him some questions.

MR. MACEY: All right.

CROSS EXAMINATION

BY MR. GISBURN:

Q Mr. Greer, with your experience in the Basin and knowing the eccentricities and depositions of the Pictured Cliffs sands, are you

saying that that cross section that you have displayed there represents the conditions that exist within the Huerfanito Unit, say, across Section 36?

A Yes, sir, I mean to represent that that is quite likely a similar picture of what would occur, what actually has occurred across the Huerfanito Unit.

Q In other words, that is simply an opinion; but you, Mr. Greer, you have obviously worked in this Basin a long time, and you must admit that this Pictured Cliffs sand is not deposited in a homogeneous way, it has tremendous variability as to thickness, as to area covered, as to permeability conditions, amount of silt, et cetera, you do admit that?

A Yes, sir, and we have tried to determine just the difference in productive sand and sand not productive insofar as it affects our drilling and production of the well.

Q Going back to your cross section, can you see any way in which you can connect all of the sands which you have displayed there in red in one area or the other?

Q Connect them?

Q Yes, can you?

A Yes, sir. For instance --

Q Wait a minute. You said you could connect them?

A Well, I say all of them, I am just going on a conclusion. I might explain what --

Q If they can be --

A First, do you mean to say, is perhaps this sand the top sand in the McBlanus No. 1 not connected with the second sand?

Q No, let me get up here. What I am saying is this, if we drill a well here, you might find this sand came out here and gradually work

in to this; you might find here as you came across this area around this well, remember this isn't a straight cross section infinite thickness, it is as you come around this sand connect to this, this comes up and connects with this, you might find that true if you drill here?

A That is entirely true, and I believe I pointed out in my earlier testimony that the determining factor in knowing whether or not those sands did connect or did not connect are the pressures; here we have pressure equalization; then we can go a couple of miles from the number one Nixon to the number one Lupe.

Q I am not talking about pressure; I am talking about geology, about sand.

A Yes, it can be and that points out, of course, the inadequacy of using geology as a loop to try to determine separation of sands.

Q Well, let me ask you this, then, if pressure not stabilized over a long period of time, if you could take a pressure in two days different than in three and four, this morning, somebody here asked how they could explain the difference in pressures over the whole field, from the center to the northeast toward the outcrop of the southwest and it might be that is due to the difficulties or poorer quality of sand between, say, this well and that well. That it might take a very long time for pressures to stabilize between here and there. So I say how long would it take, two hundred years or two million, do you think it is possible that there is not enough time elapsed to have allowed the pressure to stabilize over the whole thing?

A Oh, yes, sir. That is entirely possible. I think --

Q Whether it be two years or two million years that will approach a --

A Yes, I would like to point out the practical nature of this

pressure --

Q Wait a minute, if you agree that that could happen, two areas belong in a common reservoir.

A That is a point where we have gone a step too far.

Q I haven't.

A I think it is entirely possible over some millions and millions of years, that if gas could be prevented from escaping from the Pictured Cliffs outcrop that all of the fields might equalize; there is that possibility, the important matter is this, over the some two or three million years that they have been trying to equalize in the past, the communication is so poor that the two pools have not equalized. I think it is, therefore, elementary in the next twenty or thirty years in which we produce the pools, the communication will still be so poor that one reservoir will not equalize the other.

MR. GISBURN: I submit Mr. Greer's testimony as pointed out, in answer to my questions, have pointed out that he agrees the sand can be connected with it logically and possibly the pressures would stabilize because they are connected with that sand all through the reservoir. Whether they stabilized in any given specified period it is a little long --

A You are speaking like a true geologist.

Q Thank you, sir.

CROSS EXAMINATION

BY MR. ARNOLD:

Q The Pictured Cliffs outcrop all around the basin; isn't it possible that the gas from these fields is being dissapated at the outcrop which would give you a pressure variant?

A Yes, sir, I think it is possible that there is that.

Q In that case, you probably wouldn't get pressure equalization?

A I think I qualified my answer to Mr. Gisburn's question.

Q Excuse me, Mr. Gisburn.

A Gisburn --

Q Just for the record --

A I believe I said that if no gas could escape from the outcrop, then it might be possible that they would equalize.

Q It probably is, don't you think?

A I think it is probably escaping.

MR. MACEY: Does anyone else have a question of Mr. Greer? Nothing further, Mr. Greer may be excused. Do you have any further witnesses, Mr. Webb?

MR. WEBB: No.

F. NORMAN WOODRUFF,

called as a Witness, having been previously duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HOWELL:

Q State your name for the record? A F. Norman Woodruff.

Q Are you the same Norman Woodruff who testified in this case on May 18? A Yes, sir, I am.

Q At that time, I believe your testimony was that El Paso Natural Gas Company has conducted reservoir studies of various gas pools in the in the San Juan Basin area and particularly of the South Blanco-Pictured Cliffs Pools, Ballard-Pictured Cliffs Pool, and Fulcher Kutz-Pictured Cliffs Pool, is that correct?

A That is correct.

Q Will you, please, state to the Commission what additional

information has been accumulated since the last time you testified, a number of wells have been completed?

A A number of wells have been completed since the last time we testified and we have brought up to date as of October 7, 1955, the development and pressure history in the area which is under consideration in this Hearing. I might add that the Exhibit which we have placed on the board, we haven't offered anything yet --

Q We will refer to it as our Exhibit 1.

A It covers only a portion of the area which my previous Exhibit covered. I have limited this Exhibit just to the area which is under discussion here today involving the Huerfanito Unit, and it consists of ranges 7 through 10 and townships 25 through 27, with portions of township 24 and portions of 28 on this Exhibit.

Q Now, referring to the Exhibit 1 which has been placed on the board, will you generally state to the Commission what is contained on that Exhibit?

A Contained in this Exhibit in solid lines are the present pool outlines as defined by the Commission; the solid blue line is the Fulcher Kutz; the solid brown is Aztec, the solid red is South Blanco and solid green is the Ballard Pool. Also in the map on dotted lines of the same colors are areas which we will recommend to be included in the various pools presently designated.

Q Does the Exhibit also show the wells which have been completed in this area up to the present time? A Yes, sir, it does.

Q And does the Exhibit show the initial pressures as it was available to you? A It does.

Q Now, I call your attention to the southeast quarter of Section 26, Township 27 North Range 9 West, which is marked the Gantle Well,

and ask you if you are familiar with that well?

A I am familiar with various features of that well, yes, sir.

Q Was that well drilled by El Paso Natural Gas Company?

A No, sir.

Q Was it contracted by El Paso Natural Gas Company in connection with purchase and re-work? A That is right.

Q Was that well sandfracked? A It was.

18 Q Was any productive sand found in that well at all?

A So far as production is concerned, no. There was no log on the well to be able to attempt to prove that statement.

Q Has that well been plugged and abandoned as a dry hole after reworking? A It has.

Q Then, I believe, in the diagonal offset in the northwest quarter of the same Section, is another dry hole? A That is correct.

Q And in Section 23, directly to the north, appears another well, are you familiar with it?

A In general terms, yes.

Q And was it a producing well or dry hole?

A Dry hole.

Q Now, what conclusion did you reach concerning the additions to the presently designated Pictured Cliffs Pools from the studies which the Company has made?

A Would you like for me to, at this time, point out the additions that are covered on this map?

Q I would like for you to do so and state to the Commission the data upon which you base those conclusions.

A All right, sir. In Township 26, North, Range 9 West, we are recommending for inclusion in the Ballard-Pictured Cliffs Pool, the

east half of Section -- I will start over, it is the west half of Section 1, all of Section 2, north half of Section 3, and west half of Section 4.

MR. MACEY: East half?

A East half of Section 4. The west half of Section 16, 26N 8W, SW 1/4 of Section 17, S one half of Section 16, S one half of Section 15; all of 21, 22, and the S one half of 23, and the NE 1/4 of Section 14, which is in 25 N 8W. For the Fulcher Kutz Pool, in 27N 9W, we are recommending the addition of Section 21; for the Aztec Pool, 28N 10W, we are recommending the addition of the SW 1/4 of Section 13; for the South Blanco Pool, we are recommending the addition of [illegible] of the NE 1/4 of [illegible]; [illegible] and 8, N 1/2 of Section 2, and 27 and 7, NE 1/4 of Section 14.

Q Now, upon what data do you base those recommendations?

A That data is based on pressure history of those wells, on our studies of sand characteristics in such wells as we had logs on and in relationship of the other wells in the area.

Q What would be -- what conclusion have you reached in reference to this, to there being communication -- state whether or not the wells located in area "A" as shown on the Skelly Exhibit, and the Turner well which I believe has been referred to as the 10-36, the Unit 10-36 well located in Section 36 of T27 N R9 W, on one hand with the Ballard Pool on the other?

A I was unable to determine from the data available to me definitely where that well should be placed; we had no log on the well available to us, and I have not shown that on my Exhibit to be recommended for any pool, based on previous development.

Q Do you have information sufficient to enable you to believe

that that well is connected with the wells in the Ballard Pool?

A No, sir, I do not.

Q What leads you to believe that it is not connected?

A Actually, as I state, from the pressure standpoint; it cannot be definitely established and we have no logs on that well; had none at the time. I might go on to say that from the evidence presented here today, on pressure history which I do not have available to me, I think it does indicate that the well has pressure characteristics of those pressures excepting in, I believe, area "A" of Skelly's Exhibit, or the wells to the north of that well in 36.

Q In your opinion, should that well be classified as a part of the same pool as the wells lying immediately to the north?

A Based on the evidence I have available to me now, I do believe that it should.

Q And had you had that evidence, would you have included that well in the recommendation to be included in the area to the north?

A Yes, I would have.

MR. HOWELL: That is all.

MR. MACEY: Any questions of the Witness?

MR. SELINGER: Yes, sir, a few.

CROSS EXAMINATION

BY MR. SELINGER:

Q Mr. Woodruff, your Exhibit 1, what is the pressure that you show in that Exhibit for the well, the Turner well in northeast of Section 36, Township 9?

A 642 pounds.

Q What is the pressure you show in your Unit for the Southern Union Newsom Well, Section 6, 26 8? A 692 pounds.

Woodruff

Q Where do you place your Southern Union Newsom well in that pool?

A I place that in no presently designated gas pool.

Q Where do you place the Southern Union Newsom 2 A in Section 4, 26 8?

A I place that in no designated pool.

Q What is the initial pressure on that?

A 700 pounds.

Q As between those three wells, Turner in 36, Southern Union in 6, and Southern Union Newsom in 4, which have the lowest initial pressure?

A The Turner well in 36.

Q Now, would you say then, that because of that pressure that the two Southern Union wells should be thrown in with the South Blanco Pool? A No, sir.

Q Should they be thrown in with the Ballard Pool?

A No, sir.

Q Those three wells, then, you recommend so far as the Turner well in northeast 36, it be thrown in the South Blanco and the other wells be left alone?

A That is correct. May I ask a question?

Q Are they in a strike, northeast southwest?

MR. HOWELL: Mr. Selinger, would you let him answer, he wants to comment on his last statement.

A In regard to the previous question I answered, did you include all three wells in your question or just the two Newsom wells of Southern Union?

Q I said, based on the Turner well in NE 36, with the 642 pounds

thrown into the South Blanco, where would you put the other two wells, and you said you would put them in no field?

A That is correct.

Q That was my question.

Q Mr. Woodruff, I believe you stated that pressure was one of your most important methods or basis for determining pool nomenclature here:

A Yes, sir.

Q Do you use initial pressures or initial stabilized pressure or seven day shut-in pressure, what do you use as a basis?

A Most desirable pressure would be the initial stabilized pressure.

Q What did you use on your Exhibit?

A I used initial stabilized pressure where they were available, I used the initial reported pressure.

Q Did you attempt to use stabilized pressure like seven day shut-in pressure or some common shut-in day for your pressure determination?

A No, sir.

Q How do you recognize or determine a stabilized pressure?

A By evidence of stabilization.

Q If you had a well like the Turner well in the NE of 36, with a 670 pound pressure in 32 days, and you had the Turner well in the northwest of 1, with a 670 pound pressure in the same number of days, would you say that those pressures are comparable?

A The first pressure you mentioned was 670?

A Both the same.

A I think they would be very comparable.

Q Now, you heard Mr. Greer's testimony that the pressures of those two wells were 670 pounds; would you say those were comparable as to those two wells?

A Now, isn't it the same question you asked me?

Q Yes, I am repeating for emphasis.

A You are asking me whether I think the pressures are comparable?

Q Yes, on those two wells.

A At that stage, they were both equal.

Q All right. Then, why didn't you put those in the same reservoir or the same pool for nomenclature purposes if they have the same pressure; I understood you to say that that is what youuse for a basis of determining nomenclature and if the pressures are equalized, or the same between those two wells, why don't you put them in the same pool?

A As I said, previously, I had no additional pressure history on that Turner well in 36.

Q You have it now?

A I do have it now, yes, sir.

Q But not before the testimony. Now, what is your opinion?

A Based on the testimony I have heard, I do not think that well in 36 belongs with this other well that had the 670 pounds in Ballard; the characteristics described by that well and testified to by Mr. Greer are not comparable between those two wells.

Q The pressure, as I understood you to say, is what you use for the basis of -- for nomenclature?

A That is one of the basis.

Q What other basis do you use? A Logs.

Q Now, if you have no logs available, do you have the logs available for those two wells?

A I do not have a log available on the one in 36.

Q Now, if your pressures are the same for the well in the northeast

of 36 and the well in the northwest of 1, they are exactly the same, 670 in 32 days, why do you say that they are not in the same field if you only use pressure as your determining factor?

MR. HOWELL: If the Commission please, the Witness just testified that he uses other things besides pressure, and the question is addressed "if he only uses pressure," it is assuming a fact that isn't in evidence.

MR. SELINGER: We will get that in evidence.

Q What other factors do you use other than pressure, then, if you had no logs which you say you had none available?

A I did have additional information available, if I might include the testimony that has been given here today as evidence.

Q Now, you compared these exhibits prior to the hearing today?

A That is right, at the time I prepared this Exhibit I was not prepared to make any recommendation to the Commission on the Turner well in 36.

Q But you do put the Turner well in northwest 1 in Ballard?

A That is correct.

Q And you don't put the Turner well in the northeast of 36 in any pool, do you?

A No, sir, I haven't. In my Exhibit, I have now recommended that it be in the same area as the north one.

Q Despite the fact that its pressure is lower than the two Southern Union wells on a strike to the southeast well in Section 6 and the well in 4?

A Yes, I do. I might point out that there has been additional evidence presented on this well in 36 today other than the pressure; there has also been the record of the experience gained during the

running of that well, which shows the occurrence of gas in the Pictured Cliffs Formation which is an additional factor to be concerned in and that is the data which was presented in today's Hearing concerning the information made available during the completion of this well, and the areas in which the entrance of gas into the well is found.

Q Now, the pressure that you have put on your Exhibit which you placed on prior to today's Hearing, indicates 642 pounds on the northeast of 36; what is the pressure of the well in NW of 1?

A Indicated on my Exhibit is 666.

Q Are there any other pressures of wells in the area that you have indicated in Sections 1, 2, 3, 4, in T26, R9, which have higher pressures than the Turner well in the NE of 36?

A You don't mean 26 and 9, do you now?

Q Yes, 26 9.

A There is a well in the SW of Section 2 which has a pressure of 672 pounds.

Q What is the pressure of the well immediately north of that?

A Six hundred and thirty-two pounds.

Q There is a 40 pounds difference there between those two wells in the pool, is that right? A That is right.

Q And what about the two wells in the north half of 3?

A One showed a pressure of 659 pounds; that being the well in the northwest, and one showed a pressure of 654, that being in the northeast

Q Are both of those wells higher than the Turner well in north of 36?

A No, sir, they are both lower.

Q Six hundred forty-two as compared to six hundred fifty-nine?

A I am sorry, you are correct. I was thinking you meant Section 1.

Q No, the northeast of Section 36, Turner well.

A They are both higher than the Turner well.

Q How much higher is the well in the northwest of 3 in pressure as compared to the Turner well in the northeast of 36?

A Seventeen pounds, isn't it?

Q That is correct. Now, you find other evidence of greater pressures in the BallardPictured Cliffs Pool comparing it with the Turner well in the north of -- in the northeast of 36, do you not?

A May I hear that question again, please?

Q I said you find evidence of higher pressures of wells in the Ballard-Pictured Cliffs than you do in the comparison of Turner well, 642 pounds, in the northeast of Section 36?

A Yes, we do.

Q With the exception of one well which your Counsel, Mr. Howell, said in Cross Examination of Mr. Ratliff, in the area "A" all the other pressures of those wells in area "A" are much higher than the Turner well in the northeast of 36, are they not?

A Yes, sir.

Q What is the maximum differential in pressure between the well in the northeast of 36 and any well in area "A"?

A I believe 75 pounds.

Q Do you have that much discrepancy in pressures within wells within the Ballard Pool? A Yes, sir, you do.

Q Where?

A Between the initial reported pressure for the Southern Union Newsome Well in the SW of 20.

Q What township?

A Twenty-six and eight, and the previously mentioned well in the

southwest of Section 20 of 26 and 8, you have a pressure differential of 78 pounds.

Q You are talking about the 594 pound well?

A Yes, sir, this is related to that.

Q Now, I will take the same privilege that your Counsel, Mr. Howell took; let's eliminate that unusual 594 pound well, let's take another well. Can you find a 70 pound differential in the Ballard Pool?

A Have you found one?

Q We haven't, to tell you the truth.

A I don't see one, Mr. Selinger.

Q All right now, I asked Mr. Greer with respect to Township 26, Range 8 -- you see that, 26 8 -- when he started his cross section "F" and asked him to give me the differential of pressures which he stated was in the neighborhood of pretty uniform, in the neighborhood of one or two pounds differential; could you find more than a few pounds differential in this Township in the Ballard Pool?

A Yes, sir, I do.

Q You have some substantial differences, do you not?

A Yes, sir.

Q They do not anywhere near the differences in pressures between the Turner well in the northeast of 36 and the wells immediately to the north, as much as 70 pounds, do they, in this Township 26 8?

A Was your question, do they vary as much as that?

Q Yes, in 26-8, in the Ballard Pool, is there as much variation as there is in the 642 pound pressure in the well in the northeast of Section 36 in the so-called area "A" to the north?

A Yes, sir, I believe so.

Q With the exception of this 594 pound, there isn't any wells

that have pressure differentils as much as 70 pounds?

A No.

Q But they do vary in the neighborhood of 20 and 25 pounds?

A Yes, sir.

MR. SELINGER: I believe that is all -- just one more. I believe that the last Hearing your testimony was that this area "A" did not properly belong in the South Blanco-Pictured Cliffs; do you recall your testimony in that regard?

A Yes, sir, I do. I believe that I said that it very well may not be.

Q Well, --

A May not be quite as exact as you want.

Q Well, I believe -- but the record will speak for itself -- you used the words properly, not properly placed in the South Blanco Pool, but regardless of that, have you changed your mind as to the conditions surrounding area "A" and the South Blanco to the east there?

A No, sir.

Q Just by way of representation, in conclusion, what I believe you stated that there was as much as 150 or 200 pounds differences in pressures between area "A" and the South Blanco to the east, is that correct?

A There is at least that much.

Q And the pressures is what you used in determining nomenclature of the pools, is that correct?

A That is one of the basis.

Q Thank you, sir.

A I might point out, Mr. Selinger, that I think this pressure differential which you pointed out, have clearly shown what Mr. Greer

also testified to; you can't always rely on these initially reported pressures, of course.

Q I don't want to argue with you, Mr. Woodruff, but maybe that is your conclusion and statement, but the fact remains that you do have these pressure differentials and you have very well stated that that was the basis of nomenclature and I am satisfied with your answer.

MR. MACEY; Does anybody else have any questions of Mr. Woorruff?

MR. UTZ: I have a few questions.

CROSS EXAMINATION

BY MR. UTZ:

Q Referring to your Exhibit 1 --

A Excuse me, I didn't catch the first part of that.

Q Referring to your Exhibit 1, T27 N 9W, in the area of Section 33, 34 and the east one half of 28, what would be your recommendation as to how we handle that insofar as nomenclature is concerned as it is drilled?

A I think that we must wait, Mr. Utz, until the wells are drilled to make our decision.

Q Well, what would be your recommendation as to how we analyze the wells after the hearing, if they are dry holes, of course, we know, but if they are not dry holes, then what?

A I think that we should analyze it on basis of all information available, pressures, any logs, and I trust when we drill, logs in there, we might be a little more prudent in getting some logs, so we will have some basis of determination other than pressure. Those will be the two major basis that I would use.

Q It is my understanding that Mr. Turner is completing these wells with cable tools; do you know that? A That is my understanding.

Q Then, the only logs that he can run, and correct me if I am wrong, is a Gamma-Nutron log.

A I am not positive on that, whether there be any other logs that he could run at this time.

Q Do you know of any cores in this area that have been taken that you could correlate the core data with the Gamma-nutron log?

A I do not recall any, do not have that information available to me now.

Q If Gamma-nutron logs are the only logs available in this area, do you think we can correlate from Ballard to Fulcher Kutz by using those logs, the geological information?

A Those logs are valuable for certain factors, certain information. Now, whether we can correlate definitely in one portion of the Pictured Cliffs Formation with another portion, I doubt it. It is very difficult to correlate with that type of log; you can pick the top of the pay very adequately and also from it with reasonable accuracy, the pay, but attempting to correlate whether or not one and another is very difficult to do.

Q I must say up to now I agree with you one hundred per cent, and my question to you is to try to determine to get a recommendation into the record as to how we -- on what to base our nomenclature in these questionable areas which undoubtedly, due to the fact that Mr. Turner gave us the plat on it which indicates that he intended to drill wells in that area, I would just like to know how to handle it.

A I believe, Mr. Utz, that I could tell you now, but I think that I can promise a definite, as development takes place in this area, we will be prepared to the best of our ability to aid in determination at that time.

Q Did you think it would be well to request a core in the area so that we can do some correlation between the Gamma-nutrons and the actual core?

A I am not sure, Mr. Utz, whether the taking of one core would enable you to relate over a wide distance; I think you would have to have more than one core, probably a core in Fulcher, a core in between, and one in Ballard or at least one in Fulcher and Ballard; I could be wrong, but I doubt that one core would suffice.

Q It boils down tothe fact that the Gamma-nutron logs are not of any value to determine pool?

A They are the poorest of the logs that we now have available to us.

MR. UTZ: That is all I have..

MR. MACEY; Does anybody else have a question of the Witness? If not, the Witness may be excused.

MR. HOWELL: We would like to offer in evidence the El Paso Natural Gas Re-hearing Exhibit 1.

MR. MACEY: Without objection it will be received. Does anybody else have any statement they wish to make in this case? We will take the case under advisement. We will take a short recess.

STATE OF NEW MEXICO)
ss
COUNTY OF BERNALILLO)

I, THURMAN J. MOODY, Court Reporter, do hereby certify that the foregoing and attached transcript of Proceedings was taken before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, and is a true and correct record to the best of my knowledge, skill and ability

In Witness whereof I have fixed my hand, this, the 31st day of October, 1955.

Thurman J. Moody
Court Reporter

ADA DEARNLEY & ASSOCIATES
STENOTYPE REPORTERS
ALBUQUERQUE, NEW MEXICO
TELEPHONE 3-6691