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

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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

ENGINEERING 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

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ENGINEERING REPORT OF 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 - W/2
Section 25 - W/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 characteristics.

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. PRESENT STATUS OF DEVELOPMENT

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 <u>reservoir</u> pressure only. <u>Wellhead</u> pressures for wells at the same elevation would be exactly the same.

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 284 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 Nickson. From the #1 Nickson, 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

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*** 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. R. 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 OPERATIONS

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 C.

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.

EXHIBIT B
Compiled 5-10-55
Page 1

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			

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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	662	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	658	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	546	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

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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 5- 8-55	640 668	3 31
#1 Naw-di-des-wood	3-28-55		Not tested			4-10-55 5- 8-55	648 653	13 41
#1 Bud-dos-pah	4- 3-55		Not tested			4-10-55 5- 8-55	651 666	7 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	25	4-15-55 5- 3-55	648 651	** **
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 5-10-55
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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 5-10-55

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		

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 [illegible] UNIT

		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)
Southern Union								
#1 Starr NE 6-26-8	10-6-54	1615	692	10-20-54	14	4-15-55 5- 3-55	686 690	** **
#2-A Newsom SW 4-26-8	4-5-55	926	700	4-13-55	7	4-15-55 5- 3-55	709 716	9 27
#1-B Newsom SE 9-26-8	1-21-55	Plugged and abandoned						

** Flowed intermittently since completion

ALBERT R. GREER

EXHIBIT F
Compiled 5-10-55
Page 1

SOUTHEAST 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

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OPERATOR AND WELL	LOCATION	DATA FROM POTENTIAL TEST COMP. DATE	I.P. MCF/DAY	SHUT-IN PRESSURE psig
J. Glenn Turner				
#1 Lodewick	NW/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