CASE 1641: (Reopened) - June 14, 1962

Continued from April 18, 1962.

Case No.

1641

Application, Transcript,
Small Exhibits, Etc.

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. 1641
Order No. R-1410-D

APPLICATION OF THE OIL CONSERVATION
COMMISSION ON ITS OWN MOTION TO
RECONSIDER THE SPECIAL RULES AND
REGULATIONS FOR THE ANGELS PEAK-
GALLUP OIL POOL, SAN JUAN COUNTY,
NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on June 14, 1962, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 17th day of July, 1962, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

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

(2) That by Order No. R-1410-C, entered in Case No. 1641 on September 16, 1960, Special Rules and Regulations were promulgated for the Angels Peak-Gallup Oil Pool.

(3) That the evidence presented at the hearing of this case establishes that the gas area in the Angels Peak-Gallup Oil Pool can be efficiently and economically drained and developed on 320-acre proration units and that the oil area in the pool can be efficiently and economically drained and developed on 80-acre proration units.

(4) That the temporary Special Rules and Regulations promulgated for the subject pool by Order No. R-1410-C should be made permanent.

IT IS THEREFORE ORDERED:

That the temporary Special Rules and Regulations promulgated for the Angels Peak-Gallup Oil Pool by Order No. R-1410-C, entered in Case No. 1641 on September 16, 1960, are hereby made permanent.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

EDWIN L. MECHEM, Chairman

E. S. WALKER, Member

A. L. PORTER, Jr., Member & Secretary

esr/

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. 1641
Order No. R-1410-C

APPLICATION OF W. R. WEAVER
FOR THE PROMULGATION OF SPECIAL
RULES AND REGULATIONS GOVERNING
THE DRILLING, SPACING, AND PRO-
DUCTION OF WELLS IN THE ANGELS
PEAK-GALLUP OIL POOL, SAN JUAN
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on July 13, 1960, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 16th day of September, 1960, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

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

(2) That by Order No. R-1410-A, temporary Rules and Regulations were promulgated governing the Angels Peak-Gallup Oil Pool in San Juan County, New Mexico, which Order provided for 80-acre proration units for all wells in said pool, with a limiting gas-oil ratio of 4,000 to 1.

(3) That said Order No. R-1410-A provided that this Case (No. 1641) be reopened in July of 1960 for further consideration of the temporary Special Rules and Regulations set forth in said Order, and for consideration of any other rules and regulations which might be necessary for the efficient operation of the pool.

(4) That while the said Angels Peak-Gallup Pool is presently classified as an oil pool, the evidence adduced at this hearing as well as at previous hearings clearly indicates that it is in fact an "associated" reservoir, producing oil from

an oil-saturated sand overlain by a gas-cap being contained in common and contiguous gas-saturated sand.

(5) That the parties appearing at the hearing on July 13, 1960, proposed that 80-acre proration units be established for wells in the pool which would be classified as oil wells, and that operators be permitted to assign up to 320 acres to wells which would be classified as gas wells. Further, the parties proposed that the limiting gas-liquid ratio for the pool be set at 4,000 to 1.

(6) That the parties also proposed that any well in the pool producing with a gas-liquid ratio of 30,000 cubic feet of gas per barrel of liquid hydrocarbons, or more, be classified as a gas well, and that any well producing with a gas-liquid ratio of less than 30,000 cubic feet of gas per barrel of liquid hydrocarbons be classified as an oil well.

(7) That the applicants further proposed that the gas allocation formula be based on 75 per cent acreage times deliverability plus 25 per cent acreage.

(8) That the parties failed to prove that there is a general correlation between the deliverabilities of the gas wells in the Angels Peak-Gallup Oil Pool and the recoverable gas in place under the tracts dedicated to such gas wells.

(9) That the evidence establishes that the gas area in the pool can be efficiently and economically drained and developed on 320-acre proration units, and it further establishes that the oil area in the pool can be efficiently and economically drained and developed on 80-acre proration units.

(10) That neither from an engineering nor an economic standpoint did the parties establish any necessity for a limiting gas-oil ratio in excess of the Statewide provision of 2,000 to 1.

(11) That the parties also proposed that at any time a gas well is overproduced six times its current allowable, it should be shut-in until it is overproduced less than six times its current allowable.

(12) That permitting a gas well to become overproduced in an amount equal to six times its current allowable prior to shutting the well in might cause oil to migrate up-structure, thereby causing physical waste.

IT IS FURTHER ORDERED:

(1) That Commission Order No. R-1410-A be and the same is hereby superseded, effective October 1, 1960.

(2) That Special Rules and Regulations for the Angels Peak-Gallup Oil Pool be and the same are hereby promulgated as hereinafter set forth, effective October 1, 1960.

(3) That all operators having wells classified as gas wells pursuant to these rules shall file new acreage dedication plats (Commission Form C-128) with the Aztec District Office of the Commission prior to November 1, 1960.

(4) That a Case is hereby docketed for the Regular Commission Hearing in April, 1962, in order that the Commission can, at that time, determine whether the Special Rules and Regulations hereinafter set forth have been effective in preventing significant movement of the gas-oil contact. Should conditions warrant such action, the Commission might decide to re-examine these Special Rules and Regulations prior to April, 1962.

SPECIAL RULES AND REGULATIONS FOR THE ANGELS PEAK-GALLUP OIL POOL

RULE 1. Each well completed or recompleted in the Gallup formation within the boundary of the Angels Peak-Gallup Oil Pool or within one mile thereof, and not nearer to nor within the boundaries of another designated Gallup pool, shall be drilled, spaced, and produced in accordance with the Special Rules and Regulations hereinafter set forth.

RULE 2. (a) Each gas well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located on a tract consisting of approximately 320 acres which may reasonably be presumed to be productive of gas from said pool, and which shall comprise any two contiguous quarter sections of a single governmental section, being a legal subdivision (half section) of the United States Public Lands Survey. For purposes of these Rules, a unit consisting of between 316 and 324 surface contiguous acres shall be considered a standard gas unit. Nothing contained herein shall be construed as prohibiting the drilling of a gas well on each quarter section in the 320-acre unit.

RULE 2. (b) For good cause shown, the Secretary-Director may grant an exception to the requirements of Rule 2(a) without notice and hearing where an application has been filed in due form, and where the unorthodox size or shape of the tract is due to a variation in the legal subdivision of the United States

Public Lands Survey, or where the following facts exist and the following provisions are complied with:

(1) The non-standard unit consists of contiguous quarter-quarter sections or lots.

(2) The non-standard unit consists of not more than 324 acres and lies wholly within a single governmental section.

(3) The entire non-standard unit may reasonably be presumed to be productive of gas from said pool.

(4) The applicant presents written consent in the form of waivers from all offset operators, and from all operators owning interests in the section in which any part of the non-standard unit is situated and which acreage is not included in the non-standard unit.

(5) In lieu of Paragraph 4 of this Rule, the applicant may furnish proof of the fact that all of the aforesaid operators were notified by registered mail of his intent to form such non-standard unit. The Secretary-Director may approve the application if, after a period of 30 days, no such operator has entered an objection to the formation of the non-standard unit.

RULE 2. (c) The District Supervisor shall have authority to approve non-standard gas proration units without notice and hearing and without administrative approval by the Secretary-Director if such unit consists of less than 316 surface contiguous acres and the non-standard unit is necessitated by a variation in the United States Public Lands Survey.

RULE 2. (d) The allowable assigned to any such non-standard gas proration unit shall bear the same ratio to a standard allowable in said pool as the acreage in the unit bears to 320 acres.

RULE 3. (a) Each oil well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located on a unit containing approximately 80 acres, which may reasonably be presumed to be productive of oil from said pool, and which consists of the N/2, S/2, E/2 or W/2 of a single governmental quarter section. For purposes of these Rules, a unit consisting of between 79 and 81 surface contiguous acres shall be considered a standard unit. Nothing contained herein shall be construed as prohibiting the drilling of an oil well on each of the quarter-quarter sections in the 80-acre unit.

RULE 3. (b) For good cause shown, the Secretary-Director may grant an exception to the requirements of Rule 3(a) without notice and hearing where an application has been filed in due form, and where the unorthodox size or shape of the tract is due

to a variation in the legal subdivision of the United States Public Lands Survey, or where the following facts exist and the following provisions are complied with:

(1) The non-standard unit is to consist of a single quarter-quarter section or lot.

(2) The non-standard unit consists of not more than 81 acres.

(3) The entire non-standard unit may reasonably be presumed to be productive of oil from said pool.

(4) The applicant presents written consent in the form of waivers from all offset operators.

(5) In lieu of Paragraph 4 of this Rule, the applicant may furnish proof of the fact that all of the offset operators were notified by registered mail of his intent to form such non-standard unit. The Secretary-Director may approve the application if, after a period of 30 days, no operator has entered an objection to the formation of such non-standard unit.

RULE 3. (c) The District Supervisor shall have authority to approve non-standard oil proration units without notice and hearing and without administrative approval by the Secretary-Director if such unit consists of two contiguous quarter-quarter sections or lots comprising less than 79 acres lying within a single governmental quarter section and the non-standard unit is necessitated by a variation in the United States Public Lands Survey.

RULE 3. (d) The allowable assigned to any such non-standard oil proration unit shall bear the same ratio to a standard allowable in said pool as the acreage in the unit bears to 80 acres.

RULE 4. (a) Each well, oil or gas, completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located no nearer than 790 feet to any quarter section line and each such well shall be located no nearer than 330 feet to a governmental quarter-quarter section line or subdivision inner boundary line. Any well drilled to and producing from the Angels Peak-Gallup Pool prior to the effective date of this Order at a location conforming to the well location requirements in effect at the time the well was drilled shall be considered to be located in conformance with this Rule.

RULE 4. (b) The Secretary-Director shall have authority to grant an exception to Rule 4 (a) without notice and hearing when the application has been filed in due form and the Secretary-Director determines that good cause exists for granting such exception. However, such an unorthodox location, if approved, may necessitate an allowable adjustment.

Applicants shall furnish all offset operators and all operators within the section in which the subject well is located, a copy of the application to the Commission, and the applicant shall include with his application a list of the names and addresses of all such operators together with a stipulation that proper notice has been given said operators at the addresses listed. The Secretary-Director of the Commission shall wait at least 20 days before approving any such unorthodox location, and only in the absence of objection from an offset operator may such application be approved.

RULE 5. A well in the Angels Peak-Gallup Oil Pool shall be classified as a gas well if it has a gas-liquid ratio of 30,000 cubic feet of gas per barrel of liquid hydrocarbons, or more. A well in said pool shall be classified as an oil well if it has a gas-liquid ratio of less than 30,000 cubic feet of gas per barrel of liquid hydrocarbons. The simultaneous dedication of any acreage to both an oil well and a gas well is strictly prohibited.

RULE 6. The gas-liquid ratio limitation for the Angels Peak-Gallup Oil Pool shall be 2,000 cubic feet of gas per barrel of liquid hydrocarbons produced.

RULE 7. Any oil well in the Angels Peak-Gallup Oil Pool which has 80 acres dedicated to it shall be permitted to produce an amount of gas determined by multiplying the top unit oil allowable for said pool by the limiting gas-liquid ratio for the pool, (2,000). In the event there is more than one oil well on an 80-acre oil proration unit, the operator may produce the allowable assigned to the 80-acre unit from said wells in any proportion.

Any gas well in the Angels Peak-Gallup Oil Pool shall be permitted to produce that amount of gas obtained by multiplying the top unit oil allowable for the pool by 2,000 by a fraction, the numerator of which is the number of acres dedicated to the particular gas well and the denominator of which is 80. In the event there is more than one gas well on a 320-acre gas proration unit, the operator may produce the amount of gas assigned to the unit from said wells in any proportion.

RULE 8. The operator of each newly completed well in the Angels Peak-Gallup Oil Pool shall cause a gas-liquid ratio test to be taken on said well upon recovery of all load oil from the well, provided however, that in no event shall the test be commenced later than 30 days from the date of first production unless the well is connected to a gas-gathering facility and is producing under a temporary gas allowable assigned in accordance with Rule 11. Provided further, that any well which is shut-in shall be exempted from the aforesaid gas-liquid ratio test requirement so long as it remains shut-in. The initial gas-liquid ratio test shall be taken in the manner prescribed by Rule 9. If the gas-liquid ratio is 30,000 cubic feet of gas per barrel of

liquid hydrocarbons, or more, the operator shall not produce the well until beneficial use can be made of the gas.

No gas shall be flared or vented from any well classified as an oil well more than 60 days after the well begins to produce. Any operator that desires to obtain an exception to the foregoing provisions for a well classified as an oil well shall submit to the Secretary-Director of the Commission an application for such exception with a statement setting forth the facts and circumstances justifying it. The Secretary-Director is hereby authorized to grant such an exception if he determines that the granting of it is reasonably necessary. If the Secretary-Director declines to grant administrative approval of the requested exception, the matter shall be set for hearing if the operator so requests.

RULE 9. Gas-liquid ratio tests shall be taken on all wells in the Angels Peak-Gallup Oil Pool, and on all wells producing from the Gallup formation within one mile of the boundaries of the Angels Peak-Gallup Oil Pool which are not within another designated Gallup oil pool, during the months of January, April, July, and October of each year. The initial gas-liquid ratio test shall suffice as the first quarterly test. Tests shall be 24-hour tests, being the final 24 hours of a 72-hour period during which the well shall be produced at a constant normal rate of production. Results of such tests shall be filed on Commission Form C-116 on or before the 10th day of the following month. At least 72 hours prior to commencement of any such gas-liquid ratio tests, each operator shall file with the Aztec office of the Commission a test schedule for its wells, specifying the time each of its wells is to be tested. Copies of the test schedule shall also be furnished to all offset operators.

Special tests shall also be taken at the request of the Secretary-Director and may also be taken at the option of the operator. Such special tests shall be taken in accordance with the procedures outlined hereinabove, including notification to the Commission and offset operators.

RULE 10. An initial shut-in pressure test shall be taken on each gas well and shall be reported to the Commission on Form C-125.

RULE 11. Any well completed in the Angels Peak-Gallup Oil Pool after the effective date of this Order shall receive an allowable only upon receipt by the Commission's Aztec Office of Commission Forms C-104, C-110, and C-116, all properly executed. The district Supervisor of the Commission's Aztec Office is hereby authorized to assign a temporary gas allowable to wells connected to a gas transportation facility during the recovery of load oil, which allowable shall not exceed the number of cubic feet of gas obtained by multiplying the daily top unit allowable for the Angels Peak-Gallup Oil Pool by 2,000.

RULE 12. The initial gas proration period shall be from 7 o'clock a.m. on October 1, 1960, to 7 o'clock a.m. on February 1, 1961. Subsequently, the dates 7 o'clock a.m. February the first and 7 o'clock a.m. August the first shall be known as balancing dates, and the periods of time bounded by these dates shall be known as the gas proration periods for the Angels Peak-Gallup Oil Pool.

RULE 13. Any gas well which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

RULE 14. Production during any one month of a gas proration period in excess of the allowable assigned to a well for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

RULE 15. Any well which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period, provided that such overproduction shall be compensated for during such succeeding period. Any well which has not compensated for the overproduction carried into a gas proration period by the end of such proration period shall be shut-in until such overproduction is compensated for. If, at any time, a well is overproduced an amount equalling three times its current monthly allowable, it shall be shut-in during that month and each succeeding month until the well is overproduced less than three times its current monthly allowable.

RULE 16. The allowable assigned to a well during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction carried into such period in determining the amount of overproduction, if any, which has not been compensated for.

RULE 17. The Commission may allow overproduction to be compensated for at a lesser rate than would be the case if the well were completely shut-in upon a showing after notice and hearing that complete shut-in of the well would result in material damage to the well and/or reservoir.

RULE 18. The monthly gas production from each gas well shall be metered separately and the gas production therefrom shall be reported to the Commission on Form C-115 so as to reach the Commission on or before the 24th day of the month next succeeding the month in which the gas was produced. The

operator shall show on such report what disposition has been made of the produced gas.

RULE 19. Each purchaser or taker of gas shall submit a report to the Commission on or before the 15th day of the month next succeeding the month in which the gas was purchased or taken. Such report shall be filed on either Form C-111 or Form C-114 (whichever is applicable) with the wells being listed in approximately the same order as they are listed on the oil proration schedule.

RULE 20. Failure to comply with any provision of this Order or the Rules contained herein shall result in the immediate cancellation of allowable assigned to the affected well. No further allowable shall be assigned until all Rules and Regulations have been complied with. The District Supervisor shall notify the operator of the well and the purchaser in writing of the date of allowable cancellation and the reason therefor.

RULE 21. All transporters or users of gas shall file gas well-connection notices with the Commission as soon as possible after the date of connection.

RULE 22. Allowables to wells whose classification has changed from oil to gas or from gas to oil as the result of a gas-liquid ratio test shall commence on the first day of the month following the month in which such test was reported, provided that a plat (Form C-128) showing the acreage dedicated to the well and the location of all wells on the dedicated acreage have been filed.

RULE 23. The vertical limits of the Angels Peak-Gallup Oil Pool shall be the Gallup formation.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN BURROUGHS, Chairman

MURRAY E. MORGAN, Member

A. L. PORTER, Jr., Member & Secretary

esr/

BOTTOM HOLE PRESSURES OF NEW WELLS
ANGELS PEAK CALLUP FIELD

Virgin Bottom Hole Pressure	1620 psig

Huerfano Unit No. 131 (NW/4 19-27-10)

Completion Date	1-12-61
Initial Potential	1900 MCFPD
GOR	34,722:1
Shut In Casing Pressure, 8 days	1130 psig
Calculated Bottom Hole Pressure	1315 psig
Pressure Loss Due to Offset Production	305 psi

Huerfano Unit No. 113 (NW/4 33-27-10)

Completion Date	1-25-61
Initial Potential	2127 MCFPD
GOR	76,511:1
Shut In Tubing Pressure, 7 days	1087 psig
Calculated Bottom Hole Pressure	1273 psig
Pressure Loss Due to Offset Production	347 psi

Huerfano Unit No. 116 (NW/4 11-26-10)

Completion Date	1-7-61
Initial Potential	272 MCFPD
GOR	34,871:1
Shut In Casing Pressure, 8 days	977 psig
Calculated Bottom Hole Pressure	1164 psig
Pressure Loss Due to Offset Production	456 psi

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
Pan Am EXHIBIT No. 2-A
CASE 1641

BOTTOM HOLE PRESSURES OF NEW WELLS
ANGELS PEAK GALLUP FIELD

Virgin Bottom Hole Pressure	1629 psig

Huerfano Unit No. 101 (NW/4 19-27-10)

Completion Date	1-12-61
Initial Potential	1000 MCFPD
GOR	34,722:1
Shut In Casing Pressure, 8 days	1139 psig
Calculated Bottom Hole Pressure	1315 psig
Pressure Loss Due to Offset Production	305 psi

Huerfano Unit No. 113 (NW/4 33-27-10)

Completion Date	1-25-61
Initial Potential	2127 MCFPD
GOR	76,511:1
Shut In Tubing Pressure, 7 days	1087 psig
Calculated Bottom Hole Pressure	1273 psig
Pressure Loss Due to Offset Production	347 psi

Huerfano Unit No. 116 (NW/4 11-26-10)

Completion Date	1-7-61
Initial Potential	272 MCFPD
GOR	34,871:1
Shut In Casing Pressure, 8 days	977 psig
Calculated Bottom Hole Pressure	1164 psig
Pressure Loss Due to Offset Production	456 psi

Ex-2 A,
Case 1641

A1

BOTTOM HOLE PRESSURES OF NEW WELLS
ANGELS PEAK GALLUP FIELD

Virgin Bottom Hole Pressure	1620 psig

Huerfano Unit No. 101 (NW/4 19-27-10)

Completion Date	1-12-61
Initial Potential	1000 MCFPD
GOR	34,722:1
Shut In Casing Pressure, 8 days	1130 psig
Calculated Bottom Hole Pressure	1315 psig
Pressure loss Due to Offset Production	305 psi

Huerfano Unit No. 113 (NW/4 33-27-10)

Completion Date	1-25-61
Initial Potential	2127 MCFPD
GOR	76,511:1
Shut In Tubing Pressure, 7 days	1087 psig
Calculated Bottom Hole Pressure	1273 psig
Pressure Loss Due to Offset Production	347 psi

Huerfano Unit No. 116 (NW/4 11-26-10)

Completion Date	1-7-61
Initial Potential	272 MCFPD
GOR	34,871:1
Shut In Casing Pressure, 8 days	977 psig
Calculated Bottom Hole Pressure	1104 psig
Pressure Loss Due to Offset Production	456 psi

Case 1641
Exhibit No. 2
Witness

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month	No. Prod. Wells	Total Wells	Oil Bbls.	Gas MCF	GOR Cu. ft. /Bbl.	Cumulative Production Oil Bbls.	Cumulative Production Gas MCF
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1958							
Apr.	1	1		1,486			1,486
May	2	2		71,885			73,371
June	2	2		102,181			175,552
July	2	2		149,305			324,857
Aug.	2	3		123,516			448,373
Sept.	3	5		180,743			629,116
Oct	3	5	3,013	201,636	66,922	3,013	830,752
Nov.	5	5	1,506	305,986	203,178	4,519	1,136,738
Dec.	5	5	2,479	144,856	58,433	6,998	1,281,594
1959							
Jan.	4	8	2,471	197,571	79,955	9,469	1,479,165
Feb.	5	8	2,490	230,178	92,440	11,959	1,709,343
Mar.	8	10	6,835	307,703	45,018	18,794	2,017,046
Apr. *	9	10	1,309	73,422	56,090	20,103	2,090,468
May	11	11	6,864	151,467	22,067	26,967	2,241,935
June	12	12	8,711	233,792	26,839	35,678	2,475,727
July	12	13	11,104	236,065	21,259	46,782	2,711,792
Aug.	11	13	11,472	275,026	23,974	58,254	2,986,818
Sept.	12	14	9,029	308,827	34,204	67,283	3,295,645
Oct.	11	15	7,243	315,442	43,551	74,526	3,611,087
Nov.	14	16	9,441	277,656	29,409	83,967	3,888,743
Dec.	15	17	9,739	298,648	30,665	93,706	4,187,391
1960							
Jan.	15	19	9,754	279,965	28,702	103,460	4,467,356
Feb.	16	19	9,218	241,226	26,169	112,678	4,708,582
Mar.	18	19	10,823	234,301	21,648	123,501	4,942,883
Apr.	18	19	10,862	313,588	28,870	134,363	5,256,471
May	18	19	10,441	325,147	31,141	144,804	5,581,618
June	18	19	8,189	289,369	35,336	152,993	5,870,987
July	18	19	8,042	275,901	34,307	161,035	6,146,888
Aug.	18	19	8,285	331,219	39,987	169,320	6,478,107
Sept.	18	19	6,124	221,632	36,190	175,444	6,699,739
Oct.	18	19	7,177	394,122	54,914	182,621	7,093,861
Nov.	18	19	5,860	315,959	53,917	188,481	7,409,820
Dec.	18	19	5,892	280,312	47,575	194,373	7,690,132

* Pool reclassified from gas to oil effective April 1, 1959.

Case_____
Exhibit No. _____
Witness_____

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. / Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1961							
Jan.	17	21	6,035	224,444	37,190	200,408	7,914,576
Feb.	20	21	5,138	266,825	51,931	205,546	8,181,401
Mar.	20	21	7,543	434,066	57,545	213,089	8,615,467
Apr.	20	21	6,235	386,347	61,964	219,324	9,001,814
May	20	21	7,046	396,998	56,343	226,370	9,398,812
June	19	21	6,416	418,404	65,212	232,786	9,817,216
July	20	21	7,691	519,895	67,597	240,477	10,337,111
Aug.	20	21	6,669	459,334	68,875	247,146	10,796,445
Sept.	20	21	3,989	253,694	63,598	251,135	11,050,139
Oct.	20	21	5,667	382,289	67,458	256,802	11,432,428
Nov.	20	21	5,041	361,677	71,747	261,843	11,794,105
Dec.	20	21	4,335	385,404	88,905	266,178	12,179,509
1962							
Jan.	20	22	5,328	358,644	67,313	271,478	12,538,153
Feb.	19	22	4,545	283,767	62,434	276,023	12,821,920
Mar.	20	22	5,961	401,758	67,397	281,984	13,223,678

1641
Exh. 3

ANGELS PEAK - GALLUP OIL POOL
GAS-OIL RATIO PERFORMANCE

Operator Well Name & Number	July 1960	October 1960	January 1961	April 1961	July 1961	October 1961	January 1962	April 1962
El Paso Natural Gas Company								
Huerfano #92	106,976	86,897	81,944	84,200	102,326	120,000	89,747	99,444
Huerfano #99	133,837	134,286	188,194	151,676	229,700	155,069	152,522	110,923
Huerfano #101				53,445	63,266	50,690	77,404	66,452
Huerfano #103	116,962	98,734	95,833	146,279	104,400	83,960	103,889	132,273
Huerfano #105	21,179 (78)	24,271 (79)	20,844 (88)	18,717 (88)	22,079 (76)	21,299 (79)	20,355 (79)	25,033 (61)
Huerfano #106	127,182	92,619	142,143	120,102	159,214	231,429	240,571	172,857
Huerfano #107	11,617 (71)	9,344 (84)	9,638 (47)	6,901 (84)	12,930 (61)	16,026 (31)	12,318 (31)	20,250 (24)
Huerfano #108	54,460	68,793	56,650	97,019	90,577	112,593	125,432	108,817
Huerfano #109	95,086	118,148	117,734	114,316	163,871	161,075	139,462	280,652
Huerfano #110	4,108 (19)	6,357 (16)	5,750 (16)	11,126 (16)	11,525 (12)	14,356 (11)	16,400 (10)	13,700 (10)
Huerfano #111		136,897	58,214	58,966	51,818	81,364	154,286	278,571
Huerfano #113				116,294	150,733	174,310	260,247	211,075
Huerfano #116				21,595 (10)	66,206 (3)	57,222	92,759	55,349
Pan American Petroleum Corp.								
Frost B #1	23,103 (6)	43,027 (4)	34,027	181,850	141,368 (1)	210,000	210,000	210,000
McAdams B #1	12,428 (17)	12,133 (17)	6,745 (31)	12,930 (19)	16,635 (15)	18,258 (14)	2,492 (11)	5,696 (14)
McAdams B #2	3,477 (39)	4,063 (32)	5,640 (32)	7,428 (27)	9,219 (19)	11,892 (18)	7,457 (16)	3,395 (9)
A. N. Brown								
McAdams Nos. 1 & 4	83,348	84,806	174,536	117,236	89,674	104,864	119,333	130,416
McAdams #2	54,909	110,068	156,187	161,353	126,208	115,338	133,333	120,000
McAdams #3	13,478 (102)	10,310 (57)	14,576 (48)	28,928 (28)	26,947 (23)	26,947 (23)	26,915 (20)	36,786 (14)
McAdams #5	18,320 (14)	12,237 (8)	Plugged and Abandoned					

Proration Department
June 11, 1962

Case _____
Exhibit No. _____
Witness _____

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. /Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1958							
Apr.	1	1		1,486			1,486
May	2	2		71,885			73,371
June	2	2		102,181			175,552
July	2	2		149,305			324,857
Aug.	2	3		123,516			448,373
Sept.	3	5		180,743			629,116
Oct	3	5	3,013	201,636	66,922	3,013	830,752
Nov.	5	5	1,506	305,986	203,178	4,519	1,136,738
Dec.	5	5	2,479	144,856	58,433	6,998	1,281,594
1959							
Jan.	4	8	2,471	197,571	79,955	9,469	1,479,165
Feb.	5	8	2,490	230,178	92,440	11,959	1,709,343
Mar.	8	10	6,835	307,703	45,018	18,794	2,017,046
Apr. *	9	10	1,309	73,422	56,090	20,103	2,090,468
May	11	11	6,864	151,467	22,067	26,967	2,241,935
June	12	12	8,711	233,792	26,839	35,678	2,475,727
July	12	13	11,104	236,065	21,259	46,782	2,711,792
Aug.	11	13	11,472	275,026	23,974	58,254	2,986,818
Sept.	12	14	9,029	308,827	34,204	67,283	3,295,645
Oct.	11	15	7,243	315,442	43,551	74,526	3,611,087
Nov.	14	16	9,441	277,656	29,409	83,967	3,888,743
Dec.	15	17	9,739	298,648	30,665	93,706	4,187,391
1960							
Jan.	15	19	9,754	279,965	28,702	103,460	4,467,356
Feb.	16	19	9,218	241,226	26,169	112,678	4,708,582
Mar.	18	19	10,823	234,301	21,648	123,501	4,942,883
Apr.	18	19	10,862	313,588	28,870	134,363	5,256,471
May	18	19	10,441	325,147	31,141	144,804	5,581,618
June	18	19	8,189	289,369	35,336	152,993	5,870,987
July	18	19	8,042	275,901	34,307	161,035	6,146,888
Aug.	18	19	8,285	331,219	39,987	169,320	6,478,107
Sept.	18	19	6,124	221,632	36,190	175,444	6,699,739
Oct.	18	19	7,177	394,122	54,914	182,621	7,093,861
Nov.	18	19	5,860	315,959	53,917	188,481	7,409,820
Dec.	18	19	5,892	280,312	47,575	194,373	7,690,132

* Pool reclassified from gas to oil effective April 1, 1959.

Case _____
Exhibit No. _____
Witness _____

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. / Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1961							
Jan.	17	21	6,035	224,444	37,190	200,408	7,914,576
Feb.	20	21	5,138	266,825	51,931	205,546	8,181,401
Mar.	20	21	7,543	434,066	57,545	213,089	8,615,467
Apr.	20	21	6,235	386,347	61,964	219,324	9,001,814
May	20	21	7,046	396,998	56,343	226,370	9,398,812
June	19	21	6,416	418,404	65,212	232,786	9,817,216
July	20	21	7,691	519,895	67,597	240,477	10,337,111
Aug.	20	21	6,669	459,334	68,875	247,146	10,796,445
Sept.	20	21	3,989	253,694	63,598	251,135	11,050,139
Oct.	20	21	5,667	382,289	67,458	256,802	11,432,428
Nov.	20	21	5,041	361,677	71,747	261,843	11,794,105
Dec.	20	21	4,335	385,404	88,905	266,178	12,179,509
					42,500		
1962							
Jan.	20	22	5,328	358,644	67,313	271,478	12,538,153
Feb.	19	22	4,545	283,767	62,434	276,023	12,821,920
Mar.	20	22	5,961	401,758	67,397	281,984	13,223,678

BOTTOM HOLE PRESSURES OF REN WELLS
ANGELS PEAK GALLUP FIELD

Virgin Bottom Hole Pressure	1620 psig

Huerfano Unit No. 101 (NW/4 19-27-10)

Completion Date	1-12-61
Initial Potential	1000 MCFPD
GOR	34,722:1
Shut In Casing Pressure, 8 days	1130 psig
Calculated Bottom Hole Pressure	1315 psig
Pressure Loss Due to Offset Production	305 psi

Huerfano Unit No. 113 (NW/4 33-27-10)

Completion Date	1-25-61
Initial Potential	2127 MCFPD
GOR	76,511:1
Shut In Tubing Pressure, 7 days	1087 psig
Calculated Bottom Hole Pressure	1273 psig
Pressure Loss Due to Offset Production	347 psi

Huerfano Unit No. 116 (NW/4 11-26-10)

Completion Date	1-7-61
Initial Potential	272 MCFPD
GOR	34,871:1
Shut In Casing Pressure, 8 days	977 psig
Calculated Bottom Hole Pressure	1164 psig
Pressure Loss Due to Offset Production	456 psi

ANGELS PEAK - GALLUP OIL POOL
GAS-OIL RATIO PERFORMANCE

Operator Well Name & Number	July 1960	October 1960	January 1961	April 1961	July 1961	October 1961	January 1962	April 1962
El Paso Natural Gas Company								
Huerfano #92	106,976	86,897	81,944	84,200	102,326	120,000	89,747	99,444
Huerfano #99	133,837	134,286	188,194	151,676	229,700	155,069	152,522	110,923
Huerfano #101				53,445	63,266	50,690	77,404	66,452
Huerfano #103	116,962	98,734	95,833	146,279	104,400	83,960	103,889	132,273
Huerfano #105	21,179 (78)	24,271 (79)	20,844 (88)	18,717 (88)	22,079 (76)	21,299 (79)	20,355 (79)	25,033 (61)
Huerfano #106	127,182	92,619	142,143	120,102	159,214	231,429	240,571	172,857
Huerfano #107	11,617 (71)	9,344 (84)	9,638 (47)	6,901 (84)	12,930 (61)	16,026 (31)	12,318 (31)	20,250 (24)
Huerfano #108	54,460	68,793	56,650	97,019	90,577	112,593	125,432	108,817
Huerfano #109	95,086	118,148	117,734	114,316	163,871	161,075	139,462	280,652
Huerfano #110	4,108 (19)	6,357 (16)	5,750 (16)	11,126 (16)	11,525 (12)	14,356 (11)	16,400 (10)	13,700 (10)
Huerfano #111		136,897	58,214	58,966	51,818	81,364	154,286	278,571
Huerfano #113				116,294	150,733	174,310	260,247	211,075
Huerfano #116				21,595 (10)	66,206 (3)	57,222	92,759	55,349
Pan American Petroleum Corp.								
Frost B #1	23,103 (6)	43,027 (4)	34,027	181,850	141,368 (1)	210,000	210,000	210,000
McAdams B #1	12,428 (17)	12,133 (17)	6,745 (31)	12,930 (19)	16,635 (15)	18,258 (14)	2,492 (11)	5,696 (14)
McAdams B #2	3,477 (39)	4,063 (32)	5,640 (32)	7,428 (27)	9,219 (19)	11,892 (18)	7,457 (16)	3,395 (9)
A. N. Brown								
McAdams Nos. 1 & 4	83,348	84,806	174,536	117,236	89,674	104,864	119,333	130,416
McAdams #2	54,909	110,068	156,187	161,353	126,208	115,338	133,333	120,000
McAdams #3	13,478 (102)	10,310 (57)	14,576 (48)	28,928 (28)	26,947 (23)	26,947 (23)	26,915 (20)	36,786 (14)
McAdams #5	18,320 (14)	12,237 (8)	Plugged and Abandoned					

Proration Department
June 11, 1962

Case 1641
Exhibit No. 2
Witness

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. /Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1958							
Apr.	1	1		1,486			1,486
May	2	2		71,885			73,371
June	2	2		102,181			175,552
July	2	2		149,305			324,857
Aug.	2	3		123,516			448,373
Sept.	3	5		180,743			629,116
Oct	3	5	3,013	201,636	66,922	3,013	830,752
Nov.	5	5	1,506	305,986	203,178	4,519	1,136,738
Dec.	5	5	2,479	144,856	58,433	6,998	1,281,594
1959							
Jan.	4	8	2,471	197,571	79,955	9,469	1,479,165
Feb.	5	8	2,490	230,178	92,440	11,959	1,709,343
Mar.	8	10	6,835	307,703	45,018	18,794	2,017,046
Apr. *	9	10	1,309	73,422	56,090	20,103	2,090,468
May	11	11	6,864	151,467	22,067	26,967	2,241,935
June	12	12	8,711	233,792	26,839	35,678	2,475,727
July	12	13	11,104	236,065	21,259	46,782	2,711,792
Aug.	11	13	11,472	275,026	23,974	58,254	2,986,818
Sept.	12	14	9,029	308,827	34,204	67,283	3,295,645
Oct.	11	15	7,243	315,442	43,551	74,526	3,611,087
Nov.	14	16	9,441	277,656	29,409	83,967	3,888,743
Dec.	15	17	9,739	298,648	30,665	93,706	4,187,391
1960							
Jan.	15	19	9,754	279,965	28,702	103,460	4,467,356
Feb.	16	19	9,218	241,226	26,169	112,678	4,708,582
Mar.	18	19	10,823	234,301	21,648	123,501	4,942,883
Apr.	18	19	10,862	313,588	28,870	134,363	5,256,471
May	18	19	10,441	325,147	31,141	144,804	5,581,618
June	18	19	8,189	289,369	35,336	152,993	5,870,987
July	18	19	8,042	275,901	34,307	161,035	6,146,888
Aug.	18	19	8,285	331,219	39,987	169,320	6,478,107
Sept.	18	19	6,124	221,632	36,190	175,444	6,699,739
Oct.	18	19	7,177	394,122	54,914	182,621	7,093,861
Nov.	18	19	5,860	315,959	53,917	188,481	7,409,820
Dec.	18	19	5,892	280,312	47,575	194,373	7,690,132

* Pool reclassified from gas to oil effective April 1, 1959.

Case _____
Exhibit No. _____
Witness _____

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. / Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1961							
Jan.	17	21	6,035	224,444	37,190	200,408	7,914,576
Feb.	20	21	5,138	266,825	51,931	205,546	8,181,401
Mar.	20	21	7,543	434,066	57,545	213,089	8,615,467
Apr.	20	21	6,235	386,347	61,964	219,324	9,001,814
May	20	21	7,046	396,998	56,343	226,370	9,398,812
June	19	21	6,416	418,404	65,212	232,786	9,817,216
July	20	21	7,691	519,895	67,597	240,477	10,337,111
Aug.	20	21	6,669	459,334	68,875	247,146	10,796,445
Sept.	20	21	3,989	253,694	63,598	251,135	11,050,139
Oct.	20	21	5,667	382,289	67,458	256,802	11,432,428
Nov.	20	21	5,041	361,677	71,747	261,843	11,794,105
Dec.	20	21	4,335	385,404	88,905	266,178	12,179,509
1962							
Jan.	20	22	5,328	358,644	67,313	271,478	12,538,153
Feb.	19	22	4,545	283,767	62,434	276,023	12,821,920
Mar.	20	22	5,961	401,758	67,397	281,984	13,223,678

El Paso Ex. 3

ANGELS PEAK - GALLUP OIL POOL
GAS-OIL RATIO PERFORMANCE

Operator Well Name & Number	July 1960	October 1960	January 1961	April 1961	July 1961	October 1961	January 1962	April 1962
El Paso Natural Gas Company								
Huerfano #92	106,976	86,897	81,944	84,200	102,326	120,000	89,747	99,444
Huerfano #99	133,837	134,286	188,194	151,676	229,700	155,069	152,522	110,923
Huerfano #101				53,445	63,266	50,690	77,404	66,452
Huerfano #103	116,962	98,734	95,833	146,279	104,400	83,960	103,889	132,273
Huerfano #105	21,179 (78)	24,271 (79)	20,844 (88)	18,717 (88)	22,079 (76)	21,299 (79)	20,355 (79)	25,033 (61)
Huerfano #106	127,182	92,619	142,143	120,102	159,214	231,429	240,571	172,857
Huerfano #107	11,617 (71)	9,344 (84)	9,638 (47)	6,901 (84)	12,930 (61)	16,026 (31)	12,318 (31)	20,250 (24)
Huerfano #108	54,460	68,793	56,650	97,019	90,577	112,593	125,432	108,817
Huerfano #109	95,086	118,148	117,734	114,316	163,871	161,075	139,462	280,652
Huerfano #110	4,108 (19)	6,357 (16)	5,750 (16)	11,126 (16)	11,525 (12)	14,356 (11)	16,400 (10)	13,700 (10)
Huerfano #111		136,897	58,214	58,966	51,818	81,364	154,286	278,571
Huerfano #113				116,294	150,733	174,310	260,247	211,075
Huerfano #116				21,595 (10)	66,206 (3)	57,222	92,759	55,349
Pan American Petroleum Corp.								
Frost B #1	23,103 (6)	43,027 (4)	34,027	181,850	141,368 (1)	210,000	210,000	210,000
McAdams B #1	12,428 (17)	12,133 (17)	6,745 (31)	12,930 (19)	16,635 (15)	18,258 (14)	2,492 (11)	5,696 (14)
McAdams B #2	3,477 (39)	4,063 (32)	5,640 (32)	7,428 (27)	9,219 (19)	11,892 (18)	7,457 (16)	3,395 (9)
A. N. Brown								
McAdams Nos. 1 & 4	83,348	84,806	174,536	117,236	89,674	104,864	119,333	130,416
McAdams #2	54,909	110,068	156,187	161,353	126,208	115,338	133,333	120,000
McAdams #3	13,478 (102)	10,310 (57)	14,576 (48)	28,928 (28)	26,947 (23)	26,947 (23)	26,915 (20)	36,786 (14)
McAdams #5	18,320 (14)	12,237 (8)	Plugged and Abandoned					

Proration Department
June 11, 1962

PAN AM 2A

BOTTOM HOLE PRESSURES OF NEW WELLS
ANGELS PEAK GALLUP FIELD

Virgin Bottom Hole Pressure	1620 psig

Huerfano Unit No. 101 (NW/4 19-27-10)

Completion Date	1-12-61
Initial Potential	1000 MCFPD
GOR	34,722:1
Shut In Casing Pressure, 8 days	1130 psig
Calculated Bottom Hole Pressure	1315 psig
Pressure Loss Due to Offset Production	305 psi

Huerfano Unit No. 113 (NW/4 33-27-10)

Completion Date	1-25-61
Initial Potential	2127 MCFPD
GOR	76,511:1
Shut In Tubing Pressure, 7 days	1087 psig
Calculated Bottom Hole Pressure	1273 psig
Pressure Loss Due to Offset Production	347 psi

Huerfano Unit No. 116 (NW/4 11-26-10)

Completion Date	1-7-61
Initial Potential	272 MCFPD
GOR	34,871:1
Shut In Casing Pressure, 8 days	977 psig
Calculated Bottom Hole Pressure	1164 psig
Pressure Loss Due to Offset Production	456 psi

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 5
CASE 646

Case _____
Exhibit No. _____
Witness _____

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. /Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1958							1,486
Apr.	1	1		1,486			73,371
May	2	2		71,885			175,552
June	2	2		102,181			324,857
July	2	2		149,305			448,373
Aug.	2	3		123,516			629,116
Sept.	3	5		180,743			830,752
Oct	3	5	3,013	201,636	66,922	3,013	1,136,738
Nov.	5	5	1,506	305,986	203,178	4,519	1,281,594
Dec.	5	5	2,479	144,856	58,433	6,998	
1959							
Jan.	4	8	2,471	197,571	79,955	9,469	1,479,165
Feb.	5	8	2,490	230,178	92,440	11,959	1,709,343
Mar.	8	10	6,835	307,703	45,018	18,794	2,017,046
Apr. *	9	10	1,309	73,422	56,090	20,103	2,090,468
May	11	11	6,864	151,467	22,067	26,967	2,241,935
June	12	12	8,711	233,792	26,839	35,678	2,475,727
July	12	13	11,104	236,065	21,259	46,782	2,711,792
Aug.	11	13	11,472	275,026	23,974	58,254	2,986,818
Sept.	12	14	9,029	308,827	34,204	67,283	3,295,645
Oct.	11	15	7,243	315,442	43,551	74,526	3,611,087
Nov.	14	16	9,441	277,656	29,409	83,967	3,888,743
Dec.	15	17	9,739	298,648	30,665	93,706	4,187,391
1960							
Jan.	15	19	9,754	279,965	28,702	103,460	4,467,356
Feb.	16	19	9,218	241,226	26,169	112,678	4,708,582
Mar.	18	19	10,823	234,301	21,648	123,501	4,942,883
Apr.	18	19	10,862	313,588	28,870	134,363	5,256,471
May	18	19	10,441	325,147	31,141	144,804	5,581,618
June	18	19	8,189	289,369	35,336	152,993	5,870,987
July	18	19	8,042	275,901	34,307	161,035	6,146,888
Aug.	18	19	8,285	331,219	39,987	169,320	6,478,107
Sept.	18	19	6,124	221,632	36,190	175,444	6,699,739
Oct.	18	19	7,177	394,122	54,914	182,621	7,093,861
Nov.	18	19	5,860	315,959	53,917	188,481	7,409,820
Dec.	18	19	5,892	280,312	47,575	194,373	7,690,132

* Pool reclassified from gas to oil effective April 1, 1959.

Case _____
Exhibit No. _____
Witness _____

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. / Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1961							
Jan.	17	21	6,035	224,444	37,190	200,408	7,914,576
Feb.	20	21	5,138	266,825	51,931	205,546	8,181,401
Mar.	20	21	7,543	434,066	57,545	213,089	8,615,467
Apr.	20	21	6,235	386,347	61,964	219,324	9,001,814
May	20	21	7,046	396,998	56,343	226,370	9,398,812
June	19	21	6,416	418,404	65,212	232,786	9,817,216
July	20	21	7,691	519,895	67,597	240,477	10,337,111
Aug.	20	21	6,669	459,334	68,875	247,146	10,796,445
Sept.	20	21	3,989	253,694	63,598	251,135	11,050,139
Oct.	20	21	5,667	382,289	67,458	256,802	11,432,428
Nov.	20	21	5,041	361,677	71,747	261,843	11,794,105
Dec.	20	21	4,335	385,404	88,905	266,178	12,179,509
1962							
Jan.	20	22	5,328	358,644	67,313	271,478	12,538,153
Feb.	19	22	4,545	283,767	62,434	276,023	12,821,920
Mar.	20	22	5,961	401,758	67,397	281,984	13,223,678

EPNG #3

ANGELS PEAK - GALLUP OIL POOL
GAS-OIL RATIO PERFORMANCE

Operator Well Name & Number	July 1960	October 1960	January 1961	April 1961	July 1961	October 1961	January 1962	April 1962
El Paso Natural Gas Company								
Huerfano #92	106,976	86,897	81,944	84,200	102,326	120,000	89,747	99,444
Huerfano #99	133,837	134,286	188,194	151,676	229,700	155,069	152,522	110,923
Huerfano #101				53,445	63,266	50,690	77,404	66,452
Huerfano #103	116,962	98,734	95,833	146,279	104,400	83,960	103,889	132,273
Huerfano #105	21,179 (78)	24,271 (79)	20,844 (88)	18,717 (88)	22,079 (76)	21,299 (79)	20,355 (79)	25,033 (61)
Huerfano #106	127,182	92,619	142,143	120,102	159,214	231,429	240,571	172,857
Huerfano #107	11,617 (71)	9,344 (84)	9,638 (47)	6,901 (84)	12,930 (61)	16,026 (31)	12,318 (31)	20,250 (24)
Huerfano #108	54,460	68,793	56,650	97,019	90,577	112,593	125,432	108,817
Huerfano #109	95,086	118,148	117,734	114,316	163,871	161,075	139,462	280,652
Huerfano #110	4,108 (19)	6,357 (16)	5,750 (16)	11,126 (16)	11,525 (12)	14,356 (11)	16,400 (10)	13,700 (10)
Huerfano #111		136,897	58,214	58,966	51,818	81,364	154,286	278,571
Huerfano #113				116,294	150,733	174,310	260,247	211,075
Huerfano #116				21,595 (10)	66,206 (3)	57,222	92,759	55,349
Pan American Petroleum Corp.								
Frost B #1	23,103 (6)	43,027 (4)	34,027	181,850	141,368 (1)	210,000	210,000	210,000
McAdams B #1	12,428 (17)	12,133 (17)	6,745 (31)	12,930 (19)	16,635 (15)	18,258 (14)	2,492 (11)	5,696 (14)
McAdams B #2	3,477 (39)	4,063 (32)	5,640 (32)	7,428 (27)	9,219 (19)	11,892 (18)	7,457 (16)	3,395 (9)
A. N. Brown								
McAdams Nos. 1 & 4	83,348	84,806	174,536	117,236	89,674	104,864	119,333	130,416
McAdams #2	54,909	110,068	156,187	161,353	126,208	115,338	133,333	120,000
McAdams #3	13,478 (102)	10,310 (57)	14,576 (48)	28,928 (28)	26,947 (23)	26,947 (23)	26,915 (20)	36,786 (14)
McAdams #5	18,320 (14)	12,237 (8)	Plugged and Abandoned					

Proration Department
June 11, 1962

Case_____
Exhibit No._____
Witness_____

SUMMARY OF OIL & GAS PRODUCTION
TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

Year & Month (1)	No. Prod. Wells (2)	Total Wells (3)	Oil Bbls. (4)	Gas MCF (5)	GOR Cu. ft. /Bbl. (6)	Cumulative Production Oil Bbls. (7)	Cumulative Production Gas MCF (8)
1958							
Apr.	1	1		1,486			1,486
May	2	2		71,885			73,371
June	2	2		102,181			175,552
July	2	2		149,305			324,857
Aug.	2	3		123,516			448,373
Sept.	3	5		180,743			629,116
Oct	3	5	3,013	201,636	66,922	3,013	830,752
Nov.	5	5	1,506	305,986	203,178	4,519	1,136,738
Dec.	5	5	2,479	144,856	58,433	6,998	1,281,594
1959							
Jan.	4	8	2,471	197,571	79,955	9,469	1,479,165
Feb.	5	8	2,490	230,178	92,440	11,959	1,709,343
Mar.	8	10	6,835	307,703	45,018	18,794	2,017,046
Apr. *	9	10	1,309	73,422	56,090	20,103	2,090,468
May	11	11	6,864	151,467	22,067	26,967	2,241,935
June	12	12	8,711	233,792	26,839	35,678	2,475,727
July	12	13	11,104	236,065	21,259	46,782	2,711,792
Aug.	11	13	11,472	275,026	23,974	58,254	2,986,818
Sept.	12	14	9,029	308,827	34,204	67,283	3,295,645
Oct.	11	15	7,243	315,442	43,551	74,526	3,611,087
Nov.	14	16	9,441	277,656	29,409	83,967	3,888,743
Dec.	15	17	9,739	298,648	30,665	93,706	4,187,391
1960							
Jan.	15	19	9,754	279,965	28,702	103,460	4,467,356
Feb.	16	19	9,218	241,226	26,169	112,678	4,708,582
Mar.	18	19	10,823	234,301	21,648	123,501	4,942,883
Apr.	18	19	10,862	313,588	28,870	134,363	5,256,471
May	18	19	10,441	325,147	31,141	144,804	5,581,618
June	18	19	8,189	289,369	35,336	152,993	5,870,987
July	18	19	8,042	275,901	34,307	161,035	6,146,888
Aug.	18	19	8,285	331,219	39,987	169,320	6,478,107
Sept.	18	19	6,124	221,632	36,190	175,444	6,699,739
Oct.	18	19	7,177	394,122	54,914	182,621	7,093,861
Nov.	18	19	5,860	315,959	53,917	188,481	7,409,820
Dec.	18	19	5,892	280,312	47,575	194,373	7,690,132

* Pool reclassified from gas to oil effective April 1, 1959.

Case_____
Exhibit No. _____
Witness_____

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TOTAL ANGELS PEAK (GALLUP) FIELD
(Gas Volumes @ 15.025 psia)

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ANGELS PEAK - GALLUP OIL POOL
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McAdams #5	18,320 (14)	12,237 (8)	Plugged and Abandoned					

Proration Department
June 11, 1962

No. 18-62

DOCKET: REGULAR HEARING - THURSDAY - JUNE 14, 1962
OIL CONSERVATION COMMISSION - 9 A.M., MORGAN HALL, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

ALLOWABLE: (1) Consideration of the oil allowable for July, 1962.

(2) Consideration of the allowable production of gas for July, 1962, for ten prorated pools in Lea and Eddy Counties, New Mexico. Consideration of the allowable production of gas for nine prorated pools in San Juan, Rio Arriba, and Sandoval Counties, New Mexico for July, 1962, also presentation of purchaser's nominations for the six-month period beginning August 1, 1962 for that area.

CASE 2049: (Reopened)
Application of the Oil Conservation Commission on its own motion to reconsider the special rules and regulations for the Devils Fork-Gallup Pool, Rio Arriba County, New Mexico.

Case 2049 will be reopened pursuant to Order No. R-1670-B to permit interested parties to appear and present testimony relative to the effectiveness of the special rules and regulations for the Devils Fork-Gallup Pool.

CASE 1641: (Reopened)
Application of the Oil Conservation Commission on its own motion to reconsider the special rules and regulations for the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico.

Case 1641 will be reopened pursuant to Order No. R-1410-C to permit interested parties to appear and present testimony relative to the effectiveness of the special rules and regulations for the Angels Peak-Gallup Oil Pool.

CASE 2583: Application of S. P. Yates for permission to drill a well in the potash-oil area, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks permission to drill a well to the Yates formation in the SW/4 SE/4 of Section 21, Township 19 South, Range 30 East, Eddy County, New Mexico, which well would be located within the potash-oil area as defined by Order No. R-111-A, as amended.

CASE 2584: Application of Harvey E. Yates for permission to drill a well in the potash-oil area, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks permission to drill a well to the Yates formation in the NE/4 SE/4 of

CASE 2584: (Cont.)
Section 9, Township 19 South, Range 30 East, Eddy County, New Mexico, which well would be located within the potash-oil area as defined by Order No. R-111-A, as amended.

CASE 2585: Southeastern New Mexico nomenclature case calling for an order creating new pools and extending and abolishing certain existing pools in Lea and Roosevelt Counties, New Mexico.

(a) Create a new oil pool for Pennsylvanian production, designated as the West Allison-Pennsylvanian Pool, and described as:

TOWNSHIP 8 SOUTH, RANGE 36 EAST, NMPM
Section 31: NW/4

(b) Create a new oil pool for Drinkard production, designated as the Goodwin-Drinkard Pool, and described as:

TOWNSHIP 18 SOUTH, RANGE 37 EAST, NMPM
Section 30: NW/4

(c) Create a new oil pool for Devonian production, designated as the Monument Draw-Devonian Pool, and described as:

TOWNSHIP 23 SOUTH, RANGE 38 EAST, NMPM
Section 17: SE/4

(d) Abolish the East Prairie-Pennsylvanian Pool, described as:

TOWNSHIP 8 SOUTH, RANGE 36 EAST, NMPM
Section 23: SW/4

(e) Extend the North Anderson Ranch-Wolfcamp Pool, to include:

TOWNSHIP 15 SOUTH, RANGE 32 EAST, NMPM
Section 28: N/2 SW/4

TOWNSHIP 16 SOUTH, RANGE 32 EAST, NMPM
Section 1: Lots 4 & 5

(f) Extend the Allison-Pennsylvanian Pool to include:

TOWNSHIP 8 SOUTH, RANGE 36 EAST, NMPM
Section 36: E/2 NW/4

TOWNSHIP 8 SOUTH, RANGE 37 EAST, NMPM
Section 32: S/2
Section 34: NW/4

(g) Extend the North Justis-Devonian Pool to include:

TOWNSHIP 25 SOUTH, RANGE 37 EAST, NMPM
Section 1: SW/4
Section 2: SE/4

(h) Extend the North Justis-Fusselman Pool to include:

TOWNSHIP 24 SOUTH, RANGE 37 EAST, NMPM
Section 35: SE/4

(i) Extend the North Justis Tubb-Drinkard Pool to include:

TOWNSHIP 24 SOUTH, RANGE 37 EAST, NMPM
Section 35: SW/4

(j) Extend the Pearl-Queen Pool to include:

TOWNSHIP 19 SOUTH, RANGE 35 EAST, NMPM
Section 23: E/2 NE/4
Section 24: NW/4

TOWNSHIP 20 SOUTH, RANGE 35 EAST, NMPM
Section 4: W/2 NE/4

(k) Extend the South Prairie-Pennsylvanian Pool to include:

TOWNSHIP 8 SOUTH, RANGE 36 EAST, NMPM
Section 22: N/2
Section 23: W/2

(l) Extend the Triste Draw-Delaware Pool to include:

TOWNSHIP 23 SOUTH, RANGE 32 EAST, NMPM
Section 26: SE/4

(m) Extend the Vacuum-Abo Pool to include:

TOWNSHIP 18 SOUTH, RANGE 35 EAST, NMPM
Section 2: NE/4

CASE 2586: Northwestern New Mexico nomenclature case calling for an order extending existing pools in Rio Arriba and San Juan, Counties.

(a) Extend the Fulcher Kutz-Pictured Cliffs Pool to include:

TOWNSHIP 29 NORTH, RANGE 10 WEST, NMPM
Section 31: W/2

(b) Extend the Blanco-Mesaverde Pool to include:

TOWNSHIP 29 NORTH, RANGE 10 WEST, NMPM
Section 4: All
Section 9: N/2

(c) Extend the Flora Vista-Mesaverde Pool to include:

TOWNSHIP 30 NORTH, RANGE 12 WEST, NMPM
Section 28: N/2

(d) Extend the South Blanco-Tocito Oil Pool to include:

TOWNSHIP 27 NORTH, RANGE 7 WEST, NMPM
Section 1: S/2
Section 2: S/2
Section 3: SE/4

iqg/

GOVERNOR
EDWIN L. MECHEM
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
E. S. JOHNNY WALKER
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

P. O. BOX 871
SANTA FE

July 17, 1962

Re: Case No. 1641
Order No. R-1410-D
Applicant:
OIL CONSERVATION COMMISSION

Mr. Garrett Whitworth
El Paso Natural Gas Company
Box 1492
El Paso, Texas

Dear Sir:

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

Very truly yours,

A. L. Porter, Jr.

A. L. PORTER, Jr.
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x

Artesia OCC

Aztec OCC x

OTHER Mr. Guy Buell
Pan American Petroleum Corporation

BEFORE THE OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF THE OIL CONSERVATION COMMISSION ON ITS OWN MOTION TO RECONSIDER THE SPECIAL RULES AND REGULATIONS FOR THE ANGELS PEAK-GALLUP OIL POOL, SAN JUAN COUNTY, NEW MEXICO.	]]]]]]	No. 1641

ENTRY OF APPEARANCE

The undersigned, Atwood & Malone of Roswell, New Mexico, a firm of attorneys all of whose members are duly licensed to practice law in the State of New Mexico, hereby enters its appearance as local counsel with Guy Buell, of the Texas Bar, appearing for Pan American Petroleum Corporation in said cause.

DATED at Roswell, New Mexico this 12th day of April, 1962.

ATWOOD & MALONE

By Clark K. Malone
Post Office Drawer 700
Roswell, New Mexico

DEARNLEY-MEIER REPORTING SERVICE, Inc.
ALBUQUERQUE, N. M.
PHONE 243-6691
FARMINGTON, N. M.
PHONE 325-1182

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 14, 1962

REGULAR HEARING

IN THE MATTER OF:
(Reopened)
Application of the Oil Conservation Commission on its own motion to reconsider the special rules and regulations for the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico.

Case 1641 will be reopened pursuant to Order No. R-1410-C to permit interested parties to appear and present testimony relative to the effectiveness of the special rules and regulations for the Angels Peak-Gallup Oil Pool.

CASE 1641

BEFORE:

Governor Edwin L. Mechem
Mr. A. L. (Pete) Porter
Mr. E. S. (Johnny) Walker

TRANSCRIPT OF PROCEEDINGS

MR. PORTER: The Commission will take up next Case 1641.

MR. MORRIS: Application of the Oil Conservation Commission on its own motion to reconsider the special rules and regulations for the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico.

MR. WHITWORTH: For the record, Garrett Whitworth and the Santa Fe firm of Seth, Montgomery, Federici and Andrews for El Paso Natural Gas Company.

MR. PORTER: I would like to call for other appearances

at this time. Mr. Buell.

MR. BUELL: If it please the Commission, are you interested in all of us interested entering an appearance again?

MR. PORTER: I don't think it would hurt anything to ask for re-appearances. It has been quite some time.

MR. BUELL: For Pan American Petroleum Corporation, Guy Buell.

MR. PORTER: I have forgotten who all was involved. Anyone else desire to make an appearance in the Angels Peak case? Mr. Buell, does Pan American have testimony?

MR. BUELL: Yes, sir, we have one witness.

MR. PORTER: Mr. Whitworth?

MR. WHITWORTH: El Paso has one witness, Mr. Rainey.

MR. PORTER: I will ask you to proceed with your testimony at this time.

(Witness D. H. Rainey sworn.)

D. H. RAINEY

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. WHITWORTH:

Q Mr. Rainey, would you please state your full name, by whom and in what capacity you are employed?

A David H. Rainey, Administrative Assistant in the Proration Department for El Paso Natural Gas Company.

DEARNLEY-MEIER REPORTING SERVICE, Inc.
ALBUQUERQUE, N. M.
PHONE 243-6691
FARMINGTON, N. M.
PHONE 325-1182

Q You have previously testified before this Commission as an expert witness, haven't you, Mr. Rainey?

A Yes, sir, in this case.

MR. PORTER: The witness' qualifications are acceptable.

Q (By Mr. Whitworth) Mr. Rainey, have you had occasion to make a study recently of the production characteristics and gas-oil ratios of the Angels Peak-Gallup Oil Pool?

A Yes, sir. We have reviewed to date, from the time of the last hearing, the production performance history and the gas-oil ratio performance history of this pool and have had exhibits prepared to show the production performance and the gas-oil ratio performance in this pool since the time of the last hearing in July of 1960.

Q Do you also have an exhibit which is a plat showing wells in this pool?

A Yes, sir, I do.

Q Is that El Paso's Exhibit No. 1?

A Yes, sir.

(Whereupon, El Paso's Exhibit No. 1 marked for identification.)

Q You mentioned an exhibit showing the production history of the Angels Peak-Gallup Pool. Is that Exhibit No. 2?

A Yes, sir.

(Whereupon, El Paso's Exhibits Nos. 2 and 3 marked for identification.)

Q And El Paso's Exhibit No. 3 shows the gas-oil ratios of

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FARMINGTON, N. M.
PHONE 325-1182

the wells in this pool, is that right?

A Yes, sir, that's correct.

Q Mr. Rainey, do you have any recommendation or conclusion with respect to the special rules for Angels Peak-Gallup Oil Pool?

A Yes, it is our recommendation that the present field rules be extended for another year, and I believe that it will probably be more apropos to make it on a temporary basis, as is the current rule, so that as we gain more production performance history in this pool we can definitely determine whether or not these rules should be made permanent.

There is no evidence, affirmative evidence at this time that the rules should be changed. There is no evidence that the gas-oil contact has moved appreciably. There has been some change in gas-oil ratios, as would be expected, and I'll discuss those in a moment, but in general, we feel that the present rule should be continued.

Q Will you go ahead and explain the exhibits, El Paso's Exhibits 1, 2, and 3, and explain on what you base your conclusions and recommendations with regard to the special rules of this pool?

A Yes, sir. The plat, Exhibit 1, shows in the dashed, the heavy dashed outline, the short dashes, the pool limits as they were defined at the time of the last hearing in this case. I have shown in red in Section 19 of 27 North, Range 10 West, the West

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Half of that Section and the Northeast Quarter of that Section have been added to the pool limits since the time of the last hearing on this matter; and in 26 North, Range 10 West, the North Half of Section 11 and the South Half of the South Half and the North Half of the Southwest Quarter of Section 2 have been added to the pool limits. There's been no other change in the limits of the pool other than the addition of those two relatively small tracts of acreage.

There have been three new producing wells drilled in the pool, two of them in Section 19 of 27 and 10, and one in Section 11 of 26 and 10; and there has been one dry hole drilled in the Northwest Quarter of Section 12, 26 and 10 since the time of the last hearing.

The wells shown on this exhibit are only Gallup wells. The other development in the area, the Pictured Cliffs, is not shown, only the Gallup wells are shown. The small "d" under a number of the wells indicate that they are dual completions in the Gallup and the Dakota. I think that's essentially all that that plat shows.

Exhibit 2 is a set of production performance statistics on the pool since its original production in 1958, brought down through the month of March, 1962. As you can see, we have shown the monthly oil production, the monthly gas production, the actual field producing gas-oil ratio for each month, and the cumulative total oil and gas production from the field. I think it's

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interesting to note that for the last three years the gas-oil ratio has gradually increased. The producing gas-oil ratio for the pool for the year -- and bear in mind that the ratios have varied somewhat from month to month, dependent on what wells have actually been on the line or how much production has actually been taken from the pool, but that the year 1959, based on the total production for the year, the pool gas-oil ratio was 33,500 cubic feet per barrel; for the year 1960, it was 35,000 cubic feet per barrel; and for the year 1961 it was 62,500 cubic feet per barrel. The ratios have in general climbed, as would be expected in a reservoir of this kind, I think. I know of nothing particularly significant to point out on this Exhibit 2, other than the overall cumulative figures, and you can see that the gas-oil ratios have steadily climbed but have varied somewhat from month to month, dependent on the individual well that happened to be producing at that time.

Exhibit 3 is a gas-oil ratio performance history data sheet from July, 1960, for each quarter through April, 1962, which is the last gas-oil ratios we have available. Now in general the gas-oil ratios in the pool, as can be seen from these individual well gas-oil ratios, have tended to increase. It is significant, I think, to note that in some cases the gas-oil ratio performance appears to be somewhat erratic on an individual well. I think that can be accounted for by the fact that, for the most part, the wells in this pool produce relatively small volumes of

oil in relationship to the volumes of gas which they produce, and just a few barrels change in oil production in any given month when they may be taking the official gas-oil ratio test will result in a fairly substantial change in the tested gas-oil ratio; but as far as the actual producing month-to-month gas-oil ratio, in most of these wells it has climbed slightly throughout the history of the pool.

One well in particular I might call to your attention is the Pan American Frost B-1, which was classified as an oil well at the time of the last hearing. That well is now classified as a gas well, and as you can see, has a gas-oil ratio of 210,000 to 1. That well has declined so markedly in oil production that although it's not producing any more gas than it was before -- it's located in Section 27 of 27 and 10, and that well, because of the marked decline in oil production, has an apparently very high gas-oil ratio, but these last, for the last year or so the gas-oil ratios tested on that well were based on less than one barrel of oil production; so just a minor fraction of a change in the amount of oil produced can make a very drastic and substantial change in the gas-oil ratio, even though the gas production has not gone up.

We believe from the evidence, if you realize the reason for that tremendous increase in the gas-oil ratio on the Frost 1-B, that there has been no marked movement of that gas-oil contact since the time of the last hearing.

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Q Mr. Rainey, what do the numbers in parentheses mean?

A Pardon me, I missed that; but the numbers in parentheses after the gas-oil ratios on certain of the wells are the wells that are classified as oil wells, and those numbers are the oil producing rates on those wells as reported on gas-oil ratio tests for that period of time. I might add that I took these gas-oil ratios directly from the proration schedules for the months in which there should have been a change in gas-oil ratio. If there have been other gas-oil ratios taken on some of these wells, and I know that there have been on some of them, I did not pick up any intervening gas-oil ratios. These are the ones that appeared on the proration schedules, the oil proration schedules for the month in which it was intended that the ratio should change. You can see the gradual decline in oil production on every one of the oil wells.

Q In your opinion, the special field rules have been working and should be extended for another year, is that correct?

A Yes, sir.

Q From what date?

A It's my understanding that the present rules provide that they shall continue in force until changed. There is a provision in the order as it now stands that this matter would come up for rehearing, for a redetermination as to whether or not the rules should continue or not, in April of this year by the terms of the order itself. At that time this hearing was continued

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until this date. It's my understanding that unless changed, those rules will remain in effect.

It's my recommendation that we come back a year from today, or the June hearing in 1963, to review the matter again.

Q Were El Paso's Exhibits 1, 2, and 3 prepared by you or under your supervision?

A Yes, sir, they were.

MR. WHITWORTH: We ask that these exhibits be admitted.

MR. PORTER: Yes, sir. Any questions concerning the exhibits? They will be admitted to the record.

(Whereupon, El Paso's Exhibits 1 & 2 admitted in evidence.)

MR. WHITWORTH: That's all we have.

MR. PORTER: Anyone have a question of Mr. Rainey?

MR. MORRIS: Yes, sir.

MR. PORTER: Mr. Morris.

CROSS EXAMINATION

BY MR. MORRIS:

Q Mr. Rainey, is the Brown-McAdams Well No. 3 classified as an oil or gas well at this time?

A Based on its ratio, the last ratio in April, 1962, of 36,786 to 1, it should be classified as a gas well. However, there was no change in the classification on the June oil proration schedule from which this ratio was picked up. The rules provide that when wells have ratios in excess of 30,000 to 1, they should

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be classified as gas wells. Again, that well, I think, because of the decline in oil production, just a barrel or two one way or the other makes a substantial difference in the calculated ratio.

Q In your opinion, Mr. Rainey, has the 30,000 to 1 dividing line between oil and gas wells been a realistic one?

A I think so. It seems to have worked out pretty well.

Q Has the gas-oil ratio of 2,000 to 1 been any handicap in the production of the oil wells?

A Not to my knowledge. El Paso has no oil wells and I'm not -- excuse me, we have a number of oil wells.

Q Yes.

A Excuse me. To my knowledge, there has been no particular handicap. I was thinking a hearing ahead of us.

Q Mr. Rainey, do you have any information with respect to the Brown-McAdams Well No. 5 as to why that well has been plugged and abandoned?

A It is my understanding that they drilled that extra well in that section, they have only one section in that pool and they drilled that extra well in that section to get additional oil allowable; and it's my understanding that it was uneconomical to produce the well. I'm not specifically familiar with the details on it. I might add all my other testimony has been in regard to this pool. I don't want to get that confused.

Q Upon what do you base your conclusions that there has

been no substantial movement of the gas-oil contact in this pool?

A Well, the ratios in the oil of the pool, in the oil zone of the pool have increased, but it would appear to me that the increase has been what would normally be expected in an oil well of this kind. Had there been any marked movement of the gas-oil contact, it would seem reasonable that the gas-oil ratios of some of those oil wells would have climbed very rapidly, and the only one that has climbed very rapidly has been the Pan American Frost B-1, which as I explained is because of the very marked decline in oil production on that well.

MR. MORRIS: I believe that's all I have. Thank you.

MR. PORTER: Does anyone else have a question of Mr. Rainey? The witness may be excused.

(Witness excused.)

MR. BUELL: May it please the Commission, Mr. Eaton was not fast enough on his feet and did not get sworn.

(Witness sworn.)

GEORGE W. EATON

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Eaton, would you state your complete name, by whom you are employed, and in what capacity and what location, please?

A George W. Eaton, Jr., Senior Petroleum Engineer for Pan

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American Petroleum Corporation in Farmington, New Mexico.

Q Mr. Eaton, you've testified at prior Commission hearings and your qualifications as a Petroleum Engineer are a matter of public record, have you not?

A Yes, they are, and I likewise have testified in this case previously.

Q Mr. Eaton, would you look now at what has been marked as Pan American's Exhibit No. 1 and state for the record what that exhibit reflects? Pardon me, Exhibit 1-A so we can avoid confusion with past exhibits that we might have entered in this case.

(Whereupon, Pan American's Exhibit No. 1-A marked for identification.)

A All right. Exhibit No. 1-A is an isopac map of the Angels Peak-Gallup Pool. It is a map of that portion of the San Juan Basin which includes the Angels Peak-Gallup Pool. The sand thicknesses of the Angel Peak-Gallup Pool are shown with the contour lines contoured on a ten-foot contour interval.

Q Mr. Eaton, how have you distinguished the wells that are completed in the Angels Peak-Gallup Pool?

A The Angels Peak-Gallup Pool wells are colored in yellow.

Q Have you distinguished in any manner those wells that have been drilled subsequent to the last hearing in this case?

A Yes, sir. There have been three producing wells drilled in the Angels Peak-Gallup Pool since the last hearing, and one

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dry hole. The three wells which are producers are colored in yellow with an outer brown circle.

Q What is the significance of the numbers opposite each well, Mr. Eaton, that are colored in red and green?

A The gas-oil ratio of each well that existed at the time of the last hearing is colored in red, has a red number beside that well. The green number immediately underlying the red number is the gas-oil ratio of that well as of the latest date.

Q What is the orange line that traverses this pool, Mr. Eaton, on Exhibit No. 1-A?

A The orange line is the estimated gas-oil contact. You will note that it is depicted at a structural elevation of plus 430 feet. This is the same structural elevation at which the gas-oil contact was estimated at the time of the last hearing. The line has not been changed except for a better structural control which was provided by the additional wells which have been drilled since that time.

Q Are you in agreement with Mr. Rainey's conclusion that in this interim period since these pool rules were adopted, there has been no substantial movement one way or the other of the gas-oil contact?

A Yes, sir, I am. As a matter of fact, it appears to me that there has been remarkably little change, that the gas-oil contact has been remarkably stable during this interim period.

Q Would you care to comment on our Frost B-1? I think

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Mr. Rainey very clearly covered it. Do you have any other additional information in that regard that you would like to contribute relative to that gas-oil ratio's performance?

A I agree, I think Mr. Rainey adequately covered it, but I would add this. I don't want to say that the gas-oil ratio shown of 210,000 is not representative, but I do believe it's meaningless. The well declined both in gas and oil production to such an extent that it is now, in the company terminology, shut in, temporarily abandoned. It is not intended that the well be produced any more. It became uneconomical to operate, and this gas-oil ratio was measured sometime before it completely became uneconomical to operate. I believe it's meaningless.

Q If the gas-oil contact had moved to that well, we could operate it economically as a gas well, could we not, Mr. Eaton?

A Yes, sir.

(Whereupon, Pan American's Exhibit No. 2-A marked for identification.)

Q Would you look at our Exhibit No. 2-A and briefly state for the record what that exhibit shows?

A Exhibit No. 2-A is a tabulation showing the bottom hole pressures of the new wells which have been completed in the Angels Peak-Gallup Pool since the time of the last hearing. This exhibit also shows the initial reservoir pressure in the Angels Peak-Gallup Pool, showing that pressure to be 1620 psig. In the case of each of the three wells which have been completed, the

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initial bottom hole pressure on each of the wells was substantially less than the original bottom hole pressure. Each of these three new wells are isolated at a location substantially far from the nearest producing well at the time that the new well was completed.

Q So these new data which have been acquired subsequent to the last hearing also indicate that in this pool, a gas well will effectively and efficiently drain in excess of 320 acres?

A Yes, sir.

Q Mr. Eaton, more or less by way of summary, have you seen any new data which we have acquired in this interim period which would indicate to you in any way that the current rules are not the proper rules for this pool?

A I have seen no new data which have been acquired since the last hearing which would suggest to me that these rules aren't functioning properly in maintaining a stable gas-oil contact and adequately protecting the correlative rights of the gas operators as well as preventing the waste of the oil in the oil area by permitting an upward movement of the gas-oil contact.

Q Mr. Eaton, what is your engineering recommendation to the Commission with respect to the continuation of these rules?

A It is my recommendation that these rules be made permanent.

Q Do you see any necessity for keeping them on a temporary basis of another year?

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A No, sir. I believe that the data which have been obtained during the past two years should be sufficient to extrapolate into the future, so that if it has worked properly the last two years, we can satisfactorily conclude it will continue to do so.

Q And, Mr. Eaton, should the occasion develop, which we do not foresee now, that these rules would adversely affect anyone or adversely affect conservation, when this becomes known, of course, a hearing could be requested --

A Yes.

Q -- and the rules again considered.

MR. BUELL: May it please the Commission, that's all we have at this time; and may I formally offer our Exhibits 1-A and 2-A?

MR. PORTER: Without objection the exhibits will be admitted.

(Whereupon, Pan American's Exhibits Nos. 2-A & 2-B admitted in evidence.)

MR. PORTER: Does anyone have a question of Mr. Eaton? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q To what do you attribute the fact that the workover on Huerfano Unit No. 110 is an oil well?

A Would you locate that well for me?

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Q It's in Section 26 of 26, 10 -- I beg your pardon, Section 3.

A Section 3. It's my recollection, Mr. Nutter, that that is the anomalous well which was the subject of considerable discussion at the previous hearing. I didn't believe at that time that we ever could satisfactorily explain the low gas-oil ratio on the Huerfano Unit 110, and I still can't.

Q It's still an anomaly, then?

A Yes, sir, although less so than at the time of the last hearing. According to the data shown on this Exhibit 1-A, the gas-oil ratio at the time of the previous hearing was in the range of 7,000 cubic feet per barrel and is now 16,400 cubic feet per barrel. It appears that it might be approaching that area where it should be classified as a gas well.

Q It's the only old oil well south of your gas-oil line, I presume?

A No, sir. Huerfano Unit No. 108 which I kept looking at at the time that you brought this 110 up is classified actually as an oil well. It's immediately south of the gas-oil contact line. Apparently the gas-oil ratio in that well has changed very little in this interim period, but is still in the range which it would be classified as an oil well.

Q Doesn't it have a GOR of 125,000?

MR. MORRIS: You are referring to 105, are you not?

A Oh, excuse me, 105. 105 in the Southeast Quarter of

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Section 29, Township 27 North, Range 10 West.

Q (By Mr. Nutter) Oh, yes, it's close to the gas-oil contact?

A Yes, sir.

MR. NUTTER: Thank you. That's all.

MR. PORTER: Does anyone else have a question of Mr. Eaton?

MR. MORRIS: Yes.

MR. PORTER: Mr. Morris.

BY MR. MORRIS:

Q If the Commission should continue the rules in effect for another year as El Paso has suggested, and then have another hearing at that time, is it your opinion that we'll have any oil wells left in this pool or will they all have turned to gas wells in the meantime?

A It would be my opinion that there would still be oil wells left under these pool rules.

Q Two or three of them?

A Yes, sir. In that regard, I don't believe that there have been any which have passed over in the last two years. I don't believe, with the possible exception of this Brown, Weaver-Brown No. 3 which was mentioned previously, so I don't believe that another year's history will make any appreciable number of wells pass over from oil to gas classification.

MR. MORRIS: Thank you.

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MR. PORTER: Does anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: Does anyone else have any testimony to offer in this case, 1641? Any statements? Mr. Whitworth, do you have a statement to make?

MR. WHITWORTH: May it please the Commission, El Paso has no objection to making the rules permanent, as has been recommended by Pan American. We can always come back in for another hearing if that doesn't prove satisfactory.

MR. PORTER: If nothing further to be offered in Case 1641, the Commission will take it under advisement.

* * * * *

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STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in stenotype and reduced to typewritten transcript under my personal supervision; that the same is a true and correct record of said proceedings to the best of my knowledge, skill and ability.

WITNESS my hand and notarial seal this 25th day of June, 1962.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1963.

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BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
April 19, 1962

REGULAR HEARING

IN THE MATTER OF: Application of the Oil Conservation Commission on its own motion to reconsider the special rules and regulations for the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico. Case 1641 will be reopened pursuant to Order No. R-1410-C to permit interested parties to appeal and present testimony relative to the effectiveness of the special rules and regulations for the Angels Peak-Gallup Pool.	Case 1641 (Reopened)

BEFORE: Honorable Edwin L. Mechem
A. L. "Pete" Porter
E. S. "Johnny" Walker

TRANSCRIPT OF HEARING

MR. MORRIS: Before we proceed with the testimony of Mr. Utz, the attorney for Pan American, Mr. Buell, would like to make a motion in connection with Case 2049 and 1641. Mr. Buell.

MR. BUELL: May it please the Commission, with respect to both of those cases and considering the lateness of the hour and the day of the week and the fact that we are at the present

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time at about the half-way mark in the Basin-Dakota case, I would like to respectfully move that both of these cases be continued until the regular May hearing.

MR. PORTER: Mr. Kellahin.

MR. KELLAHIN: Jason Kellahin, Kellahin & Fox for Val Reese and Associates. We join in Mr. Buell's motion.

MR. BRATTON: Howard Bratton for Redfern & Herd. We join in the motion.

MR. MORRIS: Before the concurrences proceed, may I ask if the Commission wants to consider these cases at the May regular or defer them to the June regular when it will be heard here in Santa Fe, inasmuch as the Commission hearing in May will be in Hobbs?

MR. PORTER: Mr. Morris, the Commission is concerned, it appears that we'll have a short hearing in Hobbs next month. Probably the cases which we anticipate which we advertised will not cause us to run past noon. So it seems that May would be a good time to have them. Mr. Howell.

MR. HOWELL: El Paso Natural Gas Company would concur in the request for continuance.

MR. PORTER: Are there any objections to the counsel's motion? Mr. Cooley?

MR. COOLEY: William J. Cooley for Great American

Associates. We would strongly urge that it be continued to the June hearing due to the geography involved. That's about eight hundred miles round trip.

MR. PORTER: Mr. Buell, would you care to express yourself as to the date?

MR. BUELL: May it please the Commission, on behalf of Pan American, we would have no objection to a continuance to either date. It is the consensus of the operators that the present rules will be recommended to be continued for another year, so I do not see that a two-month delay will hurt anyone at all.

MR. PORTER: Mr. Morris, do you anticipate any cases for the June docket that might be time consuming other than these two?

MR. MORRIS: No, sir, I do not.

MR. PORTER: The June hearing will be heard on Thursday, which is one day later in the week. How would the June date suit you, Mr. Kellahin?

MR. KELLAHIN: I think that will be satisfactory.

MR. PORTER: Mr. Howell?

MR. HOWELL: Completely satisfactory.

MR. PORTER: In that case, Cases 2049 and 1641 will be continued until the June regular hearing date. The orders are

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such that the rules will remain in effect until further orders are issued.

Back to Case 2504.

STATE OF NEW MEXICO)
) SS
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 9th day of May, 1962.

Ada Dearnley
Notary Public-Court Reporter

My Commission Expires:

June 19, 1963.

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THE FRONTIER REFINING COMPANY
4040 EAST LOUISIANA AVENUE • DENVER 22, COLORADO • SKyline 6-1511

June 5, 1962

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

Gentlemen:

Reference is made to Docket No. 18-62 for regular hearing June 14, 1962, Case 1641. This is to advise that The Frontier Refining Company desires to continue the special rules and regulations for the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico, and we see no reason for any change thereto.

Yours very truly,

E. B. Granville

E. B. Granville
Superintendent of
Drilling and Production

EBG:ak

THE FRONTIER REFINING COMPANY

4040 EAST LOUISIANA AVENUE • DENVER 22, COLORADO • SKyline 6-1511

1962 APR 13 PM 1 22

April 10, 1962

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

Gentlemen:

Reference is made to Docket No. 12-62 for regular hearing April 18, 1962, Case 1641. This is to advise that The Frontier Refining Company desires to continue the special rules and regulations for the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico, and we see no reason for any change thereto.

Yours very truly,

E. B. Granville

E. B. Granville
Superintendent of
Drilling and Production

EBG:ak

CASE 1641: (HEARING DE NOVO) 7-15-59
APPLICATION of El Paso for hearing de novo for promulgation of special rules & regulations governing drilling spacing & prod. of wells in the ANGELS-PEAK-GALLUP OIL POOL.

CASE 1641 (REHEARING) JULY 13, 1960
APPLICATION OF W. R. WEAVER FOR RULES GOVERNING ANGELS PEAK-GALLUP OIL.

Case No.

1641

Large Exhibit

Case 1041

LAW OFFICES OF
MODRALL, SEYMOUR, SPERLING, ROEHL & HARRIS
SIMMS BUILDING
P. O. BOX 466
ALBUQUERQUE, NEW MEXICO
TELEPHONE CHAPEL 3-4514

J. R. MODRALL
AUGUSTUS T. SEYMOUR
JAMES E. SPERLING
JOSEPH E. ROEHL
GEORGE T. HARRIS
DANIEL A. SISK
DEAN P. KIMBALL
LELAND S. SEDBERRY
BURNS H. ERREBO
ALLEN C. DEWEY

JOHN F. SIMMS (1885-1954)

March 26, 1959

April 22
Examiner

Oil Conservation Commission
125 Mabry Hall
State Capitol
Santa Fe, New Mexico

Attention: Mr. A. L. Porter, Jr.

Gentlemen:

Enclosed in triplicate is the application of W. R. Weaver for a hearing for the adoption of special pool rules for the Angel's Peak-Gallup Oil Pool, San Juan County, New Mexico.

We understand that this matter will be set for hearing on the examiner docket on April 22 in Santa Fe.

Very truly yours,

MODRALL, SEYMOUR, SPERLING,
ROEHL & HARRIS

By Burns H. Errebo

BHE:imk

ENC:

Docket Mailed
4-10-59
JT

Docket Mailed
5-1-59

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5-28-59

BEN R. HOWELL
EL PASO NATURAL GAS COMPANY
EL PASO, TEXAS

COMMISSION ORDER R-1410, SIGNED TODAY, AUTHORIZES 80-ACRE UNITS FOR ALL WELLS IN ANGELS PEAK GALLUP OIL POOL. POOL GOR LIMIT FOUR THOUSAND TO ONE. ORDER EFFECTIVE JUNE 1, 1959. PROPORTIONAL FACTOR FOR POOL IS TWO POINT SEVEN SEVEN (2.77).

NEW MEXICO OIL CONSERVATION COMMISSION
A. L. PORTER, Jr.,
SECRETARY-DIRECTOR

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	COLLECT			

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

5-28-59

BURNS ERREBO
SEYMOUR, MODRALL, SPERLING, ROEHL, AND HARRIS
SIMMS BUILDING
ALBUQUERQUE, NEW MEXICO

COMMISSION ORDER R-1410, SIGNED TODAY, AUTHORIZES 80-ACRE UNITS FOR ALL WELLS IN ANGELS PEAK GALLUP OIL POOL. POOL GOR LIMIT FOUR THOUSAND TO ONE. ORDER EFFECTIVE JUNE 1, 1959. PROPORTIONAL FACTOR FOR POOL IS TWO POINT SEVEN SEVEN (2.77).

NEW MEXICO OIL CONSERVATION COMMISSION
A. L. PORTER, Jr.
SECRETARY-DIRECTOR

Glenn Burns Fire

Copy of Order

R-1410 - Case 1641

(Decatur) June 1, 1959

BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION
OF W. R. WEAVER FOR ADOPTION OF
SPECIAL POOL RULES FOR THE ANGEL'S
PEAK-GALLUP OIL POOL, SAN JUAN
COUNTY, NEW MEXICO.

CASE NO. _____

A P P L I C A T I O N

TO THE HONORABLE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO:

COMES NOW the Applicant, W. R. Weaver, of El Paso, Texas, and alleges and states as follows:

1. That he is the owner and operator of wells producing from the Angel's Peak-Gallup Oil Pool, San Juan County, New Mexico.

2. That said pool has been classified as an oil pool by an order of this Commission effective April 1, 1959.

3. That a majority of the wells now producing from said pool are gas wells.

4. That special pool rules and regulations should be adopted by this Commission governing the drilling of oil wells and gas wells in said pool and the production therefrom, including but not limited to provisions for proration units for oil wells and for gas wells, well location, determination of allowables for oil wells and for gas wells, and limiting gas-oil ratios.

5. That the adoption of special rules and regulations is necessary for the prevention of waste and the protection of correlative rights.

WHEREFORE, Applicant prays that this matter be set for hearing, that notice thereof be given as required by law and that upon hearing this Commission adopt rules and regulations for said pool.

W. R. WEAVER

By: MODRALL, SEYMOUR, SPERLING, ROEHL & HARRIS

Burns H. Errebo

By: Burns H. Errebo
1200 Simms Building
Post Office Box 466
Albuquerque, New Mexico

S. R. COOPER #1
SW SE NE Section 23-24-36E
Lea County, New Mexico

The S. R. Cooper #1 is a Jalmat gas well produced by free piston installed in the spring of 1958. Prior to this installation the well was re-completed in January 1955 by plugging back to 3127 feet, with a 4½ inch liner set from 3132 to 2755 feet. The well was perforated in the Yates from 3020 to 3104 and completed as a Jalmat gas well. The well was originally completed at 3160, being plugged from total depth of 3600. The 1955 recompletion was done in an effort to shut off water.

From September, 1958, through June, 1959, this well averaged 3,268 mcf per month. (For the period July, 1959, through April, 1960, after the cutback the well averaged 3,529 mcf per month.) During the same period it produced an average of 16 barrels of water per day for the first 10 months but, during the last 10 months after the well was required to be shut in much of the time, it increased in water to an average of 25 barrels per day. In May, 1960, the well made no gas the entire month, being shut in during said period.

In June, 1960, the well produced approximately as follows:

6/ 1/60: No production.

6/ 2/60: No production.

6/ 3/60: No production.

6/ 4/60: No production.

6/ 5/60: No production.

6/ 6/60: No production.

6/ 7/60: No production.

6/ 8/60: No production.

6/ 9/60: No production.

6/10/60: No production.

6/11/60: No production.

6/12/60: No production.

6/13/60: No production.

6/14/60: No production.

6/15/60: No production.

6/16/60: Produced approx. 259 mcf gas, 16 barrels water, 1.000 orifice. Line pressure 169#. On approx. 22 hours.

6/17/60: Produced approx. 215 mcf gas, 25 barrels water, 1.000 orifice. Line pressure 169#. On 22 hours.

6/18/60: Produced approx. 201 mcf gas, 25 barrels water, 1.000 orifice. Line pressure 163#. Hours not shown.

6/19/60: Produced approx. 195 mcf gas, 16 barrels water, 1.000 orifice. Line pressure 115#. On approx. 22 hours.

6/20/60: Produced approx. 204 mcf gas, 23 barrels water, 1.000 orifice. Line pressure 112#. Hours not shown.

6/21/60: No production.

6/22/60: No production.

6/23/60: No production.

6/24/60: No production.

6/25/60: No production.

6/26/60: No production.

6/27/60: No production.

6/28/60: No production.

6/29/60: No production.

6/30/60: No production.

El Paso shows this well produced 1,076 mcf gas during this period.

Since we do not have access at this time to the integrated charts of El Paso for the period subsequent to July 1, we must rely on the field reports, as follows:

7/1/60: Field shows 195 mcf gas, 25 barrels water, 1.000 orifice, 116# line pressure. Hours not shown.

7/2/60: Field shows 207 mcf gas, 25 barrels water, 1.000 orifice, 122# line pressure. Hours not shown.

7/3/60: Field shows 205 mcf gas, 17 barrels water, 1.000 orifice, 122# line pressure, produced approx. 20 hrs.

7/4/60: Field shows 205 mcf gas, 23 barrels water, 1.000 orifice, 120# line pressure, prod. approx. 22 hrs.

7/5/60: Field shows 137 mcf gas, 23 barrels water, 1.000 orifice, 107# line pressure, prod. approx. 22 hrs.

7/6/60: Field shows 196 mcf gas, 18 barrels water, 1.000 orifice, 112# line pressure, prod. approx. 19 hrs.

7/7/60: Field shows 215 mcf gas, 23 barrels water, 1.000 orifice, 114# line pressure, prod. approx. 22 hrs.

7/8/60: Field shows 197 mcf gas, 17 barrels water, 1.000 orifice, 116# line pressure, prod. approx. 22 hrs.

El Paso shows total 7/1/60 to 7/8/60 as 1,597 mcf.

STANDARD OIL COMPANY OF TEXAS

Box 635
Albuquerque, New Mexico
August 27, 1959

TRANSCRIPT OF HEARING
CASE 1641
May 7, 1959

New Mexico Oil Conservation Commission
Box 871
Santa Fe, New Mexico

Attention: Miss Ida Rodriquez

Dear Sirs:

Please be advised that we have received your loan copy of the subject transcript from Mrs. Dearnley of Dearnley - Meier Associates. We will return the transcript to you within the next few days.

Thank you very much for your cooperation.

Yours very truly,

R. H. Dubitzky, District Geologist

CFL:cr

LAW OFFICES OF
MODRALL, SEYMOUR, SPERLING, ROEHL & HARRIS
SIMMS BUILDING
P. O. BOX 466
ALBUQUERQUE, NEW MEXICO
TELEPHONE CHAPEL 3-4514

J. R. MODRALL
AUGUSTUS T. SEYMOUR
JAMES E. SPERLING
JOSEPH E. ROEHL
GEORGE T. HARRIS
DANIEL A. SISK
DEAN P. KIMBALL
LELAND S. SEDBERRY
BURNS H. ERREBO
ALLEN C. DEWEY

JOHN F. SIMMS (1885-1954)

May 14, 1959

Mr. Daniel S. Nutter
New Mexico Oil Conservation Commission
Capitol Building
Santa Fe, New Mexico

Dear Dan:

Enclosed is Exhibit No. 6 in Case No. 1641, which has some notes on it, and it occurs to me that it may be an official exhibit and was picked up by us by mistake.

Very truly yours,

Burns

Burns H. Errebo

BHE:mbf
Enclosure

BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF W. R. WEAVER FOR ADOPTION OF SPECIAL POOL RULES FOR THE ANGEL'S PEAK-GALLUP OIL POOL, SAN JUAN COUNTY, NEW MEXICO.

CASE NO. 1641

O B J E C T I O N

TO THE HONORABLE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO:

COMES NOW El Paso Natural Gas Company of El Paso, Texas, an interested party in the above entitled cause, and states:

1. That it objects to the proposed hearing of the matter in the above entitled cause presently set for hearing before an examiner on April 22, 1959, and requests that said matter be transferred to the statewide hearing calendar or docket of this honorable Commission.

DATED this 17th day of April, 1959.

EL PASO NATURAL GAS COMPANY

By A. K. Montgomery
One of its Attorneys

Docket Mailed 5-1-59 dr

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF EL PASO NATURAL GAS COMPANY FOR A REHEARING BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO TO RECONSIDER CASE NO. 1641, ORDER NO. R-1410-A, OF SAID COMMISSION AS BEING THE APPLICATION OF W. R. WEAVER FOR THE PROMULGATION OF SPECIAL RULES AND REGULATIONS GOVERNING THE DRILLING, SPACING AND PRODUCTION OF WELLS IN THE ANGELS PEAK-GALLUP OIL POOL, SAN JUAN COUNTY, NEW MEXICO, AND THE ORDER OF SAID COMMISSION WITH RESPECT THERETO.	CASE NO. 1641

APPLICATION FOR REHEARING

Comes now El Paso Natural Gas Company, a Delaware Corporation, with license to do business in the State of New Mexico, hereinafter called applicant, and files its application for rehearing before the New Mexico Oil Conservation Commission in the above styled and numbered cause, and for grounds therefor would respectfully show:

I.

A hearing was held on this case by an Examiner on May 7, 1959, at Santa Fe, New Mexico, and by Order No. R-1410, which was issued on the 28th day of May 1959, the Commission established 80-acre spacing for the Angels Peak-Gallup Oil Pool. A de novo hearing before the Commission was held on the 15th day of July, 1959, and as a result of such hearing the Commission issued Order No. R-1410-A which reaffirmed the Commission's previous ruling with respect to such 80-acre spacing.

II.

Rule 2 of said Order No. R-1410-A states:

"Each well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located on a unit containing 80 acres, more or less, which consists of the N/2, S/2, E/2 or W/2 of a governmental quarter section."

The uncontradicted evidence entered in and comprising the record in this case established conclusively that one well drilled in the Angels Peak-Gallup Oil Pool can efficiently and economically drain an area of at least 320 acres; that many wells in said Angels Peak-Gallup Oil Pool properly ~~probably~~ should be classified as gas wells, and that the production of gas from such wells has a greater value than the production of oil from the same wells.

III.

The Order of said Commission which established 80-acre spacing for all wells in said Angels Peak-Gallup Oil Pool will cause the drilling of unnecessary gas wells and will result in economic waste. The Commission's Order fails to give effect to the uncontradicted evidence and fails to comply with the provisions of Section 65-3-14-(b), New Mexico Statutes Annotated, 1953 Compilation, which provides:

> "The Commission may establish a proration unit for each pool, such being the area that can be efficiently and economically drained and developed by one (1) well, and in so doing the commission shall consider the economic loss caused by the drilling of unnecessary wells, the protection of correlative rights, including those of royalty owners, the prevention of waste, the avoidance of the augmentation of risks arising from the drilling of an excessive number of wells, and the prevention of reduced recovery which might result from the drilling of too few wells."

The Commission erred in disregarding the uncontradicted testimony and the applicable provisions of law in Order No. R-1410-A, insofar as it provides for 80-acre spacing for drilling and limits the acreage to 80-acres which may be attributable to a gas well in determining the permissible gas production under the limiting gas-oil ratio established for said Pool, causes the drilling of

unnecessary wells, violates the correlative rights of owners, permits waste and increases risk arising from the drilling of an excessive number of wells. Applicant alleges that said Order is not supported by the evidence, constitutes discrimination, causes economic waste and confiscates property rights of working interest owners without due process of law.

WHEREFORE, applicant requests that the matter be set down for rehearing before the Commission, pursuant to Rule 1220, Rules and Regulations of the New Mexico Oil Conservation Commission, and Section 65-3-22-(a), New Mexico Statutes Annotated, 1953 Compilation, and that on such rehearing the Commission issue Rules and Regulations to classify gas wells in said Pool, and to permit the allocation of acreage to each gas well of not exceeding 320 acres in determining the permissible gas production as limited by the gas-oil ratio established for the Pool. Applicant requests that the Commission adopt the Rules recommended by applicant. Applicant has no additional testimony to offer and relies upon the record heretofore made.

SETH, MONTGOMERY, FEDERICI & ANDREWS

By: _____

Attorneys for Applicant
Santa Fe, New Mexico

BEN R. HOWELL
GARRETT C. WHITWORTH
El Paso, Texas
Attorneys for Applicant

July 13th Docket Mailed July 15th

OLP 8/31 OLP 8/31

Application of W.R. Weaver for the promulgation of special rules and regulations governing the drilling, spacing, and production of wells in the Angels Peak - Gallup Oil Pool, San Juan County, New Mexico

Case No. 1641
Order No. R-1410-B

J.W.J. 8/31

8-31-59

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for reconsideration upon the petition of El Paso Natural Gas Company for a rehearing in Case No. 1641, Order No. R-1410-A, heretofore entered by the Commission on August 11, 1959.

NOW, on this ____ day of September, 1959, the Commission, a quorum being present, having considered the petition for rehearing and being fully advised in the premises ~~finds~~,

FINDS:

(1) That this case was heard by the Commission and decided by the Commission and has also been heard de novo by the Commission on all of the evidence and exhibits presented at both hearings have been fully considered.

(2) That the Commission in its function as an expert body in oil and gas regulatory matters has concluded that the exhibits presented do not substantiate the allegation in the petition for rehearing that "one well drilled in the Angels Peak - Gallup Oil Pool can efficiently and economically drain an area of at least 320 acres."

(3) That Commission Order No. R-1410-A is temporary and it expressly provides that jurisdiction is retained by the Commission for such further order or orders as may appear necessary or convenient to prevent waste and/or protect correlative rights in the light of subsequent information and development.

(4) That the applicant does not propose to present additional evidence in the light of any subsequent information and development. Rather, the petition for rehearing states that applicant relies on the record heretofore made and has no additional testimony to offer.

(5) That accordingly a rehearing of this matter would serve no useful purpose and the petition for rehearing should be denied.

(6) That each and every finding contained in Order No. R-1410-A should be reaffirmed.

It is Therefore Ordered:

(1) That each and every finding contained in Order No. R-1410-A be and the same is hereby reaffirmed.

(2) That the petition for rehearing be and the same is hereby denied.

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. 1641
Order No. R-1410

APPLICATION OF W. R. WEAVER FOR
THE PROMULGATION OF SPECIAL
RULES AND REGULATIONS GOVERNING
THE DRILLING, SPACING, AND
PRODUCTION OF WELLS IN THE
ANGELS PEAK-GALLUP OIL POOL,
SAN JUAN COUNTY, NEW MEXICO

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on May 7, 1959, at Santa Fe, New Mexico, before Daniel S. Nutter, Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.

NOW, on this 28th day of May, 1959, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Daniel S. Nutter, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, W. R. Weaver, proposes that 80-acre proration units be established for wells in the Angels Peak-Gallup Oil Pool which are classified as oil wells, and that for proration purposes operators be permitted to assign up to 160 acres to wells which are classified as gas wells; that any well with a gas-oil ratio in excess of 30,000 to 1 be classified as a gas well; that the limiting gas-oil ratio for said pool be established at 6,000 to 1.

(3) That Pan American Petroleum Corporation proposes that 80-acre proration units be established for wells in the Angels Peak-Gallup Oil Pool which are classified as oil wells, and that operators be permitted to dedicate up to 320 acres to wells which are classified as gas wells; that any well with a gas-oil ratio in excess of 25,000 to 1 be classified as a gas well; that the limiting gas-oil ratio for said pool be established at 2,000 to 1.

(4) That El Paso Natural Gas Company proposes that 80-acre proration units be established for wells in the Angels Peak-Gallup Oil Pool which are classified as oil wells, and that operators be permitted to dedicate up to 320 acres to wells which are classified as gas wells; that any well with a gas-oil ratio in excess of 30,000 to 1 be classified as a gas well; that the limiting gas-oil ratio for said pool be established at 2,000 to 1.

(5) That the evidence indicates that one well in the Angels Peak-Gallup Oil Pool can efficiently and economically drain 80 acres, and conversely it does not establish that a well in said pool can drain in excess of 80 acres.

(6) That the establishment of a gas-oil ratio of 6,000 to 1 might reduce the ultimate recovery of oil from said Angels Peak-Gallup Oil Pool.

(7) That in the absence of unitization, the correlative rights of all parties who have interests in the Angels Peak-Gallup Oil Pool can best be protected by establishing 80-acre proration units for all wells in said pool and by setting the limiting gas-oil ratio at 4,000 to 1.

IT IS THEREFORE ORDERED:

That special rules and regulations, for the Angels Peak-Gallup Oil Pool, effective June 1, 1959, be and the same are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS FOR THE
ANGELS PEAK-GALLUP OIL POOL

RULE 1. Each well completed or recompleted in the Gallup formation within one mile of the boundary of the Angels Peak-Gallup Pool, and not nearer to nor within the boundaries of another designated Gallup Oil Pool, shall be spaced, drilled, operated, and prorated in accordance with the Special Rules and Regulations hereinafter set forth.

RULE 2. Each well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located on a unit containing 80 acres, more or less, which consists of either the North half or the South half of a single governmental quarter section.

RULE 3. Each well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located within 100 feet of the center of either quarter-quarter section in the unit; provided, however, that nothing contained herein shall be construed as prohibiting the drilling of a well on each of the quarter-quarter sections in an 80-acre unit. Any well which was drilling to or completed in the Angels Peak-Gallup Oil Pool prior to June 1, 1959, is granted an exception to the well location requirements of this Rule.

RULE 4. For good cause shown, the Secretary-Director may grant immediate exception to the requirements of Rule 2 without notice and hearing; provided, however, that when the application is for a non-standard unit containing less than two contiguous quarter-quarter sections all operators offsetting the proposed non-standard unit shall be notified of the application by registered

mail and the application shall state that such notice has been furnished. The Secretary-Director may approve the application if, after a period of 30 days, no offset operator has entered an objection to the formation of such non-standard unit.

RULE 5. The Secretary-Director may grant exception to Rule 3 without notice and hearing where an application has been filed in due form and the necessity for the unorthodox location is based on topographical conditions or is occasioned by the recompletion of a well previously drilled to another horizon.

Applicants shall furnish all operators within a 1980-foot radius of the subject well a copy of the application to the Commission and shall stipulate to the Commission that proper notice has been furnished to all such operators. The Secretary-Director may approve the application if, after a period of 20 days, no offset operator has entered an objection to the proposed unorthodox location.

RULE 6. An 80-acre proration unit in the Angels Peak-Gallup Oil Pool shall be assigned an 80-acre proportional factor of 2.77 for allowable purposes, and in the event there is more than one well on an 80-acre proration unit, the operator may produce the allowable assigned to the unit from said wells in any proportion.

RULE 7. The gas-oil ratio limitation for the Angels Peak-Gallup Oil Pool shall be 4,000 cubic feet of gas per barrel of oil produced.

RULE 8. Effective July 15, 1959, no gas produced from the Angels Peak-Gallup Oil Pool shall be flared or vented unless specifically authorized by the Commission after notice and hearing.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN BURROUGHS, Chairman

MURRAY E. MORGAN, Member

A. L. PORTER, Jr., Member & Secretary

vem/

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. 1641
Order No. R-1410-B

APPLICATION OF W. R. WEAVER
FOR THE PROMULGATION OF SPECIAL
RULES AND REGULATIONS GOVERNING
THE DRILLING, SPACING, AND PRO-
DUCTION OF WELLS IN THE ANGELS
PEAK-GALLUP OIL POOL, SAN JUAN
COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for reconsideration upon the petition of El Paso Natural Gas Company for a rehearing in Case No. 1641, Order No. R-1410-A, heretofore entered by the Commission on August 11, 1959.

NOW, on this 3rd day of September, 1959, the Commission, a quorum being present, having considered the petition for rehearing and being fully advised in the premises,

FINDS:

(1) That this case has been heard by an examiner and reviewed by the Commission and has also been heard de novo by the Commission and all of the evidence and exhibits presented at both hearings have been fully considered.

(2) That the Commission in its function as an expert body in oil and gas regulatory matters has concluded that the exhibits presented do not substantiate the allegation in the petition for rehearing that "one well drilled in the Angels Peak-Gallup Oil Pool can efficiently and economically drain an area of at least 320 acres."

(3) That Commission Order No. R-1410-A is temporary and it expressly provides that jurisdiction is retained by the Commission for such further order or orders as may appear necessary or convenient to prevent waste and/or protect correlative rights in the light of subsequent information and development.

(4) That the applicant does not propose to present additional evidence in the light of any subsequent information and development. Rather, the petition for rehearing states that applicant relies on the record heretofore made and has no additional testimony to offer.

(5) That accordingly a rehearing of this matter would serve no useful purpose and the petition for rehearing should be denied.

(6) That each and every finding contained in Order No. R-1410-A should be reaffirmed.

IT IS THEREFORE ORDERED:

(1) That each and every finding contained in Order No. R-1410-A be and the same is hereby reaffirmed.

(2) That the petition for rehearing be and the same is hereby denied.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN BURROUGHS, Chairman

MURRAY E. MORGAN, Member

A. L. PORTER, Member & Secretary

lcr/

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. 1641
Order No. R-1410-A

APPLICATION OF W. R. WEAVER FOR
THE PROMULGATION OF SPECIAL
RULES AND REGULATIONS GOVERNING
THE DRILLING, SPACING, AND
PRODUCTION OF WELLS IN THE
ANGELS PEAK-GALLUP OIL POOL,
SAN JUAN COUNTY, NEW MEXICO

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on May 7, 1959, at Santa Fe, New Mexico, before Daniel S. Nutter, Examiner duly appointed by the Oil Conservation Commission of New Mexico in accordance with Rule 1214 of the Commission Rules and Regulations, and Order No. R-1410 was entered promulgating special rules and regulations governing the drilling, spacing, and production of wells in the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico. This cause came on for hearing de novo at 9 o'clock a.m. on July 15, 1959, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 11th day of August, 1959, the Commission, a quorum being present, having considered the application and the evidence adduced, and being fully advised in the premises,

FINDS:

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

(2) That after an examiner hearing, Commission Order No. R-1410 was entered establishing 80-acre proration units for all wells in the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico, with a limiting gas-oil ratio of 4000 to 1.

(3) That El Paso Natural Gas Company and Pan American Petroleum Corporation requested and were granted a hearing de novo before the Oil Conservation Commission.

(4) That in the subject hearing de novo the above-named parties proposed that 80-acre proration units be established for

wells in the Angels Peak-Gallup Oil Pool which, depending on the wells' gas-oil ratios, would be classified as oil wells, and that operators be permitted to assign up to 320 acres to wells which would be classified as gas wells. Further, the above-named parties proposed that the limiting gas-oil ratios for said pool be established at 2000 to 1.

(5) That the original applicant, W. R. Weaver, proposed that the Special Rules and Regulations for the Angels Peak-Gallup Oil Pool, as set forth in Order No. R-1410, remain in effect.

(6) That the Angels Peak-Gallup Pool is, as near as can be ascertained from data available at this stage of development, an oil pool and should be spaced and prorated as such. Further, the wells producing from the Gallup formation with extremely high gas-oil ratios are produced from a gas cap associated with said oil pool and the evidence indicates that a major source of energy for the production of the oil is the gas cap.

(7) That the evidence indicates that one well in the Angels Peak-Gallup Oil Pool can efficiently and economically drain 80 acres.

(8) That under the temporary special rules and regulations for the Angels Peak-Gallup Oil Pool as hereinafter promulgated, withdrawals of gas from the gas cap are not disproportionate to permissible withdrawals from the oil section.

(9) That the areal extent of the Angels Peak-Gallup Oil Pool has not yet been determined, nor, since only a few wells have been completed entirely in the oil section, has the optimum gas-oil ratio for said pool been established; accordingly, the special rules and regulations proposed by El Paso Natural Gas Company and Pan American Petroleum Corporation might result in disproportionate withdrawals from the gas cap and the oil section.

(10) That disproportionate withdrawals would cause waste and would impair correlative rights, and the prevention of waste and protection of correlative rights are statutory considerations in establishing the size of a standard proration unit in a pool.

(11) That gas-gathering facilities are available in the Angels Peak-Gallup Oil Pool and thus the flaring or venting of casinghead gas produced from wells in said pool should be prohibited.

(12) That while the evidence establishes that pool-wide unitization would best prevent waste and protect correlative rights, the Oil Conservation Commission has no statutory authority to force-unitize.

(13) That in the absence of such unitization, the temporary special rules and regulations hereinafter promulgated will best prevent waste and protect the correlative rights of operators in the Angels Peak-Gallup Oil Pool, at least until such time as further data on the subject pool becomes available.

(14) That the temporary special rules and regulations for the Angels Peak-Gallup Oil Pool hereinafter promulgated vary in certain minor respects from the rules set forth for said pool in Order No. R-1410 and said Order No. R-1410 should be superseded.

IT IS THEREFORE ORDERED:

(1) That Commission Order No. R-1410, dated May 28, 1959, be and the same is hereby superseded, effective September 1, 1959.

(2) That special rules and regulations for the Angels Peak-Gallup Oil Pool, effective September 1, 1959, be and the same are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS FOR THE
ANGELS PEAK-GALLUP OIL POOL

RULE 1. Each well completed or recompleted in the Angels Peak-Gallup Oil Pool or in the Gallup formation within one mile of the Angels Peak-Gallup Oil Pool, and not nearer to nor within the limits of another designated Gallup oil pool, shall be spaced, drilled, operated, and prorated in accordance with the Special Rules and Regulations hereinafter set forth.

RULE 2. Each well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located on a unit containing 80 acres, more or less, which consists of the N/2, S/2, E/2 or W/2 of a governmental quarter section.

RULE 3. Each well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located no closer than 330 feet to the outer boundary of either quarter-quarter section of the unit nor closer than 660 feet to the nearest well drilling to or capable of producing from the same common source of supply; provided, however, that nothing contained herein shall be construed as prohibiting the drilling of a well on each of the quarter-quarter sections in the 80-acre unit. Any well which was drilling to or completed in the Angels Peak-Gallup Oil Pool prior to the effective date of this order is granted an exception to the well location requirements of this Rule.

RULE 4. For good cause shown, the Secretary-Director may grant exception to the requirements of Rule 2 without notice and hearing; provided, however, that when the application is for a non-standard unit consisting of other than two contiguous quarter-quarter

sections or lots or when the application is for the purpose of joining fractional lots not exceeding 20.49 acres each with a standard unit, all operators offsetting the proposed non-standard unit shall be notified of the application by registered mail, and the application shall state that such notice has been furnished. The Secretary-Director may approve the application if, after a period of 30 days, no offset operator has entered an objection to the formation of such non-standard unit.

RULE 5. The Secretary-Director may grant exception to the well location requirements of Rule 3 without notice and hearing where an application has been filed in due form and the necessity for the unorthodox location is based on topographical conditions or is occasioned by the recompletion of a well previously drilled to another horizon.

Applicants shall furnish all operators within a 660-foot radius of the non-standard location a copy of the application to the Commission, and shall stipulate to the Commission that proper notice has been furnished to all such operators. The Secretary-Director may approve the application if, after a period of 20 days, no such offset operator has entered an objection to the proposed unorthodox location.

RULE 6. An 80-acre proration unit in the Angels Peak-Gallup Oil Pool shall be assigned an 80-acre proportional factor of 2.77 for allowable purposes, and in the event there is more than one well on an 80-acre proration unit, the operator may produce the allowable assigned to the unit from said wells in any proportion.

RULE 7. The gas-oil ratio limitation for the Angels Peak-Gallup Oil Pool shall be 4000 cubic feet of gas per barrel of oil produced.

RULE 8. Gas-oil ratio tests shall be taken on all wells in the Angels Peak-Gallup Oil Pool and on all wells producing from the Gallup formation within one mile of the boundaries of the Angels Peak-Gallup Oil Pool during the last fifteen days of the months of January, April, July, and October of each year. Tests shall be 24-hour tests, being the final 24 hours of a 72-hour period during which the wells shall be produced at a constant normal rate of production. Results of such tests shall be filed on Commission Form C-116 within ten days after the close of each test period. At least 72 hours prior to commencement of any such gas-oil ratio tests, each operator shall file with the Aztec office of the Commission a Test Schedule for its wells, specifying the time each of its wells is to be tested. Copies of the Test Schedule shall also be furnished to all offset operators. The Secretary-Director may extend the 15-day testing period if future development indicates that 15 days does not allow sufficient time for operators to adequately test all of their wells.

RULE 9. Any well completed in the Angels Peak-Gallup Oil Pool after the effective date of this order shall receive an oil allowable only upon receipt by the Commission's Aztec office of Commission Forms C-104, C-110, C-116, all properly executed. Gas-oil ratio tests shall be commenced on such newly completed wells as soon as is practicable upon recovery of load oil and this test shall suffice as the first quarterly test. The District Supervisor of the Commission's Aztec office is hereby authorized to assign a temporary casinghead gas allowable to wells connected to a gas transportation facility during the recovery of load oil, which allowable shall not exceed the number of cubic feet of gas obtained by multiplying the daily top unit allowable for the Angels Peak-Gallup Oil Pool by 4000 cubic feet.

RULE 10. No gas produced from the Angels Peak-Gallup Oil Pool shall be flared or vented after the effective date of this order, unless specifically authorized by the Commission after notice and hearing. Provided, however, that any well which is newly completed in said Angels Peak-Gallup Oil Pool shall have 60 days from the date of assignment of the oil allowable in which to make beneficial use of the produced casinghead gas. Each operator shall notify the Aztec office of the Commission as to the date and type of such beneficial use, and the assignment of an oil allowable beyond the 60-day grace period shall be dependent on receipt of such notice.

IT IS FURTHER ORDERED: That this case be reopened at the regular monthly hearing of the Commission in July, 1960, for further consideration of the Special Rules and Regulations for the Angels Peak-Gallup Oil Pool hereinabove set forth, and for consideration of any other rules and regulations which may be necessary for the efficient operation of said pool.

IT IS FURTHER ORDERED: That jurisdiction of this cause is hereby retained by the Commission for such further order or orders as may appear necessary or convenient for the prevention of waste and/or protection of correlative rights in the light of subsequent information and development.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN BURROUGHS, Chairman

MURRAY E. MORGAN, Member

A. L. PORTER, Jr., Member & Secretary

vam/

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PHONE CH 3-6691

BEFORE THE
OIL CONSERVATION COMMISSION
Mabry Hall
Santa Fe, New Mexico
July 13, 1960

REGULAR HEARING

IN THE MATTER OF:

Application of W. R. Weaver for the promulgation of special rules and regulations governing the Angels Peak-Gallup Oil Pool. Applicant, in the above-styled cause, seeks an order promulgating special rules and regulations governing the drilling, spacing and production of oil and gas wells in the Angels Peak-Gallup Oil Pool in San Juan County, New Mexico. Special rules and regulations governing said pool were promulgated on a temporary basis (one year) by the Commission in Case No. 1641, Order No. R-1410-A, entered August 11, 1959.

CASE 1641

BEFORE:

Mr. A. L. Porter, Jr., Secretary-Director
Mr. Murray Morgan

TRANSCRIPT OF HEARING

MR. PORTER: We will proceed with Case 1641. Before we get underway, I would like to call for appearances in the case, and I would also like for you to indicate whether or not you intend to present testimony.

MR. ERREBO: Burns Errebo, Modrall, Seymour, Sperling, Roehl and Harris, and I am appearing on behalf of W. R. Weaver. W. R. Weaver was the Applicant in this case, as originally stated and heard last year, and as the Commission knows, the matter should be

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brought up for reconsideration this month. We are aware of the general nature of testimony to be presented by two other parties in this matter, and I understand they are the El Paso and Pan American. And, in view of the orderly presentation of evidence, we believe that probably W. R. Weaver's testimony should be second and, possibly, third in order of presentation. We will have one witness.

MR. PORTER: One witness.

MR. NEWMAN: Kirk Newman of Atwood and Malone, Roswell, New Mexico, and Guy Buell, a member of the Texas Bar, representing Pan American Petroleum Corporation. We have one witness.

MR. SETH: Oliver Seth and Ben Howell of El Paso Natural Gas Company, and we will have two witnesses.

MR. PORTER: Anyone else desire to present testimony in this case? Any other appearances to be admitted? Mr. Errebo has expressed a desire to present his testimony either second or third, anywhere but first.

MR. ERREBO: I think that would be best.

MR. PORTER: Mr. Buell, would you like to proceed first?

MR. BUELL: Yes, sir, we are ready and would like to proceed.

MR. PAYNE: Let's swear in all the witnesses at one time.

(Witnesses sworn.)

GEORGE EATON

called as a witness, having been first duly sworn on oath, testified as follows:

BY MR. BUELL:

Q Would you state your full name, by whom you are employed, in what capacity, and at what location, please?

A George W. Eaton, Jr., Senior Petroleum Engineer at Pan American Corporation, Farmington, New Mexico.

Q Mr. Eaton, have you testified at prior Commission hearings?

A I have.

Q Are your qualifications of petroleum engineer a matter of public record?

A They are.

Q Mr. Eaton, in order that the Commission may follow and evaluate your testimony, it might be well that we should summarize, briefly, at the outset, your recommendation, what will be your recommendation with respect to oil proration units?

A It will be our recommendation that the 80 now in effect in the Angels Peak-Gallup field be continued.

Q All right, sir. Would you recommend that the allowable for these eight wells be set?

A Our recommendation will be that the allowables be set for these oil wells on the basis of the normal unit allowable for Northwest New Mexico in accordance with the Statewide Rule 505.

Q Do you have a recommendation with respect to the limiting gas-oil ratio for oil wells?

A Our recommendation is that the limiting gas-oil ratio now

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in effect, being 4,000 cubic feet per barrel, be continued.

Q All right, sir. Do you have a recommendation with respect to assignment of acreage to gas wells in this Pool?

A Our recommendation is that up to 320 acres be permitted for assignment to gas wells.

Q What is your recommendation with respect to proration of the gas wells in this associated oil and gas reservoir?

A My recommendation with regard to proration of gas wells is that the allowable for gas wells be established on the basis of market demand and allocated among wells and between wells on the basis of the normal Northwest New Mexico allocation formula of 75 percent acre deliverability plus 25 percent acreage with the top gas allowable being equal to no more than four times the daily gas limit of an oil well.

Q All right, sir. That would be for 320 acre gas wells, is that correct?

A That is correct.

Q All right, 160 gas wells, that would be the ceiling or the maximum would be twice?

A That is correct.

Q In the 80 acre oil well?

A Correct.

Q Is that classified as a gas pool?

A Yes, sir.

Q Do you have a recommendation to the Commission as to the

breakover point, or how would you define an oil well and a gas well in this pool?

A We recommend that any well having a gas-oil ratio less than 30,000 cubic feet per barrel be classified as an oil well. Any well producing with a gas-liquid ratio greater than 30,000 cubic feet per, would be classified as a gas well.

Q All right, Mr. Eaton, does that complete your recommendations that you are making to the Commission today?

A Yes, sir.

Q Let me direct your attention to what has been marked as Pan American Exhibit Number 1, what is that Exhibit, Mr. Eaton?

A Exhibit Number 1 is an isopach map of the Angels Peak-Gallup Pool contoured to a ten foot net pay beneath a sand interval.

Q Where is the gas-oil contact located in this Pool, Mr. Eaton?

A The gas-oil contact is located at an elevation of plus 430 feet.

Q Have you designated the oil area and gas area in any particular manner on this Exhibit?

A On Exhibit 1 the oil area is shown in green. The gas area is shown in red.

Q How have you determined the different type oils in the field?

A The oil wells are colored brown, the gas wells are colored yellow.

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Q What is the significance, I see two gas wells that have a larger blue circle around them, what is the significance of that, Mr. Eaton?

A These are two wells on which data will be presented in later Exhibits.

Q All right, sir. Now, the last time that data on this Pool was presented to the Commission was in July of 1959. At that time, at that hearing, how many gas wells did we have data on?

A Nine gas wells.

Q How many oil wells were there in the Pool?

A Four oil wells.

Q Have you additional development since that time?

A Yes, there has been additional development since that time.

Q How many oil wells and gas wells are there?

A At the present time, the Pool contains seven oil wells and twelve gas wells.

Q All right, sir. Directing your attention back to Exhibit 1, and from the standpoint of this hearing, Mr. Eaton, to adopt the proper rules for this Pool, what is the significance of that Exhibit?

A Exhibit Number 1 simply shows the relative size of the oil and gas accumulations. It shows that while the Angels Peak-Gallup Pool is predominantly a gas pool, with an oil accumulation on the Northeast rim.

Q On a surface acreage basis, Mr. Eaton, would you compare the two?

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A The gas areas are approximately four times as large as the oil area.

Q In your opinion, do you have an oil accumulation here that is worth conserving and producing in the proper manner?

A Yes.

Q We should practice conservation of this oil, and as you state, a large gas area?

A That is right.

Q Do you feel it should be prorated in such a manner that an owner of interest in that gas area would have the opportunity to protect their correlative rights?

A It should be prorated in such a manner as to both protect conservation and protect all parties' correlative rights.

Q Do you feel that the rules you have recommended at the outset of your testimony will serve that dual purpose?

A Those rules will afford such an opportunity.

Q Let's discuss those recommendations a little closer, Mr. Eaton. Do you recommend a limiting ratio of 4,000 to 1? Why do you make that recommendation?

A I see no need to change the present rule in that respect. All of the oil wells in this field are producing with gas-oil ratios greater than 4,000 cubic feet per day now.

Q Now, what is the lowest producing gas-oil ratio well, do you know?

A According to my information, 5,372.

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Q Mr. Eaton, you have observed performances in this field, have you not, since the hearing in '59?

A Yes, sir.

Q Have you noticed a tendency of the gas-oil ratios of the oil wells in this Pool to increase?

A Without exception, they have increased.

Q To what do you attribute that, Mr. Eaton?

A The increase in gas-oil ratios are due to two things. One is normal depletion, which has occurred in the oil zone itself, and the other is slight expansion of the gas-cap into the oil area. This we detect by a fact that while some increase in gas-oil ratio has accounted for the depletion, it is not possible to account for the entire increase in gas-oil ratio by application of depletion qualifications alone.

Q So, we have that expansion of the gas-cap into the oil area?

A I believe we have.

Q And, after all one of the concerns of the Commission, as well as to the operators, both gas and oil, was that the Pool should not be produced in such a manner that oil would migrate up into the dry gas area and be loose and wasting?

A Yes.

Q Such is certainly not occurring in the field at this time?

A No, sir.

Q Do you feel that that would occur under your recommended

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rules?

A No, sir, I do not.

Q Do you think, if there is movement in either direction, that it will be a tendency for the gas-cap to expand into the oil area?

A These are rules that would tend to favor the oil areas a little bit, slightly.

Q So, the doubt, if any, is really involved in favor of not wasting any oil?

A That is correct.

Q But yet giving the gas operators an opportunity to protect their correlative rights?

A Yes, sir.

Q All right. Why do you recommend 30,000 to 1 ratio as the breakover point, or as how you would define a gas and oil well in this Pool?

A The breakover point of 30,000 cubic feet per barrel was actually based on two considerations. One of those considerations is that it is at about that point where the value of gas produced with a barrel of oil exceeds the value of the oil, the gas at that point, at about that point, the value of the gas exceeds the value of the oil. The other consideration is that in this field the oil wells have gas-oil ratios considerably less than 30,000 cubic feet per barrel, whereas, the lowest gas-oil ratio on a gas well is somewhat more than 30,000 cubic feet per barrel.

Q Do you think either the operators or the Commission would have any trouble in being able to ascertain whether a well is gas or oil under your recommended breakover point?

A I don't think there would be any difficulty.

Q Has there ever been any question as to whether or not a well is gas or oil?

A No, sir.

Q You might want to make one reservation on that recently completed El Paso Well, would you not, Mr. Eaton?

A There was recently completed an El Paso Well which has a low gas-oil ratio, and it is in the gas area.

Q To what do you attribute that anomaly, shall we say?

A That well has a Gallup section open other than the main pay zone, which we have an isopach in Exhibit 1.

Q So it's your opinion that other zones, other than the Gallup pay, are considered to have fluids, too, this well making it be non-representative?

A That is my opinion.

Q All right, sir. You recommended that the Commission continue with 80 acre proration units, is that correct?

A Yes, sir.

Q Do you feel that is the proper size unit for oil wells in this Pool?

A Yes, sir, I feel the finding on those lines, made at the previous hearing, was correct that an oil well would definitely drain

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in excess of 80 acres.

Q Has any data, that you have examined in the intervening period since the last hearing, indicated in any way that 80 acres is not the proper unit for oil wells?

A Wells, no, sir.

Q All data, that is indicated unit?

A Yes, sir.

Q With respect to gas wells, you have recommended proration units of 320 acres. Let me ask you right now, are you of the opinion that a well completed in the gas area of this Pool will effectively and efficiently drain in excess of 320 acres?

A It is my opinion that a well will drain considerably in excess of 320 in a gas area.

Q Are you aware, Mr. Eaton, that a subsequent witness is going to discuss drainage through a comparison of initial pressures of subsequently completed wells, comparing that initial pressure to original pressure?

A That is my understanding, yes.

Q Have you examined the data in that regard?

A I am familiar with the data which he will use.

Q Do you feel that the data that you have examined, which he will cover in his testimony, conclusively shows that one well in the gas area will effectively and efficiently drain in excess of 320 acres?

A Yes, sir.

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Q I direct your attention, now, Mr. Eaton, to what has been marked as Pan American Exhibit Number 2. What is that Exhibit?

A Exhibit Number 2 is a geographical illustration of the theoretical performance of pressure cumulative for the Huerfano No. 99. The blue lines on Exhibit Number 2, showing the pressure, cumulative performance which would result if that well would drain 80 percent, 160 acres, 320 acres, 640 acres.

Q Would you explain and point out where that well is, Mr. Eaton?

A Our Huerfano No. 99 is located in the N. W. 1/4 of Section 2, Township 26 North, Range 10 West.

Q Exhibit 2, or rather the data reflected thereon is just an engineering method of ascertaining the area that a well is draining?

A Yes, sir.

Q What you have done there, you have calculated the reserve under this well for 80 acres, 160, 320 and 640?

A That is right.

Q When you know the reserves you can predict pressure performance that would occur in the event the well was only draining those of acreage?

A You can predict what the pressure at any cumulative production point is.

Q Then you have taken actual observed performance of that well and plotted that on Exhibit 2?

A Yes, sir.

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Q What that does show, that is, the red line?

A The red line on Exhibit 2 shows the actual performance of the Huerfano No. 99.

Q What does it show with respect to the area that the well is draining?

A It shows our Huerfano No. 99 is draining 466 acres minimum.

Q To the minimum amount?

A Acreage, a minimum.

Q Let me direct your attention to Exhibit Number 3, was that Exhibit prepared for the similar matter, but on another well?

A Yes, sir.

Q Would you locate that well on Exhibit 3?

A Exhibit Number 3 shows the pressure cumulative for the Huerfano Unit No. 106, which is located in the Southeast 1/4 of Section 33, Township 27 North, Range 10 West.

Q As an engineering method that you have used and show on Exhibit Number 3, and make your comparison, what do we see that actual performance shows us this well is draining?

A Actual performance data shows this well is draining 584 acres as a minimum.

Q As a minimum?

A Yes, sir.

Q So you feel that this data, Mr. Eaton, as well as data that will be presented by the witnesses, which you have examined and analyzed, so you feel this data shows, conclusively, that a gas well

in this Pool will drain in excess of 320 acres?

A It is my opinion this data are conclusive in showing that gas wells will drain considerably in excess of 320 acres.

Q And, you feel that the rules you have recommended are a practical reason that they will prevent waste and adequately protect the correlative rights of all owners of interest, whether either a gas interest or an oil interest?

A I believe these rules will promote conservation and protect correlative rights of all operators of oil.

Q Do you have anything you would like to add, Mr. Eaton?

A I believe not.

MR. BUELL: That is all we have at this time. May I formally offer Pan American's Exhibits 1 through 3 inclusive.

MR. PORTER: Without objection, the Exhibits will be admitted into the record.

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Eaton, your proposed rule, I notice you recommend that the gas allowable, the allowable for gas wells be limited to twice the daily casing head gas for an oil well in this Pool?

A No, sir, up to four times.

Q Up to four times?

A Which would be applicable to 320 acres.

Q My next question was why. Also, I notice that there are now seven oil wells in the Pool.

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A Yes, sir.

Q Under your definition?

A Yes, sir.

Q And, did you testify that the highest ratio of those wells, or the lowest, was 5372?

A That is the lowest.

Q The lowest ratio. What is the highest among those seven wells?

A 20,543.

Q 20,543. Do you anticipate that any, or all, of these wells might become gas wells, under your definition, at some later time?

A I could anticipate. It is quite likely some of these wells, at least, would become gas wells. I don't anticipate that any of the gas wells will become oil wells.

Q You don't think that will go back that way?

A I don't think that will go back that way.

Q Under this conjecture, the royalty owner might suddenly find himself splitting his royalty four directions. In other words, if he had an 80 acre unit, or suddenly became a gas well, he would share that royalty with, possibly, people in four other 80 acre units, three of them?

A Certainly if a well went from an oil well to a gas well class, it would require filing Form CA-18, which would return them a re-division of the entire working interest, perhaps, and royalty interest.

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Q Royalty. I mean, under those circumstances you would still be producing exactly the same kind of oil or the same kind of gas. The royalty owner might have to share with three other owners?

A Yes, sir. However, that is somewhat taken care of in our recommended proration formula, in that the well would then be permitted to produce on the acreage basis up to four times what it had been producing as an oil well.

Q As far as gas is concerned?

A Yes, sir, as far as gas is concerned.

MR. PORTER: Anyone else have any questions of Mr. Eaton?

MR. EATON: May I add one thing? At the point where a well would be an oil well to a gas well, the present nominal value of the products involved are in gas.

MR. PORTER: At that time, it is gas.

CROSS EXAMINATION

BY MR. ERREBO:

Q Mr. Eaton, this green area on your Exhibit Number 1, does that represent the oil saturated area, or does that represent the area in which you think that you can probably complete a commercial well?

A It is the original oil saturated area, it does not, necessarily, represent the oil saturated area at this time. Even it is certainly not indicative of what might be called a commercial limits.

Q Actually, then, a commercial limits of the oil area must be considerably smaller as of this time, you show as a green area on

this Exhibit.

A Exhibit I isn't intended as indication of what the commercial limits are. It's simply indicative of the oil saturated portion and the gas saturated portion.

Q Actually, now, you show the Weaver-McAdams lease as being right on the line which represents the contact between the oil and gas area, don't you?

A The portion of the base is an oil area, and a portion in the gas area.

Q I believe you testified there is a slight expansion of the gas-cap over the past year?

A Yes.

Q And, that has been during the production of this Pool under the present rules?

A Yes, sir.

Q And, actually, if the present rules are kept in effect by this Commission, wouldn't you expect that expansion to continue on?

A Based on past performance, that would be a normal expectation.

Q And, then, based on what you have shown there, actually, then, would it be likely that if gas from a Weaver lease is not already being produced from the offset leases in the direction of the oil area, then you might reasonably expect that it would be at some time in the future, might you not?

A If the gas-cap expands from the Weaver lease down-dip,

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that would be the result.

Q So, then, actually, do you feel that the rules which you are offering here today, would bring this reservoir into balance so that you wouldn't have a movement either of the oil into the gas-cap or gas into the oil area?

A These recommended rules approach very closely the volumetric equivalent, approach it from the simplified manner.

Q What you are saying, it is your conclusion then, there would be little, if any, in either direction?

A Little, if any, change.

MR. ERREBO: That is all I have.

MR. PORTER: Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Eaton, as near as I can tell of the many Orders that have been entered into the Commission in this particular case for this Pool Order, No. 1410-A, is the one that governs the operation of the Pool at the present time, is that correct?

A I don't have that with me, Mr. Nutter.

Q Well, now, you do propose some rules here today for the operation of the Pool, and comparing your rules with the rules that you have been proposing, actually Order No. 1410-A, what is the advantage of adopting new rules over the presently existing rules?

A Primarily these new rules would establish a standard proration of 320 acres for gas wells, which we have shown, I think con-

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clusively, as a proper spacing unit for gas wells, in this well, and thereby prevent waste and unnecessary wells.

Q How about the oil pool, have you made a substantial change in your proposal there, to differ from the existing rules as to the oil pool?

A No, sir, no substantial change.

Q So, you suggest a GOR of 4,000 to 1?

A Yes, sir.

Q Is the gas-oil ratio limitation presently in effect?

A Yes, sir.

Q What do you base your 30,000 to 1 dividing line for the base calculation for oil wells and gas wells on?

A It is approximately that point where the value of the gas produced with barrels of oil exceeds the value of the oil itself.

Q So, you go to an economic definition of the gas well as compared with an oil well, rather than any reservoir conditions or production characteristics of the well?

A We considered actual field conditions too, in that the oil wells have considerably less than 20,000 gas-oil ratio, where the gas wells are somewhat above 30,000 gas-oil ratio.

Q You mentioned that your lowest gas-oil ratio was--

A 5,000.

Q In the neighborhood of 5,372 to 1?

A Yes, sir.

Q The highest gas-oil ratio oil well?

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A 20,543.

Q That is approaching the point that you reclassified that well as a gas well, is it not?

A This well has an original oil content.

Q Is that well in Section 29, in the S. E. 1/4?

A Huerfano Unit 105, that is correct. It's in Section 29, S. E. 1/4.

Q According to the Exhibit, that is actually completed on the south side of the line dividing the oil area and gas area?

A That is correct. According to my picture of the pay, there is about three feet of the upper portion of the sand in that well that is in the gas-cap, and the rest of it is in the oil zone with that well. The gas-oil contact is approximately 430 feet, this seems to be comparable to the gas-oil contact that was figured about a year ago.

Q Has the gas-oil ratio in this changed?

A I didn't intend to illustrate this as a gas-oil contact at the present time, it is original conditions.

Q You don't think the gas-oil contact has changed, then?

A Oh, yes. I agree it has changed, this map was drawn to show the relative size to the oil zone, and the original size of the gas zone.

Q So, where is the gas-oil contact at the present time?

A I don't know. At present, the gas-oil contact is a constant--it's due to disturbance of the reservoir by production of both

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gas and oil. It's probably a wavy line that cuts in and out among the producing wells in the vicinity of the gas-oil contact.

Q Do you think it will go straight?

A No, it went the other way, the gas-cap expanded.

Q So, that the gas-oil contact should be lower than a year ago?

A Yes, generally, except again I want to emphasize, I don't think it's constant, I don't think you can pick a gas-oil contact today. It must be 420 feet lower, because it varies with respect to how close a well is producing to the original gas-oil contact. It would be lower in the vicinity of a well, than it would be away from a well somewhere.

Q It would be lower if the well in the oil zone has been producing at a higher rate than it would be, higher about the well in the gas section, had it been producing at the higher rate, would it not?

A I don't think it would be constant anymore. Just exactly what it is would be very difficult to determine.

Q Do you think limitation should be applied to gas wells in this area?

A Yes, sir, we recommended limitation.

Q Do you think limitation would protect, you might say, the oil sections?

A Yes, sir.

Q You are in favor of some protection from the oil pay?

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A Yes, sir.

Q Well, now, what is the actual limitation you would recommend for the gas wells in the red area of your Exhibit Number 1?

A The limitation that we recommended in our rules is that no gas well shall have an allowable greater than four times the daily gas limit of an 80 acre oil well.

Q In other words, you primarily would go to the market demand for oil production for the San Juan Basin, then fix the allocation for the oil wells?

A Right.

Q And, then you take 4,000 to 1 ratio and multiply that 4,000 times the top allowable for an oil well in the Pool?

A Yes, sir. Then restrict a gas well that is on 320 acres to four times that amount of gas, that would be the absolute top limit. It would also be restricted by market demand. In other words, it would--the gas allowable would actually have two limits on it. The lesser of the market demand, or four times the daily gas limit rule.

Q In other words, four times the oil wells gas production allowable, subject to market demand for gas, is that it?

A That is correct, yes. It would be the lower of those two.

Q I see. And, have you made any study as to the actual solution of gas-oil ratio in this reservoir insofar as the oil reservoir is concerned?

A We hadn't last year, which we have not been able to improve

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upon. I indicated that the initial solution gas-oil ratio was in the range of 550 to 600 cubic feet per barrel. Actually, the number we used was 558 cubic feet per barrel.

Q Then your experience in the San Juan Basin, Mr. Eaton, is this rather typical solution gas-oil ratio for Gallup production?

A It's typical of the Gallup production in the San Juan Basin with the exception of oil that is provided from the Mesaverde-Gallup field and Horseshoe.

Q Which are lower than usual?

A Which are lower than usual. Notwithstanding the fact that the solution gas-oil ratio is in the neighborhood from 550 to 1, to 600 to 1.

Q You would recommend the limiting ratio of 4,000 to 1?

A The reason being oil wells in the Pool now have a gas-oil ratio considerably in excess of 4,000 cubic feet per barrel. To set a lower gas-oil ratio would unduly restrict the wells, in view of their high gas-oil ratio at the present time.

Q Now, I noticed Mr. Buell, in his direct examination, mentioned that an El Paso Well has a low gas ratio, do you consider that an anomaly?

A It certainly did not compete with the gas-oil ratios that I had expected. I expected that it would be a typical gas well in this Pool and, actually, its completion ratio was in the range we would normally call an oil well. It is anomalous in that respect.

Q You explain the anomaly by saying they perforate in the

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different sections than the other wells had been perforated, is that correct?

A It is in another section also open. It is also completed in this same main sand zone in which the other wells were completed, but in addition it has other material open above that, too.

Q Do you have any other areas producing or not?

A In other wells?

Q No, in this well, this upper section?

A No, sir, I can't, I don't have any selective test to show this other portion is producing, but on the basis that it is open and that well had different producing characteristics from what would normally be expected, the conclusion was reached it must be producing.

Q The most convenient thing, then, would be to attribute it to this anomalous production, to this other section then?

A Yes.

Q I see. You stated, Mr. Eaton, that there were approximately seven oil wells and twelve gas wells in the area, is that correct?

A Yes, sir.

Q Is that your definition of an oil well and gas well in your determination there are seven and twelve based on your definition of an oil well, and 30,000 to 1?

A Yes, sir.

MR. NUTTER: I see. I believe that is all.

MR. PORTER: Mr. Payne.

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CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Eaton, insofar as to prevent waste and protect correlative rights is concerned, what you attempt to do in the reservoir of this type, is to keep the gas-oil contact relatively constant, is that right?

A That would be preferable.

Q From the standpoint of preventing waste by preventing limitation of oil under the dry gas sands?

A That has been under our situation.

Q That has not occurred under the present Order, as I understand your testimony?

A No.

Q So that the expansion of the gas-cap now does not cause waste, but it might impair correlative rights of the gas zone?

A Yes, sir.

Q Now, if you had to have one of the two, assuming you did, it is preferable to have the gas-cap expanding rather than the oil rim expanding, is it not?

A Yes, it would permit the oil rim to expand to unsaturated, you know, oil saturated portion would result in waste.

Q I believe you testified that one of your reasons for proposing 320 acre spacing for the gas wells is to prevent the unnecessary drilling of a gas well?

A Yes, sir.

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Q Now, since the present order has been in effect, do you know of any gas well that has been drilled in this well that is unnecessary from the standpoint of drainage?

A No, no, sir. We drilled in this Pool on the 80 acre basis.

Q So that the gas wells that are there do have 80 acres dedicated to them at the present time, are actually draining in excess of 80 acres?

A Yes, sir. Generally, the spacing pattern in this Pool insofar as gas is concerned is on 320 basis now, which also ties back into our original recommendations.

Q I believe you testified your data up to the present, insofar as the gas liquid ratio in this Pool was concerned, you haven't been able to approach it since the last hearing?

A That is correct.

Q Why, then, do you feel the Pan American witnesses evidence in the previous case, that 2,000 to 1, the gas-oil ratio limit could cause less than 4,000 to 1 limitation?

A At the time we didn't have the benefit of the past year's performance history on the Pool, and we did not expect, then, that the gas-oil ratios for the oil portion would increase quite as rapidly as they have. Now, that all the gas-oil ratios are in excess of 4,000 cubic feet per barrel, there is relatively no basis, no good basis, to recommend that change in the present rule within that respect.

Q Well, 2,000 to 1, your oil withdrawals would be less,

wouldn't they?

A Yes, sir.

Q Now, I am still not quite sure how this gas proration ties into the oil proration, you're going to have the purchasers nominate for gas, are you not?

A Yes, sir.

Q You aren't if nominations are in excess of four times the gas allowed to the oil wells?

A Then the allowable would be set at four times the gas limit of an oil well.

Q So, you are really not prorating the gas wells to market demand, you might not be?

A Might not be prorated to market demand with ceiling, that ceiling being equal to four times the gas limit of an oil well.

CROSS EXAMINATION

BY MR. NUTTER:

Q Why is it necessary for complete gas purchasing to make a nomination in this area?

A It is quite concsivable that market demand might not be equal to the four times the daily gas limit of an oil well.

Q If you have a flare order and set the limitation on the gas wells in accordance with the oil well demand, they wouldn't be producing the gas anyway, would they?

A If the purchasers couldn't handle the gas and you had no flare order, I cannot see the necessity for the purchasers nominating for the gas.

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Q I don't think it would be purchased anyway, would it?

A Well, I am not a purchaser, it appears to me he would need to make his nominations so he can fit that pool into his schedule of gas takes for the whole San Juan Basin area.

MR. PAYNE: He is taking gas from the Pool now, he is not nominating.

MR. EATON: I realize--

MR. NUTTER: Mr. Buell, would you explain?

MR. BUELL: I want to apologize, we did not submit an Exhibit informing you of our rules because El Paso is going to submit such an Exhibit and I thought I would avoid confusion by not having two Exhibits. I see we have caused more than we saved. Actually, the main purpose of nominations, and under the rules, as El Paso will submit, they provide for the normal balancing rule for these gas wells and under the balancing rule, and under market demand type proration, we feel this will probably adjust quite readily to market demand. I should have introduced an Exhibit. I apologize for not doing it.

MR. NUTTER: I still don't understand.

MR. HOWELL: I would suggest that a good many of these questions are in the field of Mr. Rainey. He can answer the problem asked of the witness, and he will appear as a witness later on.

MR. PORTER: Will you hold those questions?

MR. NUTTER: Yes, sir, we will wait 'til Mr. Rainey is on the stand.

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CROSS EXAMINATION

BY MR. UTZ:

Q Are you familiar with productivity of the gas wells in this field?

A Yes, sir.

Q How many of the twelve gas wells that you have make the limit that you have recommended?

A According to my information, there are two of these gas wells which will make this top limit readily and the possibility of one additional well.

Q As I recall, the limit you have recommended would be approximately to that of the present oil allowable, would be approximately 1.6 MCF a day for 320 acres?

A I believe that turned out to be about twice that.

Q The allowable is 94 barrels.

A That is on 80 acres.

Q What is your allowable for this Pool this month?

A 194 barrels.

Q 194?

A Yes, sir.

Q Over three million cubic feet a day?

A Yes, sir, that would be the ceiling.

Q In other words, on your ceiling, with all the wells, all the twelve wells, would that make the ceiling if it were 400 MCF that

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would come out of these twelve wells?

A No, 36 million cubic feet.

Q I am sorry, 40 million cubic feet a day?

A Yes.

Q Now, you did recommend that much, this 25-75?

A Yes, sir.

Q The reason for recommendation on the gas wells?

A Yes, sir.

MR. UTZ: I believe that is all I have.

MR. PORTER: Anyone else have a question of Mr. Eaton?

(Whereupon, a short recess was taken.)

MR. PORTER: The meeting will come to order.

Mr. Seth, would you like to proceed at this time?

MR. WHITWORTH: We have a witness that wasn't sworn initially, he should be sworn now.

(Whereupon, witness was sworn.)

R. F. LEMON

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. WHITWORTH:

Q Will you state your name, what capacity and whom you are employed by?

A Richard Lemon, in El Paso Company, and presently assistant manager of the Reservoir Engineering Department.

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Q You have previously testified before this Commission?

A Yes, sir.

Q In an expert capacity, have you not, Mr. Lemon?

A Yes, sir.

MR. WHITWORTH: Are the witness' qualifications acceptable?

MR. PORTER: They are.

Q (BY MR. WHITWORTH) Mr. Lemon, have you made a study of the reservoir characteristics in the Angels Peak-Gallup field with respect to whether or not one well in this field will efficiently and economically drain 320 acres?

A Yes, sir.

Q In making this study, have you prepared any Exhibits or data to reflect your opinion?

A Yes.

Q We have a plat marked as El Paso's Exhibit Number 1, what does that Exhibit reflect to you?

A Exhibit Number 1 has been prepared to show the subsequent wells completed in the field after the initial completions have indicated a loss in initial pressure.

Q Does it also indicate distances between wells in this field?

A Distances between wells are indicated on here to obtain some idea of the drainage area that such communication would support.

Q What wells are indicated on this Exhibit, all wells in the

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field?

A Yes, sir, that is correct.

Q What is the greatest distance between wells that you have in this field?

A The distance I have shown here would be the greatest, 11,800.

Q What is the shortest distance?

A 2,000 feet.

Q Now, what indicates to you that there is communication between wells drilled in the Angels Peak-Gallup field?

A Comparing initial pressures on subsequent wells that have had no production, we find that those pressures are different, less than the initial pressure. Therefore, production of other wells surrounding these wells have accounted for the pressure loss, in the wells that I have indicated on here by showing the loss in pressure.

Q In other words, there has been a draw-down of initial pressure?

A That is right.

Q Can you cite some specific instances from this Exhibit?

A Yes, sir. I call your attention to Huerfano Unit No. 99, which is located in Section 2, of 26 and 10. The initial pressure on that well was 1265, which the computed bottom-hole conditions were calculated to be 1512. I assume that the initial pressure in the field was 1620, which was based on McAdams, excuse me, Weaver-McAdams No. 1 in Section 34, which showed an initial surface pressure of

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1356 per square inch, indicated an initial pressure of 1620, comparing the initial pressure on 99 to that initial pressure of 1620, we find there is 108 pounds difference, the distance between the closest well at the time the 99 was completed, was the Weaver-Brown-McAdams No. 2, which is located 3250 feet to the Northeast. Just based on that distance alone, the minimum drainage area would be 760 acres. Of course, if you can assume you have that much communication, that is 3250. In effect, you can probably support twice that distance since you can assume that the well on the other side of the diagonal, say, would be able to drain that same distance.

Q From this you concluded that there is communication between those wells and that they will drain in excess of 320 acres?

A That is right.

Q Now, what other data have you compiled, Mr. Lemon, to indicate to you that a well will drain at least 320 acres sufficiently and economically? Have you compiled gas-oil ratios on the wells in the Angels Peak-Gallup field?

A Yes.

Q That is El Paso Exhibit Number 2?

A Yes, sir.

Q Would you explain to the Commission what this Exhibit reflects with respect to gas-oil ratio performance?

A Yes, sir. On Exhibit 2, I have indicated the gas-oil ratios based on the January and April, 1960, Surveys. This Exhibit demonstrates or represents, at least, the distribution of the gas-

oil ratios through the field, that is through the gas area. The ratios vary from, oh, let's say up to 32,000 to in excess of 144,000. The 144,000 ratio being the highest that was reported. There is another well which is 111, that is in the Huerfano Unit which has a gas allowable so, in effect, its gas-oil ratio would be in the finished unit.

Q Now, it has been indicated that since the last hearing, last July, on this matter, there have been nine wells drilled, do you have the gas-oil ratios on those wells?

A Since July, which was the last hearing, there have been seven wells, I believe, completed.

Q Do you have the gas-oil ratios on those wells?

A Yes, sir. Would it be satisfactory just to read ratios on those wells as based on the April, 1960, Survey?

Q I think that will be all right.

A McAdams, Weaver-McAdams No. 5 was the subsequent completion, that well, in April, showed a 15,132 ratio, that well, of course, is in what would be classified as an oil area based on the 30,000 to 1 breaking point. The next well is the Huerfano Unit 108 which, in April, showed a 32,454 ratio. Another well, the Huerfano Unit 109, which showed a gas-oil ratio of 76,915 in April, and the Huerfano Unit 110 showed a ratio 6,978. The 111, which also is a subsequent completion, was carried as a gas allowable, which would make it go on quite high. The last well would be the Pan American "B" No. 1 which, in April, the ratio was 18,899.

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Q These gas-oil ratios have been increasing?

A Yes, comparing the ratios in April with the ratios which were used back in March of '59, there have been quite a number of increases. In fact, I believe there, all of the wells have increased, except one, which was the Weaver-McAdams No. 1, which showed a slight decrease, those ratios are 88,055 in March of '59 and 74,741 in April, both quite high. In comparing the range of increases in the Huerfano Unit No. 99 in March of '59 was 55,506 and in April, 1960, was 144,163. Considering one of the wells in the oil pool, the Huerfano 107 had a ratio in March of '59 of 2,573. That well ratio in April of '60, was 8,015.

Q Now, Mr. Eaton has previously testified that the lowest gas-oil ratio for an oil well was 5,372, and the highest was 20,543 in this field. Do you concur in that data?

A Yes, sir, based on the April gas-oil ratios, I would concur.

Q On the gas wells that you have here, using the 30,000 to 1 ratio, what is the gas-oil ratio, the lowest with respect to gas wells?

A I believe the lowest is on the Huerfano Unit 108, which is 32,454.

Q Do you have any data for the highest gas-oil ratio?

A Two wells that reported 144,000. One of those wells is Weaver-McAdams No. 2, which shows a ratio of 144,846 and the other well, the Huerfano Unit 99, which shows a ratio of 144,163.

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Q Mr. Lemon, does the study of those gas-oil ratios indicate to you that this field should be classified as a gas pool?

A Yes.

Q It is, essentially, a gas pool?

A Yes.

Q Do you think classification of this field as a gas pool would prevent waste and protect correlative rights in the field?

A Yes, sir.

Q Can you think of anything you would like to add to your testimony?

A No, I believe that completes it.

MR. WHITWORTH: That is all we have.

MR. PORTER: Any questions of Mr. Lemon? Mr. Payne.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Lemon, how much acreage will the well that you consider an oil well of 20,000 to 1 ratio, how much acreage will that well drain?

A I presume you are referring to the Huerfano Unit 105?

Q Yes, sir, the one that has a ratio of approximately 20,000 to 1.

A All right, sir.

Q What I am getting at, doesn't it seem anomalous a well with the 29,999 ratio can only drain 80 acres, and the 30,000 to 1 would drain 320 acres?

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A Actually the rise of drainage would not depend on the gas-oil ratio.

Q Yet, you propose oil wells of 80 and gas wells of 320 dedicated to them?

A I believe that is what the proposed rules would be, say, yes, sir.

Q And that determination as to what would be dedicated is based on the 30,000 to 1 ratio?

A That is correct as I understand it.

Q Now, I believe you testified that you feel this is primarily a gas pool, however, do you have any reason to believe that the oil section doesn't extend perhaps as much as five miles to the Northwest?

A I doubt, rather seriously, if it would extend as a continuous section. You say, now, to the Northwest?

Q Well, in any direction, it hasn't really been defined, the oil section.

A Not completely on the ends, that is right.

Q So, that we could have a considerable number more of oil wells drilled in this oil section?

A Well, based on this particular area here, the volume of gas that has been uncovered has been considerably greater than the oil, but it is possible that along the rim there you would find oil. However, I point out this Frontier-Evensen Well No. 2, North Well, didn't report any hike on initial completion, which would mean any

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oil there must be Northeast of there.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Lemon, you stated, in your opinion, this was a gas pool. What, in your definition, is a gas pool?

A I would conclude that if a gas area is large, with respect to the oil area on the order that we have here, that would constitute a gas reservoir. That is, I would say, if the oil area, in volume, which was on ten percent or so, certainly you would have a gas reservoir classification.

Q Well, what kind of liquids do these so-called oil wells in this gas reservoir produce?

A From what they report, they are down in the 40 gravities.

Q Is it clear distillate, or black oil?

A I have not seen a sample of it.

Q Assuming that it's a dark-color oil, with relative gravity, it would still be your opinion this would be a gas reservoir?

A I think it should be produced as a gas pool. The oil on the oil rim is oil, I didn't mean that.

Q The gas-cap on the oil rim, rather than the gas reservoir?

A That is correct.

Q Mr. Lemon, I noticed here on your Exhibit that one well, the El Paso, you note 103 DA decrease in gas-oil ratio, to what do you attribute that?

A Comparing the two tests, the first test, which is the

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January of 1960 test, the well produced 16 barrels of oil and DA ratio of 125,443. In April the well produced 14 barrels with 108,888, which was a slight decrease. There, as far as the reason for it, it appears to just be a normal fluctuation. It depends on a lot of factors, various conditions and so forth, frankly, I don't know.

Q I see. The average over-all is, you don't have a ratio on this Frontier-Evensen Well?

A To my knowledge, that well is not produced. All we have is the initial completion which indicated only gas and no liquid.

Q They didn't report the liquids that were produced on that?

A That is correct.

Q How about this well way down there in the Southeast end of the trend, the Huerfano No. 111, any liquids encountered on that test?

A To my knowledge, they have all been reporting gas with no oil, in April, they have been reporting through the month of May of 1960.

Q Does that mean that the well isn't making any liquids, or just not reporting any liquids?

A I assume if they were making it, they would report them.

Q Do you only have one gas-oil ratio on the Huerfano 108?

A I have a ratio which was taken in March of 1960. At that time that well indicated a ratio of 8,884. The reason I didn't show that was because it was past the January period. So it has an in-

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crease from 8.000 to 8,432, 254.

Q This is pretty nearly the gas-oil contact as depicted by Pan American?

A It would appear so.

Q Mr. Lemon, you have made reference to the amount of acreage that a well would drain, based on interference tests or bottom-hole pressure tests. Now, in your amount of acreage, it was based on what radial? That is, do you drain acreage in this Pool where the Pool is lying on the Northwest, Southwest trend?

A When you have a pattern spacing like this I have you don't have the radial drainage, radial to a certain extent; however, you fit into the square pattern, or rectangular pattern.

Q Radial anomaly in a trend of this type, a pool such as we have here, regardless of the pattern?

A The qualification for radial drainage, the formations exist all the way around the well, otherwise it wouldn't be radial anyhow.

MR. NUTTER: I see, thank you very much.

MR. PORTER: Mr. Utz.

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Lemon, have you made reserve studies in the gas area of this pool?

A No, sir.

Q Has your Company made such studies?

A I might add, I made a sort of material balance calculation

based on all of the area, not just the gas-cap area.

Q Would that give us some reserve figures for the gas area?

A Probably a combination-type calculation.

Q Your Company must have some reserve estimate?

A We have made a reserve estimate on a portion of it.

Q On the acreage that you hold?

A Yes, we have under contract.

Q Do you have knowledge of what those reserves were?

A I don't, with me.

Q How were they calculated, on the tract basis or an average basis?

A It was based on the tract basis.

Q Do you recall whether the reserves were fairly even on the tract basis?

A At that time, we were calculating the reserve just on the Section 34, there, which was Weaver-McAdams lease, just one tract involved.

Q Have you made a study of this reservoir, of the unit?

A To what extent, now?

Q Well, to the extent of reading logs and determining net pays?

A No, sir.

Q Pressures?

A I have not made a volume estimate on it.

Q Would your Company have, as to reserves as to net pays?

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A We do not have any prepared for the entire reservoir.

Q Generally speaking, do reserves vary much in the gas area, do they vary much between tracts in the gas area, to the best of your knowledge?

A Having not made the depiction in the various wells, I wouldn't really know. The only one I looked at was the Huerfano Unit 106, which was cored, I believe, from the core analysis, that well indicated 22 feet.

Q Do you consider that average, or above average, or below average?

A I would say, on the over-all average, I would say it was about average, it's in the gas-cap area there.

Q Do you know how the pressures are in the gas-cap area, pretty even throughout the area?

A It depends upon the location of the wells. A Survey was conducted in July of 1960 with the pressures bearing like so: The Huerfano Unit 105, 1446; the Huerfano Unit 106, 1220; the Huerfano Unit 109, 1222; the Huerfano Unit No. 99, 1169.

Q That is not initial pressure?

A No, sir. These are subsequent pressures based on a July Survey.

Q I was really more interested in initial pressures.

A The initial pressures in the gas-cap area, I would say, vary based on the point at which the wells were completed, that is the stage, the date.

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MR. UTZ: I guess that is all I have.

Q (BY MR. NUTTER) Mr. Lemon, could you subscribe to the Pool Rules as proposed by Pan American?

A Could I have those read?

MR. PORTER: I don't believe he was here when they presented them.

Q (BY MR. NUTTER) Does El Paso Natural Gas Company subscribe to the proposed Pool Rules, that would define a gas well as being a well with a ratio of 30,000 or more?

A Yes, sir, to that extent.

Q Could you subscribe to the proposed rule that would apply a gas-oil ratio limitation of 4,000 to 1 on the oil wells?

A Could you direct those to Mr. Rainey, those questions?

Q I see, you are not familiar then with the actual rules as proposed?

A As I understand it, the rules would incorporate the 4,000 to 1 limit, yes, sir.

MR. NUTTER: I believe that is all. Thank you.

Q (BY MR. ERREBO) With regard to 4,000 to 1 limitation, Mr. Lemon, I believe you were qualified, were you not, as a reservoir engineer?

A Yes, sir.

Q You are familiar with the fluids in this reservoir, the oil fluids, that is?

A To what extent?

Q Well, you know what kind of oil is down there, don't you?

A As far as gravity?

Q You have some idea as to a solution ratio?

A Yes.

Q In general now, with the type of fluids that we have in the Pool, can you state to the Commission whether having a ratio of 4,000 to 1 would result in any greater efficiency of production of oil than the ratio of 2,000 to 1, or any less?

A Any reduction in oil based on one or the other ratio?

Q Which would be the more efficient ratio, would there be any difference in 4,000 to 1 or 2,000 to 1, taking into consideration the type of ratio mechanism you have here, the type of oil solution, gas-oil ratio and other reservoir factors?

A I believe, under the present conditions there wouldn't be any difference between 2,000 and 4,000.

Q Actually, what you are saying, in order to produce the oil, you must produce so much gas with it, isn't that right?

A Yes, sir.

Q So, actually restricting the proration back to 2,000 to 1, from 4,000 to 1, which we have now, here, we restrict the oil production with no increase in efficiency, is that correct?

A That is correct.

Q With further regard to the gas-oil ratio insofar as the increase is concerned that you have observed over the past year, what significance does it have to you?

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A I believe the significance would be that the reservoir is getting gassier.

Q Gassier, does it have any significance to you with regard to the movement of gas within the reservoir toward or away from the oil rim?

A I believe, based on the way the gas-oil ratios have increased in the oil area, that you probably have to assume or conclude, rather, that the gas-cap has moved below the oil area some.

Q Let me ask you, are you familiar with the rules which will be later proposed by El Paso?

A Generally, yes.

Q It is concluded that they would prevent this movement or at least stop it?

A I believe they would tend to reduce it.

Q And, they would more nearly bring the reservoir into balance, then, is that correct, insofar as the movement of fluids as between these two areas is concerned?

A Yes.

MR. ERREBO: That is all.

MR. PORTER: Mr. Ramy.

Q (BY MR. RAMY) Do you agree with Mr. Eaton that the anomalous gas-oil ratio on the Huerfano 107 is due to the fact that there is another sand open up the hole, probably?

A That well has another Section open, that is right.

Q If that sand is open in very many of the wells, wouldn't

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it have the effect of making more oil and obscure the true gas-oil ratio in the main producing sand; I mean, it appears to have done so here, doesn't it?

A Generally, I would say, based on the fact that two zones are open in the 107, that certainly the second sand would have a new over-all performance, you couldn't get a clear-cut distinction between each sand performance.

Q This would affect, certainly, the definition, then, between a gas well and an oil well, or might renew it if several different areas in that sand were open?

A I think the situation here, where these zones are open you have to consider the over-all performance of both zones. Just in reviewing the completion technique here on this McAdams 1 B, it appears to be in the upper and lower zones, which is in the oil rim. The 107 would be a comparable type completion, a comparable type completion, and based on the completion type on several of the wells in the gas-cap area, I noticed they are the two zones open, so you have wells in both areas in the same zones.

Q I was under the impression the Huerfano 107 was the only gas-cap which had the upper zone open?

A The gas-cap area, according to the completion information I have here, it would be quite a few wells. Namely, well, the 107, the 108, the 109, the 110, the 111. Wait a minute, strike that last one, just 110.

Q Why do you think that having the upper sand open caused

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that particular well to have a lower ratio, just because it maybe didn't make any more than that?

A I didn't make that conclusion.

MR. PORTER: Mr. Payne.

Q (BY MR. PAYNE) Would you draw the conclusion that this gas-oil ratio has gone down because oil has migrated into the gas section?

A No, I don't believe I would.

MR. PAYNE: Thank you.

MR. PORTER: Mr. Nutter.

MR. NUTTER: No questions.

MR. PORTER: Does anyone have a question?

REDIRECT EXAMINATION

BY MR. WHITWORTH:

Q Mr. Lemon, are you familiar with the production history of the wells in the Angels Peak-Gallup Pool?

A Yes.

Q Do you have a comparison of the production of oil with the production of gas in this area?

A Yes.

Q What is that comparison?

A I could say, for the month of April, 1960, the oil production has been 10,860, the gas production is about 313,558, which would give you a gas-oil ratio of about 29,000.

MR. PORTER: That is an old pool?

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A Yes, sir.

Q (BY MR. WHITWORTH) Is that cumulative production?

A No, that was just for the month of April.

Q Do you have any data on the cumulative production of this field?

A The latest figures I have are through April, 1960. The cumulative oil production as reported was 134,362 barrels. The gas production was 5,237,229 MCF. That is 15,025, and based on the Engineering Committee's figures, both the monthly's and the annuals.

Q Is it a fact, this field has had 98 percent production or thereabouts?

A I would say, for the month of April, that would probably be a correct representation, yes, sir.

MR. PORTER: 98 percent of what?

MR. WHITWORTH: 98 percent of total production.

A This would be a comparison of reservoir space voidage.

Q Does that indicate to you that the Pool is essentially a gas pool?

A That is what I base my conclusion on, the fact that the performance has been such that the gas production has overshadowed the oil production by a considerable amount. From a practical standpoint, anyhow, the field produces as a gas field.

Q There has been a question that if an oil well would only drain 80 acres, why is it that a gas well will drain 320? Do you have any data that would indicate whether a well would drain in ex-

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cess of 80?

A On our Huerfano 107, we had an initial bottom-hole pressure on that particular well, which was subsequent to the initial completion in the field, the decline in the pressure using this 1620 as initial again was 195 pounds. The distance to the nearest well, at that time, was the Weaver-McAdams No. 3, which was located about 2200 feet away, and based on that distance, it indicated that the drainage area would be in excess of 320 acres.

Q Mr. Lemon, were El Paso Exhibits 1 and 2 prepared by you, or under your direct supervision?

A Yes, sir.

MR. WHITWORTH: We ask that the Exhibits be admitted into evidence.

MR. PORTER: Any questions concerning the Exhibits? They will be admitted into the record.

MR. WHITWORTH: That is all we have.

MR. PORTER: Any further questions?

RECROSS EXAMINATION

BY MR. PAYNE:

Q Isn't it true, Mr. Lemon, when you were looking cumulatively at oil reservoirs, or gas, that there were three or four gas wells which led to the discovery of the first oil well?

A That is essentially correct. The field was initially classified as a gas reservoir.

MR. PORTER: Mr. Nutter.

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Q (BY MR. NUTTER) Mr. Lemon, I think you stated that in the month of April the producing ratio was some 29,000 to 1 as far as the Pool, as a whole, is concerned?

A That is right.

Q The Pool, as a whole, would be classified as an oil pool then on its production ratio rather than a gas pool under the 30,000 to 1 classification, would it not?

A It does away--the average would be below the 30,000.

Q You also mentioned that No. 107 was drilled with a bottom-hole pressure derived from the original pressure of 195 pounds, and that your calculations on the footage from the nearest well would indicate it would drain some 320 acres?

A In excess of 320.

Q That well is located offsetting a 40 acre tract to the Weaver-Brown No. 3 Well, is it not?

A It appears that it is.

Q So, while you are talking about 320 acres of effective interference, the two wells are adjacent 40 acre tracts, correct?

A Yes, that is right.

MR. NUTTER: Thank you.

MR. PORTER: Mr. Utz.

Q (BY MR. UTZ) Mr. Lemon, does El Paso have any potential or deliverability on the gas wells?

A The last information I have is the results from the gas survey, they were calculated on a basis of an oil well.

Q Your answer, you do not have any deliverability?

A We have deliverability data against the line pressure on just a production standpoint. That is so many MCF for so many days on the line against a certain pressure.

Q Do you have that information with you?

A Yes.

Q I want to be as general as possible on that, I would like to know the range of deliverabilities as near as you can state?

A The wells in the gas area, the lowest one appears to be around 190 MCF per day. The highest is about 3.4 MCF per day.

Q About what was your line pressure?

A On those two, that averaged around 480 pounds.

Q So, would you say that would be a comparable range of deliverabilities?

A At 500 pounds, I believe it probably would.

MR. PORTER: Does anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: The hearing will recess at this time until 1:15 P.M.

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TRANSCRIPT OF HEARING

(Afternoon Session)

MR. PORTER: The Hearing will come to order, please.

MR. WHITWORTH: Our next witness is Mr. David Rainey who has already been sworn.

DAVID RAINEY

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. WHITWORTH:

Q Would you please state your full name, by whom and in what capacity you are employed?

A David H. Rainey, Administrative Assistant, Proration Department of the El Paso Natural Gas Company, El Paso, Texas.

Q Have you previously testified before this Commission as an expert witness?

A Yes, sir.

Q In the capacity you are testifying now?

A Yes, sir.

MR. WHITWORTH: Are the qualifications of this witness acceptable?

MR. PORTER: They are acceptable.

Q (BY MR. WHITWORTH) Mr. Rainey, have you had occasion to prepare suggested rules and regulations pertaining to the production from this well?

A Yes, sir, I have.

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Q And, that is marked as El Paso's Exhibit Number 3?

A Yes, sir.

Q Would you tell the Commission, briefly and generally, what these rules cover?

A Yes, sir. Before I get into that, if I might, there appeared to be some confusion on some of the testimony this morning, particularly on the part of some of the lawyers in the case. I thought, for the record, it might be well to straighten the thing out. Mr. Arnold questioned Mr. Lemon at some length on the anomalous condition of the Huerfano No. 107. I think, actually, he was referring to the Huerfano No. 110. There is no anomalous condition on the 107, it's in the oil area and always has been. The 110 Well, as Mr. Eaton brought up in earlier testimony, which is in the South part of the field in the up-dip position, I don't have a plat here, so I can't give you the exact location, but it has a relatively low ratio with respect to other wells in the Gas-Cap area. That well is located in the S. E. 1/4 of Section 3, Township 26 North, Range 10 West, that well which Mr. Eaton testified to as having an anomalous condition and explained by the fact it was open in some upper intervals, and Mr. Lemon further testified on the number of wells in the Gas-Cap area that were open in the upper interval, and he further testified that 110 was one of those wells in that upper interval. I think the record may be a little cloudy, and I thought that I should straighten the situation out before we went any further.

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MR. ARNOLD: Thank you for that.

MR. RAINEY: Any other question, Mr. Arnold, so we might digress and get that cleared up?

MR. ARNOLD: I think I was under the impression the 107 was the first well in the pool that was in the upper zone, it did make some oil out of the upper zone.

MR. RAINEY: It is making oil out of the lower zone also, and it also has been considered to be over in that oil rim area. Now, back to the field rules, proposed field rules, and I might state at the outset, these rules are an outgrowth of a meeting between Pan American Petroleum Corporation and El Paso Natural Gas and Weaver and Brown. At the time we called these meetings and discussed some of these rules, I am probably at fault, I was not aware that Frontier had completed a well in what was considered as the defined limits of the pool, so Frontier was not included in this build-up of lease rules. These rules are a joint effort of the three main operators in the present defined limits of the Pool. I think I can probably best discuss these rules if I go down one by one. We have tried, insofar as possible, to frame these rules within the framework of the existing rule, 1670, which consolidated the Special Pool Rules for the seven prorated gas pools in Northwest New Mexico, and these rule numbers I am referring to and discussing, they refer to the same numbers in the Northwest portion of Order R-1670.

Rule Number 1 pertains to Pool wells and wildcat wells, General Rules applicable.

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Rule Number 2 pertains to spacing--the General Rule should be applicable there in that it says: Except as provided in the Special Pool Rules. Then have a Special Rule (2) which is as follows: Each well drilled or re-completed within the Angels Peak-Gallup Gas Pool on a standard proration unit, after the effective date of this Rule, shall be drilled not closer than 660 to any boundary line of the tract, nor closer than 330 to a quarter-quarter Section line or subdivision inner boundary line. Any well drilled to and producing from the Angels Peak-Gallup Gas Pool prior to the effective date of this Order, at a location conforming to the spacing requirements in effect at the time said well was drilled, shall be considered to be located in conformance with this Rule.

Now, that rule differs in some respects to standards in the Northwest, but this spacing has been in effect since Rule R-1410A was promulgated at this time a year ago. I don't know of any wells that are so located that they would not fit the general pattern. I hadn't checked this and I saw no particular need to change what we have operated all along.

Rule 3 pertains to exceptions to the spacing provision, administrative approval for non-standard location and that sort of thing. The General Rules are applicable.

Rule 4 pertains to Statewide Rule 104, Paragraph (k), the General Rules are applicable. My recollection is that Statewide Rule 104, Paragraph (k) refers to certain spacing provisions in the said rules and certain designated wells at that time were an

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exception to it.

Special Rule 5 (a), 5 (a) is the standard proration unit rule in Order R-1670 and ours deviates in the following respects: The acreage allocated to an oil or gas well for proration purposes shall be known as the oil or gas proration unit for that well. Each well completed, or re-completed, in the Angels Peak-Gallup Gas Pool on a standard proration unit as a gas well shall be located on a proration unit of approximately 320 acres comprising any two contiguous quarter-sections of a single governmental section, being a legal sub-division of the U.S. Public Land Surveys, and each well completed, or re-completed, in the Angels Peak-Gallup Gas Pool on a standard proration unit as an oil well shall be located on a proration unit of approximately 80 acres comprising any two contiguous quarter-quarter sections of a single governmental section being a legal sub-division of the U. S. Public Land Surveys. Any gas proration unit containing between 316 and 324 acres shall be considered to contain the number of acres in a standard unit for the purposes of computing allowables. There again this Rule 5 (a) is a conformation except that we provide 80 for oil wells and 320 for gas wells.

Rule 5 (b) provides for administrative approval for non-standard units, there again the General Rule's applicable.

Rule 6 (a) provides for preliminary nominations, General Rule is applicable.

Rule 6 (b) defines the term "gas purchasers", General Rule is applicable.

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Rule 7 (a) provides for supplemental nominations, General Rules applicable.

Rule 7 (b) provides that wells shall be listed on a proration schedule, General Rules applicable.

Rule 8 (a) provides that total allowable of the Pool shall be equal to the preliminary or supplemental nominations with any adjustments which the Commission deems advisable--General Rules applicable.

Rule 8 (b) (1) provides no gas well to be given an allowable until certain forms have been filed--General Rules applicable. (2) provides that deliverability test must be taken--General Rules applicable.

Rule 8 (b) (3) is a Special Rule. No oil well shall be given an allowable until Form C-104 and Form C-110 have been filed, together with a plat (Form C-128) showing acreage attributed to said well and the location of all wells on the lease.

Rule 8 (c) provides when allowables to newly completed gas wells shall commence, General Rules are applicable.

We have added a Special Rule 8 (d): Allowables to wells whose classification has changed from oil to gas, based on the results of a gas-oil ratio test, will commence on the effective date of the new gas-oil ratio as provided in Special Rule 28; provided that: (1) A deliverability test is taken in conformance with the provisions of Order R-333-C and D, as amended by Order R-333-E and is submitted to the Commission within forty-five days of the effec-

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tive date of reclassification. In no event will a gas allowable be granted for a date more than forty-five days prior to the date the well's initial deliverability and shut-in pressure test is reported to the Commission on Form C-122-A, in conformance with the provisions of Orders R-333-C and D, as amended by Order R-333-E; (2) a plat, Form C-128, showing the acreage attributed to said gas well and the location of all wells on the lease, and a new Form C-104 and Form C-110 has been filed. That is a standard provision with respect to allowables to gas wells except that in this pool we contemplate that quite a number of these oil wells will be classed as gas wells. We should write some rule for that specification.

Rule 9 (a) provides method for calculating AD factor. The General Rules are applicable.

Rule 9 (b) provides for allowable which shall be assigned to marginal wells, the General Rules are applicable.

Rule 9 (c) 1 and 2 provides for specific method of calculating allowables, General Rules applicable. That is the rule that sets out that 75% of the total allowables to the Pool shall be on the acreage times the deliverability factor and 25% to the straight acreage factor.

Rule 9 (d) provides that deliverability tests become effective on February 1st of the year following the year in which test is taken, General Rules are applicable.

Special Rule 9 (e): 1: Oil wells in the Angels Peak-Gallup Gas Pool on an 80 acre standard proration unit shall be permit-

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ted to produce a gas limit based on the normal unit allowable for Northwestern New Mexico times a prorational factor of 2.77 times the limiting gas-oil ratio for the Angels Peak-Gallup Gas Pool. The 2.77 is the factor provided for in the Statewide rules for 80 acre gas wells at this depth. 2: Gas wells in the Angels Peak-Gallup Gas Pool shall be permitted to produce, subject to market demand fluctuations, up to four times the permitted 80 acre gas limit over a six month's proration period as determined above, based on a ratio--the numerator of which is the number of acres dedicated to the particular gas well, and the denominator of which is 80.

Rule 10 (a) provides for procedures in case acreage assigned to a well is increased--General Rules are applicable.

Rule 10 (b) provides for effective date of a new allowable due to change in deliverability after re-test or after re-completion of work over--General Rules are applicable.

Rule 10 (c) provides that deliverability be determined in accordance with the provisions of Order R-333-C and D, as amended by R-333-E, and provides for exceptions to annual deliverability test requirements. General Rules are applicable.

Special Rule 10 (c): Gas wells in the Angels Peak-Gallup Gas Pool shall have deliverability tests taken in conformance with the procedure outlined in Section B (procedure pertaining to the Mesa Verde formation of Order R-333-C and D, as amended by Order R-333-E). Now, there is a provision for Order R-333-C and D, the provision for testing the Mesa Verde, Pictured, Dakota-Farmington,

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and Fruitland. I have no provision for Gallup, so we had to add that rule in to include the Gallup under the terms of that Order.

Rule 11 provides that the Commission may assign minimum allowables in order to prevent premature abandonment--General Rules are applicable.

Rule 12 provides that all production shall be charged against the well's allowable--General Rules are applicable.

Rule 13 provides for balancing dates and proration periods. General Rules are applicable.

Rule 14 (a): provides that underproduction accrued in one proration period may be carried forward into the next proration period before cancellation--General Rules applicable.

Rule 14 (b): provides for method of making up underproduction--General Rules are applicable.

In the interest of time, Rule 15 (a), Rule 15 (b), 15 (c), 15 (d), 15 (e), Rule 16 (a), 16 (b), Rule 17, Rule 18, 19, 20, Rules 21 (a), (b), (c) and (d), and Rule 22 and Rule 23 and Rule 24 all are applicable. The General Rule is applicable in each one of the proposed Orders and I see no need to go into them further, unless the Commission requires.

Special Rule 25: The vertical limits of the Angels Peak-Gallup Gas Pool shall be the Gallup Formation.

Special Rule 26: A gas well in the Angels Peak-Gallup Gas Pool shall be any well producing with a gas-oil ratio of 30,000 cubic feet of gas per barrel of oil, or more.

Special Rule 27: An oil well in the Angels Peak-Gallup Gas Pool shall be a well producing with a gas-oil ratio of less than 30,000 cubic feet of gas per barrel of oil.

Special Rule 28 was copied verbatim from the existing rule in Order R-1610-A, I believe it is, R-1410-A. It is the current rule except where it provides in that Order that the gas-oil ratio survey shall be taken the last fifteen days of the month. I have changed that to read "the first fifteen days of the month in the months of January, April, July and October". The purpose for that is in an effort to make the new gas-oil ratio effective on the first of the month following the month in which the tests were taken. Now, it may be that because of the time element that wouldn't be possible in the gas-oil ratios after the end of the test period and get it put on the schedule as effective gas-oil ratio, that was the intent of that change. We have no particular feeling, one way or the other, and if you would rather make it, or make it effective the whole month afterwards, we have no quarrel with that.

Special Rule 29: No acreage shall be simultaneously dedicated to an oil well and to a gas well in the Angels Peak-Gallup Gas Pool.

Special Rule 30: In order to prevent waste, the gas-oil ratio limitation for the Angels Peak-Gallup Gas Pool shall be 4,000 cubic feet of gas per barrel of oil produced. That concludes the proposed Rules here. As mentioned previously, Pan American and Weaver and Brown had concurred in these Rules, and there was con-

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siderable discussion this morning as to the reason for market demand proration in these Pools, and before the question comes up I will go ahead and answer it. Under the terms of the existing order, if a well fails to produce as much as the gas limit in any given month because of market demand fluctuations, or what have you, there is no method by which that well can make up any of that underproduction, and as a consequence probably a portion of the estimated migration of the gas cap into the oil zone has been caused because during certain periods of time some of those gas wells have not produced a full gas limit in the given month. And, due to market demand fluctuation from month to month, it was felt that market demand proration should be instituted in these Pools, which provides that a well may accrue underproduction and make it up in subsequent months, or subsequent proration periods; and that was the main reason for proposing the market demand proration so these wells which in given months can't produce their gas limit because of the market demand can come up to the subsequent date and come fairly close to the administrative allowable. The reservoir withdrawal proposition for this Pool could be kept in reasonable balance and the line between the oil area and the gas area would remain static, or as near static as possible, whereas it has been demonstrated this morning, I think very definitely, that line has not remained static and it is progressing down dip into the oil zone.

Q Will you point out in what respects these proposed Special Rules differ from the Special Rules in effect at the present time

with respect to this Pool?

A Yes, sir. At the present time the Pool rules provide for 80 acre spacing to both oil wells and gas wells. Mr. Lemon testified here, today, and it is the opinion of the Engineers, and I have made a little study of it, and it is also my opinion from the data that have been furnished to me, that one well in the gas area in particular, can very adequately drain considerably in excess of 320 acres, and there is evidence to substantiate the contention that one well will drain in excess of 80 in the oil zone. I think there is actually evidence that a well in the oil zone will even drain in the neighborhood of 320 acres, and for that reason we are proposing that gas wells be permitted to be dedicated up to 320 acres. A question also arose this morning as to the drilling of unnecessary wells, if we maintain the 80 acre spacing and, it will be recalled in the previous Hearing in this case that I testified in, that the U. S. G. S. put us on notice that if there were 80 acre spacing in this Pool we will be required to drill at least three offsets under the Pool rules, as it was constituted when this Order was written, this Order 1410-A was written, and was made a Term Order for one year's duration. The U. S. G. S. agreed to waive the provision to avoid drilling extra and completely unnecessary gas wells. Now, we had not contacted U. S. G. S. as to what their position will be if this Pool comes on 80 acres after this Hearing today. But the unit agreement does provide that the unit should be protected from drainage around the borders of the unit, and this Section 34 of 27 N., 10 W.,

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is not within the unit, so it still protects the wells on the unit from drainage without the additional wells, which I think is completely and totally unnecessary, and very expensive, I might add. The next difference between what we are proposing here and what we have at the present time, is market demand proration. I think I have adequately explained that. Let me see, I believe, actually that is basically about all it amounts to, the difference of what we have and what we are asking for. The 320 spacing, with the privilege of dedicating up to 320.

Q We will commence right here with the gas limit, because of the gas agreement, respectively. Isn't it true these Rules you have proposed as to market demand are applicable to gas wells only?

A That is correct.

Q Not applicable to oil wells?

A That is correct. And up to the limit as was expressed by Mr. Eaton, up to the limit of four times the gas limit of 80 acres to a 320 acre gas well. That should be pointed out, of course, that it is intended to be on the current allowable basis, and if these wells have accrued underproduction, the production of this would be net allowable, which would be in excess of the permitted gas limit, but that is because of the previous underproduction, there is no advantage gained to the gas wells by allowing them to make up that difference, no distinct advantage or disadvantage to the gas wells, they're not permitted that privilege.

Q Do you feel that these Rules that you have proposed, or

differences you have incorporated, more nearly achieve volumetric withdrewal from the Pool of both oil and gas?

A Unquestionably.

Q Do you have anything you would like to add to your testimony?

A No, sir, I think not. If I have left anything out, I am sure it will be brought out.

Q You helped prepare these Rules, Mr. Rainey, with Pan American Petroleum Corporation and Weaver and Brown. We ask that El Paso's Exhibit Number 3 be admitted into evidence.

MR. PORTER: Without objection, it will be admitted.

MR. WHITWORTH: That is all I have of this witness.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Rainey, as I understand your testimony, the allowable for oil wells wouldn't change?

A No, sir, that is correct.

Q And, so all oil wells will be allowed to produce 4,000 times the top unit allowable for gas?

A Yes, sir.

Q Now, isn't it possible under your system of market demand proration for the gas wells that the oil wells would be actually ending up with a greater gas allowable than the gas wells, plus whatever oil they make?

A Any given month that is possible. That is why I put these

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balancing prorations in there, so the gas well can catch up in periods of high demand.

Q Isn't it underproduction that has to be made up and has to be cancelled?

A On gas wells?

Q Yes, sir.

A It sometimes happens, yes, sir, but within the limits and ability to produce, El Paso, who is the purchaser in this Pool, as well as the operator, makes every effort to take the allowable, within the realm of human error and, say, the ability of the well to produce, where it's possible.

Q Yet it never would be cancelled for the oil well?

A That is correct. However, there are some oil wells in the Pools also that are incapable of producing top gas limit, so I think the two factors compensate themselves.

Q Now, Mr. Rainey, do you have any evidence that you intend to present, or personal opinions, as to why, if this Pool is prorated as a gas pool, that deliverability should be a factor in the formula?

A I don't have any specific evidence, Mr. Payne, I have got some opinions in that regard, which I will be glad to express. It has been amply testified to on numerous occasions before this Commission, both in respect to Northwestern and Southeast New Mexico, that there is a reasonable relationship between deliverability and recoverable gas. From that standpoint, it appears appropriate to

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us in one respect, from another respect it must be remembered that as long as deliverability tests are taken in the same manner on each well, then it is not a true indication of the well's ability to deliver to the pipeline and it is still a relative indicatio[n] of that ability, and in the formula that is incorporated in all the pools in which we had deliverability, it's merely a means of allocating the total market demand to the individual wells. I don't know whether 75% deliverability is nearly correct, or 50% deliverability that is incorporated in here. It's a standard in the Northwestern part of the State. It is admittedly, and also has been testified to, that deliverability as required by Order R-333-C and D is not always a true indication of the well's ability to produce into the pipeline. Nevertheless, it's still a relative figure between one well and another, so that you get the allowable in reasonable fashion with respect to the recoverable reserves.

Q Well, inasmuch as you are really attempting to protect correlative rights by keeping the gas-oil ratio relatively constant, is it really necessary to have a deliverability factor in the formula unless a definite or reasonable relationship between deliverability and recoverable gas is established in this reservoir? I believe one of the witnesses testified this morning that the pressures are fairly uniform throughout the Pool.

A It is my recollection, that is, he may have made that statement. It was my recollection he read the pressures and it was some two or three hundred pounds on one well and the other one, I

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don't have the figures here. I am not sure, that was my recollection, just listening to him, which would not make a considerable difference in reserves.

Q Do you feel there is a more reasonable correlation between pressures and recoverable gas than there is between deliverabilities and recoverable gas?

A Not necessarily, pressures are a factor that enters into the deliverability and calculation of reserves. It's only one factor, however.

Q Is it somewhat easier to measure pressure than deliverability?

A I don't know if it's particularly easier to measure deliverability. It's been outlined in some three to four Orders and I don't want to quarrel with it, except on one or two specific questions.

Q Mr. Rainey, what allowable is the well going to get with 29,000 to 1 ratio?

A It will permit it to produce the top allowable times the limiting gas-oil ratio of 4,000 to 1 times the 2.77 depth and acreage factor. I haven't actually figured out what the specific allowable is, I would be glad to do it if you want me to. It would be in the neighborhood of 700 MCF a day.

Q If I follow you, then each oil well has the same allowable?

A That is correct. Same gas allowable, plus whatever oil it produces, and in volumetric equation, the amount of oil produced con-

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verted to the equivalent volume of gas, it is relatively insignificant. It's a factor over a period of time and it's relatively insignificant on a day to day allowable. In essence you can talk about the allowable to oil wells being the gas allowable and also the allowables to gas wells being the gas allowable for purposes of reservoir voidage.

Q You don't think, in your opinion, that deliverability or MER factors enter insofar as wells are concerned?

A No, sir, in that respect, if the well is not producing the gas limit, deliverability, of necessity, has automatically entered into the thing.

Q Mr. Rainey, will the operators of these wells make any efforts at all toward unitization?

A I can't answer that, Mr. Payne, that would be within the prerogative of our Land Department. I am not aware of what steps El Paso have taken, and I have no knowledge of what these operators do.

Q Is this one good way of handling gas-cap reservoirs or associated oil and gas pools?

A It's one way to handle it, Mr. Payne, it's unwieldy when a pool becomes too Northwest and Southeast, as it appears to begin to involve twenty-five or thirty operators, and you've got, also, this existing Huerfano unit Federal I, which Federal unit I doubt seriously if it would provide for communitization outside the unit.

Q Now, these wells, as you have indicated it, what do you

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contemplate the wells will be, gas or oil?

A It's extended two miles Northwest down this frontier to Evensen No. 2, and it's a gas well, and it's my recollection from looking at some of the maps that there is a possibility there is some more oil further than that one. It would depend whether they fall within the relationship of this apparent gas-oil contact.

Q Do you have any opinion as to whether this pool actually might extend to such a point that it joins the Devil's Fork?

A I have made no study in that regard. I seriously doubt it.

Q Are the reservoir conditions similar?

A Somewhat similar, yes, sir.

Q You intend to get in the so-called volumetric equivalent over the process of time?

A Yes, sir, by allowing the wells to accrue under-production and make up subsequent months.

MR. PAYNE: That is all, thank you.

MR. PORTER: Any other questions of the witness?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Rainey, have you had the occasion to look over Pan American's Exhibit Number 1?

A Not other than when it was put on the board, I haven't looked at it in detail.

Q You are probably familiar, however, with the potential of

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these Gallup wells that are making casinghead gas, are you not?

A Only vaguely. Some of them, on initial potential, have relatively high oil potential and, at the present time, I don't think that there are one or two wells in the oil zone that are making as much as 50 barrels a day.

Q Referring to the potential of casinghead gas?

A The volumes of gas. All the information I have as far as potential of casinghead gas would be volumes that are reported on gas-oil ratio. I don't have any volume that would be comparable to deliverability volume.

Q I am wondering if the deliverability factors were introduced into the formula for the distribution of gas in this area and what effect it would have on the amount of gas production that each well would be entitled to produce. Referring to Pan American Exhibit 1, it appears that some of the higher potentials of gas are close to the gas-cap, not to the gas-cap, the gas-oil contact, and I am wondering what effect this would have?

A Mr. Nutter, our Rules also restrict those wells to the top gas allowable of 4 times the 80 acre oil well allowable on the 320 acre unit. The wells you are referring to, which are in this Section 34, are only on the 160 acre units and only permit the gas limit up to twice what the well is permitted to produce.

Q Mr. Eaton stated there were twelve high-ratio wells and seven lower ratio wells. What would you do, would you take 4,000 times the lower allowable times 4 for the acreage factor and deter-

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mine that as the amount of gas that would be produced from the twelve wells, and then divvy that up on the basis of their deliverability?

A If I understand your question correctly, I think that is correct, yes, sir.

Q But the amount of gas that any particular well would be entitled to produce would be subject to this top ceiling?

A That is correct, and subject to the ability of the well to produce. It is contemplated these wells are marginal wells. In this well, the wells under production go through two proration periods and then you will be able to calculate the gas limit or the volume which would be assigned to the marginal formula.

Q Do you anticipate your Rules would work to protect correlative rights?

A Yes, sir, a whole lot more than the existing rules.

Q Supposing a well should be permitted to produce a large amount of gas by virtue of high deliverability of gas, and an offset oil well that doesn't produce a large amount of gas, how are correlative rights protected in that instance? We don't have deliverability in the oil well formula, do we?

A I think the condition itself is purely theoretical. I don't know of any gas--any oil wells that are very close to this so-called gas-oil contact that do not produce approximately the same volume of gas as any gas well at gas-oil contact. It doesn't seem reasonable to me, at this time, that there would be, because this

gas cap is migrating somewhat in the oil zone, and those wells that are close to that contact are getting more gas all the time.

Q You say theoretically the problem could exist. Suppose it did exist, the gas well of high deliverability is entitled to produce a large amount and the oil well of low deliverability in the formula is restricted, it may be theoretical, but what would happen in that?

A That gas well is still restricted to the top gas limit times the number of units, assuming 80 acres times the number of units assigned to that well.

Q I appreciate that fact. That gas well would have 320 dedicated to it and maybe a direct offset to the oil well, which is only 80 acres, a top ceiling of four times what the oil well is?

A It is entitled to four times the 80 acres dedicated to it.

Q Under the correlative rights proposition it would appear to me that it is entitled to four times as much, in the matter of correlative rights. Why do you need deliverability in the formula, then?

A Purely as a means of allocating the allowable back to the individual wells and because, as I say, we tried to fit these rules into the framework of the existing rules up there.

Q I see. Mr. Rainey, if the gas well doesn't make its allowable production given to it, can it make it up later?

A Yes, sir.

Q So the gas well, theoretically, would never fall short?

A Yes, sir.

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Q What if an oil well has occasional periods that it can't make its allowable, could you get a period of balancing its production also?

A There is a provision in the statutes of New Mexico for making up back allowable.

Q Under one circumstance, I believe.

A That is correct.

Q Purchaser prorationing?

A Purchaser failing to take from the well. Of course, there are going to be occasions when both gas wells and oil wells are shut-in for one reason or another, there is no question about that. These oil wells are permitted to produce a certain volume per day based on, in this case, their ability to produce and if the wells fail to make it in the given day, and are capable of making a little more oil some other time, they can make it up subject to 125% of their daily allowable, but if they are falling behind so far, then there needs to be a balancing provision put in there. It's possible that the oil wells might lose a little allowable. It should be remembered that the oil well is always going to produce the top gas limit, whereas gas wells are subject to market demand fluctuation, and many months, the summer months in particular, many of the allowables are considerably less than that. That is the reason we put in this, in that reason, to make it up in the winter months when the demand is higher. All the operators in this Pool, Pan American, I say all the three that are concerned, particularly Pan American, El Paso and

Weaver and Brown own both gas wells and oil wells.

Q El Paso is the gas purchaser in the area, isn't it?

A Yes, sir.

Q Is El Paso in a position to guarantee what the amount of the gas take will be from these gas wells, even though in the summer months it will not be high enough, and in the winter months when gas takes--when the gas and oil wells are equal?

A I can't say, taken from any of these wells. We can take that, subject to the market demand fluctuation, and we will make every effort to take all the gas we are permitted to take off of that well. And, the operators, of which El Paso is one, recognize the fact there is a possibility that there should be, and the gas operators just might recognize the fact there is a possibility that during some periods, as much as six months, there may be some inequity in withdrawals between the gas and oil area. It has been contemplated, and we assure you that El Paso will make every effort to do so, so that the thing will balance out over a period of time.

Q El Paso, in this market demand, would make sure that the gas wells are taken first, is that correct?

A Casinghead gas, that has always been our policy, casinghead gas is taken first. I might point out that I haven't discussed this in detail with Pan American, Weaver and Brown, but El Paso would have no objection, if the Commission sees fit to make this Order that we are proposing here today another Temporary Order for a year, if you want to try that again, we can come back and take an-

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other look at it.

Q What is the significance?

A An operator, to name factors, one oil well in effect today will probably require the drilling of some very costly, unnecessary wells because it's on an 80 acre spacing; and the second factor under the Order to an operator is there is unquestionably some migration of the gas cap or expansion of the gas cap into the oil area.

Q Isn't this an ideal way to produce the oil from the gas cap--

A It's increasing the cost to the owners of gas wells, this is my opinion.

Q So far as the prevention of waste is concerned?

A That is true and if you think that the ideal situation could be realized by unitizing the whole area, then that would be the way to do it. Under the existing conditions, although there may be less waste in the oil zone, correlative rights are being violated, and I don't feel that if some measure were taken to stabilize that so-called gas-oil contact, that there would be any violation of correlative rights, or any waste.

Q Mr. Rainey, this bothers me a little, you are counting on time in balancing to equalize this?

A Yes, sir.

Q When your gas withdrawals are very high in the wintertime, we will assume the oil allowables go down, so the gas takes are under limit high in that relation to the oil well production?

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A Yes, sir.

Q Then, you have some oil migrating into the dry gas sands?

A No, sir.

Q Why not?

A You're only producing in the winter. It has periodically changed producing, those oil wells were producing the previous summer, that is only balancing the thing out. The oil wells have already produced it.

Q You don't think there is any migration?

A I think there is a very, very remote possibility of any migration of oil into the gas zone, but if there is that eventuality, that is why I made the statement that we have no objection to putting the proposed Rules in effect for a year, like we have had for the past year, and then come back and take another look at it.

Q Do you think the withdrawals, so to speak, for a period of time would reach higher from the gas area than from the oil area?

A Why, certainly. Because there is some oil, to my thought, which couldn't come, and if it will migrate, you are going to the dry gas sands, there is no question about it, and it was testified to here, that what we are calling the dry gas is higher, and that has a certain amount of gas space in it anyway.

Q Mr. Rainey, do you regard this situation as somewhat similar to the small gas pool where you have a larger area that is productive of gas surrounding the oil producing area?

A I think it has been just kind of overlooked in the Jalmat

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area and I don't think we will let it go by down there for another thirty years.

Q What is the Jalmat situation if the gas and oil allowables are together?

A I don't know, Mr. Nutter, what the relationship is between the oil allowables and gas, there are many factors that enter into that.

Q It might not be unreasonable to, if you did it here, is that correct?

A It's conceivable we will take a very long, detailed reservoir study as to what effect it would have on the area.

Q Have you made a long, detailed study to determine this?

A I have not. There have been some studies made on this area. The thing that is apparent to me, it is just the flat fact that the gas and the oil wells have doubled in a three month period of time, which is very indicative of the fact that the gas cap is expanding into the oil zone. The royalty interests, the unit interests, and that sort of thing are not common in some instances in the gas zone and in the oil zone. The correlative rights of the gas operators, particularly with respect to the Huerfano unit, are being violated by allowing the migration of the gas cap into the oil zone; that has been apparent under the rules we have got. I think it's time to change and try something else. The rules we have got are not working, the idea of these rules, now, was to keep that gas-oil contact from moving, and it's obvious that hasn't

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worked, and I think this new set of rules will work.

Q They will stop this migration into the oil area?

A Yes, sir, it will, a whole lot nearer than what we have got now.

Q Exactly what is going to happen?

A It's hard to tell, we feel these proposed rules will come a whole lot nearer to doing it and giving you approximately equal reservoir withdrawals than the existing rules do.

Q Well, Mr. Rainey, you submitted some proposed rules about a year ago.

A Yes, sir.

Q These rules you offered today are similar to a year ago?

A Yes, sir.

Q With certain exceptions?

A Yes, sir.

Q What is the suggested gas-oil ratio limit for the Pool, what is the change?

A It has partly been testified to here, today, but at the present time it is a bit ridiculous to impose a 2,000 to 1 limit on the Pool, not assuming El Paso has 2,000 to 1. Therefore, I think three or four of the wells have ratios less than, or very close to, 2,000 to 1, and that was our only basis for doing that. The 2,000 to 1 limiting gas-oil ratio, without a lot of detailed calculations and an awful lot of difficulties to determine what would be most effective, that is about as arbitrary as 30,000 to 1. It is a good

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breaking point between the gas wells and oil wells, and there is a reasonable basis for it, as Mr. Eaton has testified to, and we concur completely 30,000 to 1 is the point where the value of the gas produced from the well begins to exceed the round figure. If you figure down to the penny, it might be 28,000 to 1, something like that, and it's a reasonable approach, you've got to have some figure in there. The same figured in the 2,000 to 1 a year ago, and it appeared that there was going to be sufficient oil production and gas production to offset, sufficient gas produced with the oil wells to offset the thing. It appears, because of the migration of the gas into the oil zone, that maybe 2,000 to 1 would have been more appropriate. The ratio of 29,995 to 1 was classified as a gas well, and it's a little short. It has come in because of that dedicated 320 acre unit of it.

Q Would that figure hold on the 80?

A It's 29,995, and will go 'way over thirty if we can get that extra acreage. I would like for the record to show that at the time of the Hearing a year ago there wasn't a well in this area at 2,000 to 1 or less. It was my impression that we should go and get into a Hearing, and it is my impression that one of these Pan American-McAdams Wells and the Froze Well, and I think Weaver and Brown Well, did have a 2100 to 1 ratio at that time. It was a relatively low ratio anyway.

MR. PORTER: Who offered the Exhibit?

MR. NUTTER: This is a Pan American Exhibit, I believe,

yes, sir.

MR. PORTER: In a case a year ago this month?

MR. NUTTER: I think it was actually a year ago, June.

MR. PORTER: Would you identify the Exhibit Number?

MR. NUTTER: This is Pan American Exhibit 1. I don't know the date of it. The fact is, the Froze Well at that time was in the final stages of completion and the lowest range that is indicated would be the well in the N. W. 1/4 of Section 35, 2500 to 71, 42 and 10, and 10173 as indicated by this Exhibit.

A When I made that statement I had the impression in the back of my mind from that Hearing a year ago that that well in there had a 1500 to 1 ratio, I may be in error.

Q (BY MR. NUTTER) You stated there had been considerable testimony presented to the Commission on numerous occasions that there was a correlation between deliverability and the amount of recoverable gas?

A Yes, sir.

Q There has been testimony to the other side of that question also, has there not?

A The Commission saw fit to agree with the testimony, in relationship, however.

MR. NUTTER: I believe that is all, thank you.

MR. PORTER: Any other questions?

Q (BY MR. UTZ) Mr. Rainey, do you have any knowledge of the reserves in this section of this Pool?

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A No, sir, I sure don't. I have no indication in that regard at all.

Q You don't?

A I won't even hazard a guess. I think if I recall correctly, here again I am just pulling it out of the back of my mind from something testified to, that the reserves were about four times as much in the gas area as in the oil area. The areas themselves were in about that relationship, and I think somebody testified in one of the previous hearings to approximately that same relationship. The reserves, that is purely an offhand recollection and I wouldn't want to swear to that.

Q Do you have any deliverability from gas wells?

A No, sir, at the present time there are no gas wells in this Pool, under the definition of the Rules we are operating under right now, although we have a lot of gas appear here.

Q Would you agree with Mr. Lemon's testimony this morning as to the deliverability of the wells into a 400 pipeline magnitude of 190 to 3.4 million cubic feet?

A I have seen no figures and, as I say, all I have seen is the volume of gas that was produced, gas-oil ratio tests in the months of January and April of this year, and I don't have copies of those tests with me, so I have no knowledge whatever of it.

Q In other words, Mr. Rainey, you have no knowledge or El Paso has no testimony as to the range of reserves in the gas area, as to the deliverability of the gas area?

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A No, sir, and I didn't feel that it was absolutely necessary to establish it in this particular pool. There was a relationship between recoverable gas and deliverability. If the Commission desires, we can certainly make those calculations, I don't have them with me.

Q Well, I think I would like them.

MR. PORTER: What pool calculations is it you want, Mr. Utz?

MR. UTZ: It would be the individual tract's reserves throughout the gas-cap area, as well as the deliverability of each of those tracts.

A If I may make one remark in this regard, it would appear to me it's obvious that the imposition of a deliverability formula would be much more advantageous than using straight acreage to allocate this allowable back to these individual wells and tracts. As I say, we are trying to fit these rules into the framework of the existing rules, and the whole San Juan Basin area has, since the institution of proration, been prorated and had the deliverability type formula, and we did not bring any evidence to substantiate this in this particular pool. However, it appears that it is obvious it is going to be more accurate than the same straight acreage. For that reason, if for no other, I think it would be a valid formula to try in here.

Q Wouldn't that depend on the range of reserves? In other words, in the reserves you can take, the deliverability formula wouldn't fit in?

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A From a technical standpoint you are right, yes, sir.

MR. UTZ: That is all I have.

MR. PORTER: Anyone else?

Q (BY MR. ERREBO) The so-called gas areas are greater than it is in the flank areas?

A Mr. Errebo, I have not said that.

Q What sand quality is better, I am sure there are differences throughout this Pool?

A We don't have any on the area in the Gallup, and I have looked at some of the others in a little more detail and I got perfect uniform thickness throughout the Pool area.

Q If the thickness did happen to be thicker, assuming that it was thicker in the gas area, then, actually, you would be prorating on the basis of reserves more nearly by using the deliverability formula than the straight?

A The thickness factor calculation of reserves and pressures, Mr. Nutter or Mr. Payne mentioned it, I mentioned a moment ago many factors came within reserves and that it was the basis on which a lot of the testimony previously heard has been given because the same factors are used in both types of calculations, and those factors do not vary. In the deliverability formula and in the reserve calculation formula, there has got to be a reasonable relationship between the two things.

Q You are aware, of course, that the Weaver Wells are drilled at a lesser density than 320 acres?

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A Yes, sir.

Q How do you contemplate that they would be taken care of under the Rules, insofar as whether or not they would have two special exceptions, or administrative exceptions, or be recognized by the Order as being unorthodox?

A The wells already drilled under the existing Orders say that they shall be considered to be located in conformance with this Order.

Q What Section is that in?

A It is in Special Rule Number 2, the second sentence "any well drilled". It gives the location provisions and then the facts that Special Rule 9 (e), Paragraph 2 provides that gas wells in the Angels Peak-Gallup Gas Pool shall be permitted to produce, subject to market demand fluctuations, up to four times the permitted 80 acre gas limit as determined above, based on a ratio--the numerator of which is the number of acres dedicated to the particular gas well, and the denominator of which is 80.

MR. NUTTER: So, in effect, Mr. Rainey, those gas wells on 160 acre tracts would have an acreage factor of 100 of what the remainder in the Pool would be?

A Yes.

MR. ERREBO: That is all.

MR. PORTER: Mr. Kendrick.

Q (BY MR. KENDRICK) Your Special Rules provide for purchaser nominations for gas, for wells in the gas-cap area?

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A Yes, sir.

Q What effect will it have if your purchasers from the oil area or from the gas-cap area, purchasers of gas, nominate sufficient gas that their gas allowable will be equivalent to the gas allowable of an oil well?

A None whatsoever, other than the fact El Paso makes every effort to abide by the rules and regulations and not violate any correlative rights, and, also, it may be borne in mind, that everybody in the gas area is also in the oil area.

Q At the present time?

A Yes, sir.

Q By what means would El Paso, primarily purchasers, participate in the oil allowable which is to be established at the hearing which will be later than the El Paso nominations for the gas?

A El Paso makes a statement every month on the basis of volume of casinghead gas and they anticipate they will get that in before they start making their gas nominations in the first place, and in the second place, as far as this particular Pool is concerned, if he makes a barrel or two, it doesn't make any difference, we have got a balancing provision for the gas well.

Q You have also a limit, the same limit as the maximum for the allowable, as the top gas allowable for an oil well?

A Yes, sir.

Q So, that if you under-nominate any particular month, or any particular series of months, the allowable cannot be high enough

during those particular months, or ever, to make up any under-nomination, that, as a purchasing company, you may subsequently inure?

A I don't think I follow you.

Q If you anticipate an allowable to be 60 barrels, you nominate for an equivalent amount of the gas-cap and the late oil nominations cause the oil allowable to go up to 70 barrels, which would raise the gas allowable for the wells in the oil zone, but there is no way to raise the gas allowable in the gas zone.

A That is correct.

Q And, during succeeding months your top limit would prevent you from over-nominating to make restitution for under-nominating during that one particular month?

A Yes, sir, through the balancing provisions, these wells can't over-produce their allowable. There is going to be a certain figure, and these wells can't over-produce, and can also accrue underproduction. The particular problem that you are talking about hadn't even occurred to me, and it's inherent in all gas prorationings you are going to miss it a little bit, sometimes quite frequently. The compensation factor will provide and we will make every effort to stay as close to the known factors with the change in your marketing area. Between the time we make the nomination at the beginning of one month and start to produce the allowables, there may be distribution, and what we have actually estimated we are going to produce.

MR. PORTER: Mr. Kendrick, the point you are trying to es-

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tablish is, that regardless of how much they might be underproduced the purchaser cannot nominate above the limit established by whatever Order we issue.

MR. KENDRICK: The nomination, the top limit, would hold you back to the same top limit for an oil well for that particular month. Should they subsequently under-nominate, the people in the gas-cap would have their correlative rights impaired because they could not get the same gas limit for that month as in the oil period.

MR. HOWELL: Mr. Kendrick, I think you misunderstood Mr. Rainey's testimony. Mr. Rainey very definitely testified earlier in the hearing that the accumulation of underproduction would permit the nomination in any given month when there was underproduction to make it up, and the production during that month of amounts of gas in excess of that limit; that the limit is primarily over a period of time. I think you must have overlooked that point from Mr. Rainey's testimony.

MR. KENDRICK: The limit is on a six-months basis and not on a monthly basis.

A It's contemplated that limit is over a period of time, that is true. It's also contemplated that the current allowable will not be in excess of that limit in any one month. Here is the factor there, there is a considerable misgiving on the part of the Commission that there may be migration back from the oil zone into the gas zone, this is sort of backhanded and an additional safeguard in that respect, in that the oil wells are always going to be permitted to

produce enough to balance and there is not going to be back-migration. I will grant you there is a possibility in a period, long extended period of very low demand, maybe there will not be an exact balance. However, under the existing Order there is no possibility of balance.

MR. KENDRICK: Your top limit is on a six-month basis.

A It's in individual months, it's going to have an average, it's the market demand fluctuation over your underproduction on those wells.

Q How can it be if in an average month, you are under-nominated, and the next month you are controlled by top limit?

A Well, let me put it this way, the nominations can control the thing as far as controlling that limit or receiving the production above that limit. However, I feel pretty confident that the production in the Pool is going to be such that it is going to be an approximately equal situation because of the gas limit. Now, it is contemplated under the specific terms of the Rule, that no well shall be assigned an allowable in excess of four times the 80 acre gas limit, that is true, that is on the current basis. And, I don't think that there is going to be enough missing of the estimated gas limit, or estimated oil allowable, that there is going to be any significant affect in that regard.

MR. KENDRICK: With the chance that that could occur, would it not be more inclined to protect the correlative rights to let the gas allowable be determined by the oil allowable in such a way that the people in the gas-cap area will be assured of getting

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the same gas allowable as one in another area?

A Other than the fact that El Paso's market fluctuates very widely, as you know, that might work out; that is because of the market fluctuation, and I don't see that you can exactly handle it. In other words, assign a top gas limit every month to every gas well and there is going to be some accrued underproduction, they're not going to be able to be made up, because in the summer months you've got a low market demand and you can't produce it, and in the winter months it's conceivable there will be periods when it's not going to be, when we are not going to be able to produce, and, as I say, El Paso is going to make every effort, as far as we are permitted to do, on market demand fluctuations and allowable in this Pool to try to maintain and keep the situation in balance. And that is the only assurance, I can't go any further than that.

Q You agree that El Paso, either the Gas Company or Oil Company, controls the oil purchase to develop the allowable?

A That is correct.

Q It is quite possible that the gas nominations can be underestimated, not intentionally, but accidentally, by not being fully informed of the late market conditions for oil?

A That is correct, and as a further safeguard, in respect to the fact there may be gas production from the gas-cap, and with respect to gas production from the oil rim as has been testified to here today; and as I recall, there are also some oil wells in the capable top gas limit. All these things, because of these specific

conditions in this Pool, or these factors and tests, balance themselves out, and I feel pretty confident we are going to have a reasonably equitable reservoir withdrawal here, a whole lot more reasonable than we've got here now.

Q (BY MR. PAYNE) Could you achieve the same purpose--actually every operator in the Commission has the same desire in mind and that is to keep the gas-oil contact relative--your proposed Rules hope to achieve, by 80 acre spacing for oil, 320 spacing for gas, and then by utilizing the gas-oil ratio make it 2, 3, or 4,000, whatever it worked out to, with an additional provision that the underproduction could be made up at a future date?

A That is, in effect, what we've got here, only here, nomination to determine the gas allowable.

Q Looking at it from the administrative standpoint, and I am wondering--since it appears to me much easier, what I just proposed--if your Rule is a distinct advantage to us over the other.

A I don't think a distinct advantage, I don't see any more administrative burden on the Commission, you've got your staff, all your machines are primarily new, you fit it in and print it out and that is exactly the same procedure that you used in the San Juan Basin.

Q Under my procedure, there would be no necessity for taking deliverability tests.

A You still have got to keep the records, the over and underproduction.

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Q That is correct.

A You are not going to be able to determine--without some allocation formula, how are you going to determine how long those wells have to make that gas up, and how it's going to be re-allocated in case of cancellation, and things like that.

Q When production records hit their high there is no deliverability test taken on them now.

A As I say, you propose at the time there is a cancellation of underproduction, how you propose to allocate it back, and that is one of the main reasons why you need an allocation formula, as I see it.

MR. PAYNE: Thank you.

MR. PORTER: Anyone else?

Q (BY MR. UTZ) During the periods of high demand, it's quite easily conceivable to me you would have to calculate an allowable in excess of the limitation suggested here. The difference of an allowable on those wells, and the limit, what would you suggest be done with that volume of allowable?

A Under this proposed method, it's the lesser of the calculated allowable, or this gas limit, forget the rest of it.

Q In other words, lower your market demand?

A From this particular Pool, yes, sir. This, to our way of thinking, is about the only way you can achieve an approximate volumetric withdrawal if you allow, in periods of extreme high demand, you allow the gas wells to get very far ahead of the oil wells, you

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have no way to catch up.

Q In line with Mr. Kendrick's questioning, any variance in an allowable on a monthly basis can cause these wells in this category to lose and you apply your limiting ratio on a six-month basis rather than a monthly basis?

A We have no objection to that, a six-month limitation would be fine. These particular Rules were a joint effort between us and Pan American, and Weaver and Brown, and I have not discussed the matter with them, but I feel if you asked them the same question they would not object, El Paso has no objection to this procedure.

MR. UTZ: Mr. Buell, do you happen to have an answer to that question?

MR. BUELL: Just what was your proposal?

MR. PORTER: That you apply the gas-oil limitation on the six-month's basis, rather than on the monthly basis. He asked whether or not--if you would go along with that?

MR. BUELL: In other words, in computing your gas allowables, whether it be a six-month or monthly basis?

MR. UTZ: No, sir, that wasn't it. Apply the limitation on a six-month basis in order to allow a well that has an allowable calculated in excess of limitation. You have proposed, here, to produce that allowable and receive credit in the form of an allowable, and would you, after you produced six months, would you not lose an allowable when the allowable was less than the limitation?

A You don't provide the gas well can over-produce, the limi-

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tation of underproduction comes down the line.

MR. HOWELL: Which is the reverse of the reserves theory; in the summer, underproduce, and in the wintertime you can make it up.

MR. PORTER: I think there are about three different trends of thought here.

MR. HOWELL: Could we recess and get our heads together?

(Whereupon, an off the record discussion was had.)

MR. PORTER: We will come to order.

MR. RAINEY: Mr. Porter, after consultation with all parties concerned, I find that it was everybody's understanding, except me, anyway, this thing was to be applied over a six-month period. If you refer to Special Rule 9 (e) (2) on Page 4 of these proposed rules: The gas wells in the Angels Peak-Gallup Gas Pool shall be permitted to produce, subject to market demand fluctuation, up to 4 times the permitted 80 acre gas limit as determined above, and so forth. It was everybody's understanding that meant over a six-month proration period. If I could clarify that, we can amend that by adding after "80 acre gas limit" the phrase "over a six-month proration period", which would cover the thing. As I say, I was erroneous in my understanding, and that is the understanding we had when we first went through it. It was intended to be an average over six months, under-nominate the gas limit at a given month and over-nominate some to balance.

MR. PORTER: Would you like to make that official amend-

ment on your Exhibit?

MR. RAINEY: Yes, sir, I will add it in over here.

MR. UTZ: It's your proposal that it should be subject to the usual balancing rules?

MR. RAINEY: Yes, sir.

MR. PORTER: Anyone have anything further? Anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: Mr. Errebo.

MR. ERREBO: My name is Burns Errebo from Modrall, Seymour, Sperling, Roehl and Harris. We will have one witness. I would like to call Mr. Jay Harris.

JAY J. HARRIS

was called as a witness and, having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. ERREBO:

Q Will you state your name, please?

A Jay J. Harris.

Q You were sworn in this morning, I believe, is that correct?

A That is correct.

Q Will you state what is your business, and by whom you are employed and where you live?

A I am a consulting geologist, I live in Albuquerque, and I

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am employed by, in this case, with Weaver.

Q Did you give testimony in the previous hearing in this matter last year as an expert witness, as a geologist?

A Yes.

Q Now, with regard to your experience, which you expressed last year, concerning whether or not this Pool should be treated as a gas pool and produced as such, or as an oil pool, what was your recommendation at that time.

A Last year, if I recall correctly, we recommended that it be treated as a gas pool at that time.

Q Have you changed your opinion in that regard?

A Not in the least.

Q And, what is the opinion that you expressed to the Commission with regard to spacing for gas wells?

A I believe we requested 160 acre spacing at that time, which is normal spacing for all gas wells in the State, unless it was specified.

Q And, since that time, have you had an opportunity to give further study to the data from a pool which has been made available to you?

A Yes, at this time, if we had to do it over again, I would drill, they will, on wider spacing units.

Q Namely, what?

A Namely, 320 acres.

Q Will you please refer to your Exhibit A on the board and

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explain to the Commission what that shows?

A Part of this Exhibit is actually repetitive of what has preceded it before. I have indicated the so-called oil rim in irregular red color, and the gas in green. I also indicated in the dark ledger the July or the April, 1960, gas-oil ratio on each well as they were given to me; and in red, the gas-oil ratios that were available at the last hearing, which was July of '59. And it seems to show this irregular line, which is arbitrary. I brought it up as the gas-oil ratios have increased going toward the oil rim, and it shows your regular encroachment of the gas into this oil, through expansion probably.

Q Expansion of the gas cap?

A Probably that.

Q Now, do you have any basis for comparison with what you show there as to what you showed the Commission last year?

A Well, this is one of the copies of one of the Exhibits.

Q You are referring, now, to your Exhibit B, is that correct?

A B was made from the same film which was used in the hearing last year. We indicated, at that time, to the best of our abilities and beliefs, this was the oil area in red, which was fairly even at that time. I have determined it, we had no production history even though the gas areas were quite a lot larger then. So, it's merely prepared for different purposes; this is a half scale compared to this map here, (indicating) which makes this red area look larger. If you double this, it would be considerably smaller

at this time; the oil, rather, would be smaller.

Q Now, in order that the Commission may be able to determine, by looking at the Exhibit, what migration, could you state approximately on that map, show them where the southernmost part of the oil rim was at the time of the last hearing as depicted on your Exhibit B?

A At that time it was very close to Number 3 McAdams Well, which is located in the N. E. 1/4 of Section 34, and that line actually was, we believed, in which it probably was, these wells hadn't, it was an even line across as indicated here.

Q So, actually then, the previous line as it results on your Exhibit A is roughly measured by the thickness of that band shown on Exhibit A?

A Of the oil rim, that is probably right.

Q Will you state again, if you have not already made it clear, what is your basis for thinking that this gas cap has actually expanded or moved?

A The gas cap, the terrific increase in oil and gas ratios, even this well, Pan American, the Froze, I believe, I didn't, we didn't have a gas-oil ratio test at the time this Exhibit was made last year, so I don't have the previous figure. It is a pumping well, with a very low productive capacity; it's going to 18,899 to 1 at the present time, and the McAdams has gone to 10,000, and the El Paso to 285,372 to 1 gallons on the El Paso No. 105, and has almost doubled since the last hearing, gas-oil ratios of that hearing.

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Q Have you not heard the previous witnesses in this matter?

A Yes.

Q And, did you hear this testimony, perhaps some of the increase might be due to the coming out of solution, out of solution gas?

A That is normal with the solution drive.

Q Your testimony in that probably, however, represented only a part of the increase?

A That is right.

Q And, are you also in agreement with them, that probably the rest of the increase is due to the movement of gas into the oil area from the gas area?

A I think that is highly probable.

Q Considering the relation of the W. R. Weaver lease with regard to the contact line between the two areas, do you feel that during the past year Mr. Weaver has lost any of the gas to any of the offsetting leases?

A Apparently he has, due to this movement of gas down-dip.

Q Did you drill a well on the McAdams lease after their hearing last year?

A We drilled one well in the N. E. 1/4, Section 34, McAdams No. 5 which has a north offset to the McAdams No. 3.

Q And, did you complete that as a well producing either oil or gas?

A Completed as an oil well of limited, of doubtful commer-

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cial value, I will say that.

Q How long has that well been producing?

A It was completed in, I forget, December, or January of this past year.

Q What is its present daily production?

A Its capacity is about 12 barrels per day.

Q Do you have any plan for this well?

A Probably we are going to plug it; it's not economical to produce it.

Q You are stating here, today, that your intentions are to plug it in the near future?

A I feel sure we will before too long.

Q It's not commercial now?

A Yes.

Q Do you feel this is an anomaly, actually put, were you' surprised when you got the kind of well you did?

A Yes.

Q You didn't expect it?

A We expected a trend with the Huerfano No. 107 and it's reasonably close to the No. 3 McAdams, Weaver-McAdams, probably the two best oil wells in the area, and we expected that sand to carry at least that far. Apparently the permeability and porosity decreased too rapidly to the north.

Q So, actually, it might be your conclusion that has been stated before, geology is not an exact science, is that right?

A Yes.

Q Anomalies do occur?

A Yes.

Q That perhaps is the fluctuation in the Huerfano No. 103, which also might be anomalous insofar as the fluctuation of the gas-oil ratios are concerned?

A I think that is highly probable. That could be where we had expected a real good sand condition in the No. 5, and didn't get it. They probably had localized real good sand condition in the 103, which would account for higher saturation, which would account for your gas-oil ratio. I expect in two or three months this well will have a comparative ratio on the wells in the gas cap.

Q Now, the ratio on the 103, which you show was 98,987, that is the original ratio which you show in red, is that correct?

A On the 103?

Q Yes.

A Yes, I showed that, that was at the last hearing we had, that record of it in the present one is 108,888.

Q This is the same well, 123,000 as to gas-oil ratio as of the first of the year, is that correct?

A That is right. Since the last hearing it has gone up considerably.

Q Do you have anything further you care to bring out to the Commission with regard to this line of testimony?

A Nothing, except that we speak of producing the gas through

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these wells, some of them, to the north of that sand, shales out very rapidly. Any one of the three Pan American Wells here could be considered a commercial oil well, due to their capacity to produce right now.

Q How do you feel about the possibility of losing oil into the gas area in the event the Commission should say, issue rules which, for some reason, might result in the gas area having an unusually, disproportionately large withdrawal?

A Out of the oil area?

Q Yes. With regard to the loss of oil in the gas area.

A I don't think you would lose too much oil into the area, the gas sands are all right. One core we recovered which was there on the two McAdams' was from 14 to 19 percent saturation, not really going into dry gas sand. I didn't think it would migrate under the present rules that are proposed; it would, more or less, saturate.

Q You did examine the gas-oil ratio from the McAdams No. 2?

A That is right.

Q That is a well within the gas area?

A That is right.

Q What type of fluid did you find in that core?

A Residual oil saturation, 14 to 19 percent.

Q What core was it?

A Hard telling the core.

Q The gas has been, heretofore, been designated today as a dry gas cap.

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A I associated liquids with it.

Q Is that what led you to believe the oil would enter that area, that it would not be retrievable, a loss?

A It would be lost, it has its maximum saturation right now.

Q Have you had occasion to make a study of the expected return of money from the drilling of gas wells in this area?

A Yes, I have. I have done that for Mr. Weaver, and it's kind of a rough figure. I do have a comparison as to what I know. I have what the wells cost, a couple of them, to the nearest $1,000.00.

Q Why don't you refer to your figures, if you have them, as to the expected return on a well drilled on 80 acres, gas well, I assume, that is only an assumption that the gas area was drilled up to density of 80 acres?

A 80 acre computation. The No. 3 McAdams, which is about half gas and half oil, almost on the dividing line, I used eleven feet of gas sand and eleven feet of oil sand, approximately.

Q What was the drilling cost which you used on that?

A The drilling cost was the cost on the McAdams No. 1, which was a single Gallup completion. The cost on that well was $81,000.00. The tackle equipment on it was $47,000.00. The total cost was $128,000.00 to drill it.

Q And, did you determine what the value of the reserves would be under that 80 acre tract?

A Under the No. 3, now, I came out with using eleven feet of the gas, 22 feet of net pay, the thickest section of sand in the

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area.

Q So this is probably one of the most favorable economic figures that you could present?

A I used the standard engineering textbook formula, figuring on the volumetric basis.

Q What difference did you come up with between the value of the reserves and your drilling costs?

A I came out with the cash value I had on the oil, about 82 barrels per eleven feet, with a total cash value of $140,712.00 and eleven feet of net pay on the sand, $49,132.13 per thousand giving an income on the 80 of $189,844.00 less a $28,000.00 drill cost which is a gross income of $6,844.00 over the life of that well.

Q Do you know what the life of that well would be?

A Nobody knows at the present time, but I did not discount it, the money that was involved, nor did I take into consideration any operating cost. I'm afraid we wouldn't have any profit at all.

Q You didn't consider royalty?

A No royalty, that is total income.

Q What is your opinion, then, on the total income to drill a gas well on 80 acres, as is presently contemplated by these rules that are now in effect?

A It's not economic, according to our use.

Q Did you make a similar study that you might give the Commission, the ultimate figures you got, without breaking it down as to the drilling in the 160 acres?

A On the McAdams No. 1, which was drilled on the 160, and is a single completion, the total cost, as I said, was $128,000.00 and I figured the total income was $233,000.00, 272 on both gas and oil off of McAdams No. 1, which gives you a profit of $150,000.00 on a gas well on 160 acres, which is still not very economical when you take your operator costs and count your money.

Q That is one of the figures which led you to state, I assume, awhile ago, if you had it to do over you would definitely put that lease on the 320?

A By which you could expect a reasonable profit then.

Q Then, briefly, for the 320 acres, what did your study show there?

A On 320 acres of cores, your drilling cost would be the same, and your recovery would be $338,544.00, which would be considered a reasonable profit.

Q What do you consider a reasonable profit, what rule of thumb do you use?

A You almost have to have three or four to one to be reasonable at all, and that is not too good a profit.

Q Now, you heard the testimony of the El Paso witness, Mr. Lemon, this morning, did you not, concerning the evidence of drainage of 320 acre tracts?

A Yes.

Q Have you had the opportunity to study that information and other information of your own, since the last hearing?

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A Yes, I have, and I have seen theirs, I have had access to their information, which I agree with.

Q Is it your opinion one well will effectively and economically drain 320 acres in the gas area?

A I feel sure it will.

Q In regard to the results of your economic study, it is then your opinion that a well will drain on 320 acres, is only density? Will that well pay out so that you might get a reasonable return upon your money?

A That is right. You couldn't afford to drill them otherwise.

Q You have heard the rules discussed this morning, or this afternoon, by Mr. Rainey?

A Yes.

Q And, what is the position of W. R. Weaver with regard to them?

A We are in accordance, since we were in conference when those rules were decided on, that type of rules, they met with our approval then, and still do.

Q Concerning the study in the testimony which you have previously given, in the study you made and these rules which you assisted in the drafting of, is it your opinion these rules will arrest the migration of gas which you found to be present over the past year?

A I think it's the best answer we have had so far. Under

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the present conditions we feel reasonably sure that the gas is migrating down-dip, and our correlative rights are being damaged. I think under those rules it will come nearer to being perfect than any way we have seen so far.

Q Did you prepare those Exhibits?

A These Exhibits, yes.

MR. ERREBO: We would like, at this time, to offer them into evidence.

MR. PORTER: Without objection, Weaver and Brown Exhibits A and B will be admitted into evidence.

You testified you thought these operations under these proposed rules would arrest the movement of gas to the oil zone, do you think it might reverse it?

A I don't believe it will reverse. In case that it did become apparent, I think the Commission could call a hearing and readjust it. I think any volumetric formula is subject to readjustment.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Harris, I believe you testified you feel your Huerfano No. 12 is not a commercial venture, and you may have to plug it, is that right?

A Yes, sir.

Q Do you agree with the previous witnesses that these oil wells are turning into gas wells and in other manners they have become gas wells?

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A I think that is highly probable. The gas-oil ratio in this particular well has gone up considerably since it was drilled.

Q Why would you want to plug it?

A We dedicated the acreage to the No. 3, which is a more capable well of producing its allowable.

Q I see, you dedicated the acreage to another gas well?

A To a well in the same quarter-section.

Q These figures, your income figures, they did presume a single completion, is that right?

A That is the actual cost on the Weaver-McAdams No. 1 to the nearest $1,000.00.

Q There are some dual completions in this area, are there not?

A Our No. 1 is not.

Q When you drew up the economic figures relative to 80 acres, you were going by the reserves under the 80 acre tract, were you not?

A That is right.

Q And, do you think a well will drain 320?

A I believe it will.

Q Your wells on 160 spacing are actually draining that 160?

A They're draining that 160.

Q So, perhaps, your figures should be doubled, I mean on the 80 if the well was draining 120.

A We have on the No. 3 and on the 50 and 80 acre units.

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Q You mean you only have 80 acres dedicated to them?

A Yes, sir.

Q Oil or gas?

A An oil well, both of them in the north.

Q That is dedicated under the proposed case?

A That is right.

Q Your gas wells of 80 acres are dedicated to them, but actually you are draining 160. As a practical matter you can consider the reserves under the 160, couldn't you?

A I considered my reserves under the 160, you know, the gas wells under the first figure I gave was under the No. 3 McAdams which is an 80 dedicated to an oil and gas well. The other figures were on the No. 1 McAdams, which I figured a 160 acre tract.

Q Actually, the gas area is not entirely built up, is it?

A I don't believe the limit has been established on the gas area to the south and southwest at all.

Q So that each of these gas wells on the 320 acres, each one of these gas wells, no matter how much is dedicated to it, is draining considerably more than what is dedicated to it?

A It's draining more than the 160, ours are, yes.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Harris, there are approximately nineteen wells in this Pool, all told, is that correct?

A Nineteen, I believe, there are eighteen or nineteen.

Q You gave the cost of a completed single completion?

A That is right.

Q The Gallup Formation?

A Yes.

Q Are you aware of how much of the total on the eighteen or nineteen wells in this area are dual completion and go to the Dakota?

A We could count them, they're marked on the Exhibits to the dual completion.

Q Would you give us a quick run down on that, please?

A I count fourteen wells.

Q So on fourteen of the eighteen or nineteen, the $81,000.00 you were talking about to develop the Gallup would not be applicable, would it?

A That is the intangible drilling cost on that one Gallup well, the total was $128,000.00.

Q I see. It wouldn't cost $128,000.00, it didn't cost $128,000.00 to complete the Gallup, has it?

A I don't think you would miss it very far. I don't know, you have our figures. I have the figures on one of the dual completions, too, if you want them.

Q How have you apportioned your cost to the Dakota Formation in dual completions?

A I don't know how Mr. Weaver has divided it. I have the total cost on the McAdams No. 2, which is a dual completion.

Q What was the total cost?

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A $162,000.00.

Q As compared against $128,000.00?

A That is right.

MR. PORTER: Anyone else have a question.

REDIRECT EXAMINATION

BY MR. ERREBO:

Q Just one question. Do you think it will always be possible to make a Dakota completion in this area that we are dealing with here, today?

A I do.

Q You think it will always be possible to. In other words, can you always rely upon getting a dual completion every time you put a hole in the ground?

A No, I might state further that the deliverability and production history of our three Dakota wells, in fact, we have temporarily abandoned one of them already, and two of them are producing less than half a mile feet a day, which you couldn't afford to drill as a single completion.

Q These are present Dakota completions?

A In Section 34.

Q Actually you can't drill more than two Dakota wells on the Section anyhow, can you?

A No.

MR. NUTTER: That is all you want to drill in the Gallup, anyhow.

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A It sure is.

MR. PORTER: Any other questions? You may be excused.

(Witness excused.)

MR. PORTER: Anybody wish to make a statement?

MR. ERREBO: If it please the Examiner, the evidence presented here today shows that 98 percent of the voidage of the production from this Pool during the month of April was gas. Two percent of the voidage was oil, so there seems to be a question as to whether or not this is a gas pool. On the basis of those percentages it seems like it would be a gas pool. The undisputed evidence also presented shows that, in fact, three witnesses have testified to that fact, that there is migration under the rules which the Commission now has in effect, from the gas area to the oil area, and that migration will result in the violation of correlative rights if it has not already done so. There has also been conclusive evidence presented as to the drainage of the 320 acres by a gas well drilled in this area. W. R. Weaver recommends to the Commission the adoption of the El Paso proposed rules and that the pool be reclassified as a gas pool.

MR. BUELL: If it please the Commission, I believe Pan American is clear in the record, and I see no reason for a closing statement.

MR. HOWELL: I think we will let the record speak for itself, and I believe Mr. Rainey handled the closing argument very well in his testimony.

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MR. PORTER: The Commission will take the case under advisement.

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STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, LEWELLYN NELSON, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing was reported by me in Stenotype, and that the same was reduced to typewritten transcript under my supervision, and contains a true and correct record of said proceedings, to the best of my knowledge, skill and ability.

DATED this 20 day of August, 1960, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Lewellyn J. Nelson
NOTARY PUBLIC

My Commission Expires:

June 14, 1964

DEARNLEY-MEIER REPORTING SERVICE, Inc.
ALBUQUERQUE, NEW MEXICO
PHONE CH 3-6691

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. 1937
Order No. R-1670

APPLICATION OF THE OIL CONSERVATION
COMMISSION ON ITS OWN MOTION TO CON-
SIDER CONSOLIDATING THE SPECIAL RULES
GOVERNING THE SEVEN PRORATED GAS POOLS
IN NORTHWEST NEW MEXICO, AND TO CON-
SIDER CONSOLIDATING THE SPECIAL RULES
GOVERNING THE SIX PRORATED GAS POOLS
IN SOUTHEAST NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m., on April 13, 1960, at Hobbs, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 20th day of May, 1960, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

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

(2) That in the past the Commission has held numerous hearings and taken voluminous testimony from engineers, geologists, and other interested parties and entered many orders creating, delineating, spacing, prorating, and otherwise regulating the Pools now designated the Blinebry, Crosby-Devonian, Eumont, Jalmat, Justis, Tubb, Aztec-Pictured Cliffs, Ballard-Pictured Cliffs, Fulcher Kutz-Pictured Cliffs, South Blanco-Pictured Cliffs, Tapacito-Pictured Cliffs, West Kutz-Pictured Cliffs, and Blanco Mesaverde Gas Pools in the interests of conservation, prevention of waste, and protection of correlative rights.

(3) That it has been found by the Commission that one well will efficiently and economically drain the area of the proration units set out in the Special Pool Rules in each of the several gas pools listed above.

IT IS THEREFORE ORDERED:

(1) That the following orders be and the same are hereby superseded:

Aztec-Pictured Cliffs Gas Pool	Ballard-Pictured Cliffs Gas Pool	Fulcher Kutz-Pictured Cliffs Gas Pool
R-46	R-846	748
R-565	R-846-A	R-59
R-565-A	R-967	R-565
R-565-C		R-565-A
R-565-D		R-565-C
R-614		R-565-D
R-620		R-614
R-697		R-620
		R-697

South Blanco-Pictured Cliffs Gas Pool	Tapacito-Pictured Cliffs Gas Pool	West Kutz-Pictured Cliffs Gas Pool
R-565	R-1193	R-46
R-565-A	R-1193-A	R-566
R-565-B		R-566-A
R-565-C		R-566-B
R-565-D		R-566-C
R-614		R-566-D
R-620		R-566-E
R-967		R-967

Blanco Mesaverde Gas Pool	Blinebry Gas Pool	Crosby Devonian Gas Pool
R-799	R-264-A	R-639
R-110	R-356	R-639-A
R-128	R-372	R-639-B
R-128-A	R-372-A	
R-128-B	R-464	
R-128-C	R-610-C	
R-128-D&E	R-610-D	
R-967	R-967	

Eumont Gas Pool

R-264-A
R-356
R-370
R-370-A
R-370-B
R-371
R-371-A
R-967

Jalmat Gas Pool

R-264-A
R-356
R-368
R-368-A
R-368-B
R-967

Justis Gas Pool

R-264-A
R-356
R-375
R-375-A
R-586-A
R-586-C
R-586-E
R-586-F
R-967

Tubb Gas Pool

R-356
R-373
R-373-A
R-464
R-967

(8) That all provisions in the following orders relative to the regulation of gas wells in prorated gas pools should be superseded:

Blinebry Gas Pool

R-264
R-610
R-610-A
R-610-B

Eumont Gas Pool

R-264
R-520
R-520-A
R-767
R-767-A

Jalmat Gas Pool

R-264
R-520
R-520-A
R-553
R-640
R-663
R-690

Justis Gas Pool

R-586

Tubb Gas Pool

R-264
R-586
R-586-B

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
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NOW, on this 20th day of May, 1960, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

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

(2) That in the past the Commission has held numerous hearings and taken voluminous testimony from engineers, geologists, and other interested parties and entered many orders creating, delineating, spacing, prorating, and otherwise regulating the Pools now designated the Blinebry, Crosby-Devonian, Eumont, Jalmat, Justis, Tubb, Aztec-Pictured Cliffs, Ballard-Pictured Cliffs, Fulcher Kutz-Pictured Cliffs, South Blanco-Pictured Cliffs, Tapacito-Pictured Cliffs, West Kutz-Pictured Cliffs, and Blanco Mesaverde Gas Pools in the interests of conservation, prevention of waste, and protection of correlative rights.

(3) That it has been found by the Commission that one well will efficiently and economically drain the area of the proration units set out in the Special Pool Rules in each of the several gas pools listed above.

Eumont Gas Pool

R-264-A
R-356
R-370
R-370-A
R-370-B
R-371
R-371-A
R-967

Jalmat Gas Pool

R-264-A
R-356
R-368
R-368-A
R-368-B
R-967

Justis Gas Pool

A-264-A
R-356
R-375
R-375-A
R-586-A
R-586-C
R-586-E
R-586-F
R-967

Tubb Gas Pool

R-356
R-373
R-373-A
R-464
R-967

(2) That all provisions in the following orders relative to the regulation of gas wells in prorated gas pools be and the same are hereby superseded:

Blinebry Gas Pool	Eumont Gas Pool	Jalmat Gas Pool
R-264	R-264	R-264
R-610	R-520	R-520
R-610-A	R-520-A	R-520-A
R-610-B	R-767	R-553
	R-767-A	R-640
		R-663
		R-690

Justis Gas Pool	Tubb Gas Pool
R-586	R-264
	R-586
	R-586-B

(3) That the Special Pool Rules for the seven prorated gas pools in Northwest New Mexico, and the Special Pool Rules for the six prorated gas pools in Southeast New Mexico, be and the same are hereby consolidated as hereinafter set forth, in the following "Rules and Regulations Governing Prorated Gas Pools in New Mexico."

CASE No. 1937
Order No. R-1670

RULES AND REGULATIONS

GOVERNING

PRORATED GAS POOLS IN NEW MEXICO

* * *

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RULE 4: The provisions of Statewide Rule 104, Paragraph (k), shall not apply to the gas pools regulated by this order.

RULE 5(A): The acreage allocated to a gas well for proration purposes shall be known as the gas proration unit for that well. For the purpose of gas allocation in the gas pools regulated by this order, a standard proration unit shall consist of contiguous surface acreage and shall be substantially in the form of a square in pools having 160-acre standard proration units, and substantially in the form of a rectangle in pools having 320-acre standard proration units, and shall be a legal subdivision of the U. S. Public Land Surveys (quarter-section or half-section, as applicable). A proration unit shall be considered to be a standard gas proration unit when it meets the above requirements and consists of acreage within the appropriate tolerance set out below:

Standard Proration Unit	Acreage Tolerance for Standard Unit
160 acres	158-162 acres
320 acres	316-324 acres

Any gas proration unit containing acreage within the appropriate tolerance limit above shall be considered to contain the number of acres in a standard unit for the purpose of computing allowables.

RULE 5(B): The Secretary-Director of the Commission shall have authority to grant an exception to Rule 5(A) without notice and hearing where application has been filed in due form and where the following facts exist and the following provisions are complied with:

1. The proposed non-standard proration unit consists of less acreage than a standard proration unit, or where the unorthodox size or shape of the tract is due to a variation in legal subdivision of the U. S. Public Land Surveys.

2. The non-standard gas proration unit consists of contiguous quarter-quarter sections and/or lots.

3. The non-standard gas proration unit lies wholly within a single governmental section.

4. The entire non-standard gas proration unit may reasonably be presumed to be productive of gas from the designated gas pool.

5. The applicant presents written consent in the form

CASE No. 1937
Order No. R-1670

I. GENERAL RULES AND REGULATIONS FOR THE PRORATED GAS POOLS OF NORTHWESTERN NEW MEXICO

(See Special Pool Rules in each pool for orders applicable to those pools only. Special Pool Rules will be found in the same classification order as in the General section, and, unless the special rules conflict with the general rule, the general rule is also applicable.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 1: Any well drilled to the producing formation of a gas pool regulated by this order and within said pool or within one mile outside the boundary of that pool, and not nearer to nor within the boundaries of another designated pool producing from the same formation, shall be spaced, drilled, operated, and prorated in accordance with the regulations in effect in that pool.

RULE 2: Except as provided in the Special Pool Rules, after the effective date of this order each well drilled or recompleted on a standard gas proration unit within a gas pool regulated by this order shall be located at least 990 feet from the outer boundary line of the proration unit, provided however, that a tolerance of 200 feet is permissible.

RULE 3: The Secretary-Director of the Commission shall have authority to grant exception to the requirements of Rule 2 where application has been filed in due form and such exception is required because of conditions resulting from previously drilled wells in the area or the necessity for exception is based upon topographic conditions.

Applicants shall furnish all operators of leases offsetting the lease containing subject well, a copy of the application to the Commission, and applicant shall include with his application a list of names and addresses of all such operators, together with a written statement that all such operators have been properly notified by registered mail. The Secretary-Director of the Commission shall wait at least 20 days before approving any such exception, and shall approve such exception only in the absence of objection of any offset operators. In the event any operator objects to the exception, the Commission shall consider the matter only after proper notice and hearing.

NOTE: Rule 3 does not apply to Blanco Mesaverde or Tapacito-Pictured Cliffs Gas Pools - See Special Pool Rules, Rule 2.

of waivers from:

(a) All operators owning interests outside the non-standard gas proration unit but in the same section in which any part of the non-standard gas proration unit is situated, and

(b) All operators owning interests in acreage offsetting the non-standard gas proration unit.

6. In lieu of subparagraph 5 of this rule, the applicant may furnish proof of the fact that said offset operators were notified by registered mail of his intent to form such non-standard gas proration unit. (This notification to offset operators should consist of the same information that is furnished to the Commission). The Secretary-Director of the Commission may approve the application if, after a period of 30 days following the mailing of said notice, no operator has made objection to formation of such non-standard gas proration unit. (See additional requirement for West Kutz-Pictured Cliffs Gas Pool)

B. NOMINATIONS AND PRORATION SCHEDULE

RULE 6(A): At least 30 days prior to the beginning of each gas proration period, the Commission shall hold a hearing after due notice has been given. The Commission shall cause to be submitted by each gas purchaser its "Preliminary Nominations" of the amount of gas which each in good faith actually desires to purchase within the ensuing proration period, by months, from each of the gas pools regulated by this order. The Commission shall consider the "Preliminary Nominations" of purchasers, actual production, and such other factors as may be deemed applicable in determining the amount of gas that may be produced without waste within the ensuing proration period. "Preliminary Nominations" shall be submitted on a form prescribed by the Commission.

RULE 6(B): The term "gas purchaser" as used in these rules shall mean any "taker" of gas either at the wellhead or at any point on the lease where connection is made for gas transportation or utilization. It shall be the responsibility of said "taker" to submit a nomination in accordance with Rule 6(A) and Rule 7(A) of this order.

RULE 7(A): In the event a gas purchaser's market shall have increased or decreased, he may file with the Commission prior to the 10th day of the month a "Supplemental Nomination" showing the amount of gas he actually in good faith desires to purchase during the ensuing

proration month from the gas pools regulated by this order. The Commission shall hold a public hearing between the 13th and 20th days of each month to determine the reasonable market demand for gas for the ensuing proration month, and shall issue a proration schedule setting out the amount of gas which each well may produce during the ensuing proration month, along with such other information as is necessary to show the allowable-production status of each well on the schedule. "Supplemental Nominations" shall be submitted on a form prescribed by the Commission.

RULE 7(B): The Commission shall include in the proration schedule the gas wells in the gas pools regulated by this order delivering to a gas transportation facility, or lease gathering system, and shall include in the proration schedule any well which it finds is being unreasonably discriminated against through denial of access to a gas transportation facility, which is reasinably capable of handling the type of gas produced by such well.

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 8(A): The total allowable to be allocated to each gas pool regulated by this order each month shall be equal to the sum of the "Preliminary" or "Supplemental Nominations" (whichever is applicable) for each pool, together with any adjustment which the Commission deems advisable. A monthly allowable shall be assigned to each well entitled to an allowable in each pool by allocating the pool allowable among all such wells in accordance with the procedure set out in Rule 9(C).

RULE 8(B)1: No gas well shall be given an allowable until Form C-104 and Form C-110 have been filed, together with a plat (C-128) showing acreage attributed to said well and the locations of all wells on the lease, and

2: Unless a deliverability test taken in conformance with the provisions of Order R-333-C and D as amended by R-333-E has been submitted, except as provided in Rule 10(C) below.

RULE 8(C): Allowables to newly completed gas wells shall commence:

1. On the date of connection to a gas transportation facility, such date to be determined from an affidavit furnished to the Commission (1000 Rio Brazos Road, Aztec, New Mexico) by the purchaser, or

2. The latest filing date of Form C-104, C-110, and C-128, or

3. A date 45 days prior to the date upon which the well's initial deliverability and shut-in pressure test is reported to the Commission on Form C-122-A in conformance with the provisions of Order R-333-C and D as amended by Order R-333-E,

whichever date is the later.

RULE 9(A): The product obtained by multiplying each well's acreage factor by the calculated deliverability (expressed as MCF per day) for that well shall be known as the AD factor for that well. The acreage factor shall be determined to the nearest hundredth of a unit by dividing the acreage within the proration unit by 160 in pools with 160 acre standard proration units and by 320 in pools with 320 acre standard gas proration units; however, the acreage tolerances provided in Rule 5(A) shall apply. The "AD Factor" shall be computed to the nearest whole unit.

RULE 9(B): The allowable to be assigned to each marginal well shall be equal to the maximum production of said well during any month of the preceding gas proration period except as provided in the Special Pool Rules.

RULE 9(C): The pool allowable remaining each month after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells entitled to an allowable in the following manner:

1. Seventy-five percent (75%) of the pool allowable remaining to be allocated to non-marginal wells shall be allocated among such wells in the proportion that each well's "AD Factor" bears to the total "AD Factor" for all non-marginal wells in the pool.

2. Twenty-five percent (25%) of the pool allowable remaining to be allocated to non-marginal wells shall be allocated among such wells in the proportion that each well's acreage factor bears to the total acreage factor for all non-marginal wells in the pool.

RULE 9(D): Annual deliverability tests taken each year shall be used in calculating allowables for wells in the gas pools regulated by this order for the twelve month period beginning February 1 of the following year.

RULE 10(A): If, during a proration month, the acreage

assigned to a well is increased, the operator shall notify the Commission in writing (1000 Rio Brazos Road, Aztec, New Mexico) of such increase by filing a revised plat (Form C-128). The increased allowable assigned the gas proration unit for the well shall be effective on the first day of the month following receipt of the notification by the Commission.

RULE 10(B): A change in a well's deliverability due to retest or test after recompletion or workover shall become effective:

1. On the date of reconnection after workover, such date to be determined from Form C-104 as filed by the operators, or

2. A date 45 days prior to the date upon which a well's initial deliverability and shut-in pressure test is reported to the Commission on Form C-122-A in conformance with the provisions of Order R-333-C and D as amended by Order R-333-E, or

3. A date 45 days prior to the receipt and approval of Form C-104 by the Commission's office (1000 Rio Brazos Road, Aztec, New Mexico); (Form C-104 shall specify the exact nature of the workover or remedial work. If the nature of the work cannot be explained on Form C-104, in that event, Form C-103 shall also be filed in accordance with Rule 1106 of the Commission's Statewide Rules and Regulations);

whichever is later.

RULE 10(C): The calculated deliverability at the "deliverability pressure" shall be determined in accordance with the provisions of Order R-333-C and D, as amended by Order R-333-E.

The Secretary-Director of the Commission shall have authority to allow exceptions to the annual deliverability test requirement for marginal wells where the deliverability of a well is of such volume as to have no significance in the determination of the well's allowable. Application for such exception may be submitted in writing by the operator of the well and, if granted, may be revoked by the Secretary-Director of the Commission at any time by requesting the well to be scheduled and tested in accordance with Order R-333-C and D as amended by Order R-333-E.

RULE 11: After notice and hearing, the Commission may assign minimum allowables in order to prevent the premature abandonment of wells.

RULE 12: Except as provided in the Special Pool Rules, the full production of gas from each well, including drilling gas, shall be charged against the well's allowable regardless of the disposition of the gas; provided, however, that gas used in maintaining the producing ability of the well shall not be charged against the allowable.

D. BALANCING OF PRODUCTION

RULE 13: The dates 7:00 a.m., February 1, and 7:00 a.m., August 1, shall be known as balancing dates, and the periods of time bounded by these dates shall be known as gas proration periods.

RULE 14(A): Underproduction: Any non-marginal well which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

RULE 14(B): Production during any one month of a gas proration period in excess of the allowable assigned to a well for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

RULE 15(A): Overproduction: Any well which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period, provided that such overproduction shall be made up during such succeeding period. Any well which has not made up the overproduction carried into a gas proration period by the end of such proration period shall be shut-in until such overproduction is made up.

RULE 15(B): Except as provided by the Special Pool Rules, if, at any time, a well is overproduced an amount equaling six times its current monthly allowable, it shall be shut-in during that month, and each succeeding month until the well is overproduced less than six times its current monthly allowable.

RULE 15(C): Allowable assigned to a well during any one

month of a gas proration period in excess of the production for the same month shall be applied against the overproduction carried into such period in determining the amount of overproduction, if any, which has not been made up.

RULE 15(D): The Commission may allow overproduction to be made up at a lesser rate than would be the case if the well were completely shut-in upon a showing at public hearing after due notice that complete shut-in of the well would result in material damage to the well.

RULE 15(E): Any allowable accrued to a well at the end of a proration period due to the cancellation of underage and the redistribution thereof shall be applied against the overproduction carried into said proration period.

E. CLASSIFICATION OF WELLS

RULE 16(A): After the production data is available for the last month of each gas proration period, any well which had an underproduced status at the beginning of the preceding gas proration period and which did not produce its allowable during at least one month of such preceding gas proration period may be classified as a marginal well, unless, prior to the end of said preceding gas proration period, the operator or other interested party presents satisfactory evidence to the Commission showing that the well should not be so classified. However, a well which in any month of said proration period has demonstrated its ability to produce its allowable for said proration period shall not be classified as a marginal well.

(Not applicable to Tapacito - See Special Pool Rules).

RULE 16(B): The Secretary-Director may reclassify a marginal or non-marginal well at any time the well's production data, deliverability data, or other evidence as to the well's producing ability justifies such reclassification.

RULE 17: A well which is classified as a marginal well shall not be permitted to accumulate underproduction, and any underproduction accrued to a well prior to its classification as a marginal well shall be cancelled.

RULE 18: If, at the end of a proration period, a marginal well has produced more than the total allowable for the period assigned a non-marginal unit of like deliverability and acreage, the marginal well shall be reclassified as a non-marginal well and its allowable and net status adjusted accordingly.

RULE 19: A well which has been reworked or recompleted shall be classified as a non-marginal well as of the date

of reconnection to a pipeline until such time as production data, deliverability data, or other evidence as to the well's producing ability indicates that the well should be classified as a marginal well.

RULE 20: All wells not classified as marginal wells shall be classified as non-marginal wells.

F. REPORTING OF PRODUCTION

RULE 21(A): The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Commission on Form C-115 in accordance with Rule 1114 of the Commission's Rules and Regulations, so as to reach the Commission on or before the 24th day of the month next succeeding the month in which the gas reported was produced. The operator shall show on such report what disposition has been made of the gas produced.

RULE 21(B): Each purchaser or taker of gas in each of the designated gas pools regulated by this order shall submit a report to the Commission, so as to reach the Commission on or before the 15th day of the month next succeeding the month in which the gas was purchased or taken.

RULE 21(C): Such report shall be filed on either Form C-111 or Form C-114 (whichever is applicable) with the wells being listed in approximately the same order as they are listed on the proration schedule.

RULE 21(D): Forms C-111 and C-114 referred to herein shall shall be submitted in triplicate, the original being sent to the Commission at Box 871, Santa Fe, New Mexico, the remaining copies being sent to 1000 Rio Brazos Road, Aztec, New Mexico and Box 2045, Hobbs, New Mexico, respectively.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the gas pools regulated by this order shall be flared or vented except as provided in the Special Pool Rules.

RULE 23: Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the affected well. No further allowable shall be assigned to the affected well until all rules and regulations are complied with. The Secretary-Director shall notify the operator of the well and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

RULE 24: All transporters or users of gas shall file gas well connection notices with the Commission as soon as possible after the date of connection or reconnection in accordance with the provisions of Rule 8(C) and 10(B), respectively.

(See Special Pool Rules for each pool for orders applicable to that pool only. Special Pool Rules will be found in the same classification order as in the General section, and, unless the special rules conflict with the general rule, the general rule is also applicable.)

CASE No. 1937
Order No. R-1670

II. SPECIAL RULES AND REGULATIONS FOR THE AZTEC-PICTURED CLIFFS GAS POOL

(The Aztec-Pictured Cliffs Gas Pool was created March 15, 1950 and gas prorationing was instituted March 1, 1955)

A. WELL LOCATION AND ACREAGE REQUIREMENTS:

RULE 5(A): A standard gas proration unit in the Aztec-Pictured Cliffs Gas Pool shall be 160 acres.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the Aztec-Pictured Cliffs Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Commission after notice and hearing.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Aztec-Pictured Cliffs Gas Pool shall be the Pictured Cliffs formation.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

CASE No. 1937
Order No. R-1670

III. SPECIAL RULES AND REGULATIONS FOR THE BALLARD-PICTURED CLIFFS GAS POOL

(The Ballard-Pictured Cliffs Gas Pool was created February 9, 1955 and gas prorationing was instituted October 1, 1956. The Otero-Pictured Cliffs and Canyon Largo-Pictured Cliffs Gas Pools were consolidated into the Ballard Pictured-Cliffs Gas Pool May 1, 1959. This pool also includes acreage that was formerly included in the Fulcher Kutz-Pictured Cliffs Gas Pool.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Ballard-Pictured Cliffs Gas Pool shall be 160 acres.

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 12: Gas used on the lease shall not be charged against the allowable.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the Ballard-Pictured Cliffs Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Commission after notice and hearing.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Ballard-Pictured Cliffs Gas Pool shall be the Pictured Cliffs formation.

(Rule 25 does not actually appear as such in any of the existing pool rules.)

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

IV. SPECIAL RULES AND REGULATIONS FOR THE FULCHER KUTZ-PICTURED CLIFFS GAS POOL

(The Fulcher Kutz-Pictured Cliffs Gas Pool was created effective December 22, 1950 from a consolidation of the Fulcher Basin - Kutz Canyon Gas Pools. Gas prorationing was instituted March 1, 1955)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Fulcher Kutz-Pictured Cliffs Gas Pool shall be 160 acres.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the Fulcher Kutz-Pictured Cliffs Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Commission after notice and hearing.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Fulcher Kutz-Pictured Cliffs Gas Pool shall be the Pictured Cliffs formation.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

CASE No. 1937
Order No. R-1670

V. SPECIAL RULES AND REGULATIONS FOR THE SOUTH BLANCO-PICTURED CLIFFS GAS POOL

(The South Blanco-Pictured Cliffs Gas Pool was created May 20, 1952 and prorationing was instituted March 1, 1955.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the South Blanco-Pictured Cliffs Gas Pool shall be 160 acres.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the South Blanco-Pictured Cliffs Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Commission after notice and hearing.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the South Blanco-Pictured Cliffs Gas Pool shall be the Pictured Cliffs formation.

(Rule 25 does not actually appear as such in any of the existing pool rules.)

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

CASE No. 1937
Order No. R-1670

VI. SPECIAL RULES AND REGULATIONS FOR THE TAPACITO-PICTURED CLIFFS GAS POOL

(The Tapacito-Pictured Cliffs Gas Pool was created April 18, 1956 and prorationing was instituted August 1, 1958.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 2: Wells shall be located at least 790 feet from the outer boundaries of the drilling tract and no closer than 25 feet from any quarter-quarter section line or subdivision inner boundary. The Secretary-Director shall have authority to grant exception without notice and hearing where the application has been filed in due form and where the following facts exist and the following provisions are complied with:

(A) The necessity for the unorthodox location is based on topographical conditions, and

(B) 1. The ownership of all oil and gas leases within a radius of 790 feet of the proposed location is common with the ownership of the oil and gas leases under the proposed location, or

2. All owners of oil and gas leases within such radius consent in writing to the proposed location.

(C) In lieu of Paragraph (B) 2 of this Rule the applicant may furnish proof of the fact that said offset operators were notified by registered mail of his intent to drill an unorthodox location. The Secretary-Director of the Commission may approve the application if, after a period of twenty days following the mailing of said notice, no operator has made objection to the drilling of the unorthodox location.

RULE 5(A): A standard gas proration unit in the Tapacito-Pictured Cliffs Gas Pool shall be 160 acres.

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 9(B): The allowable to be assigned to each marginal well shall be equal to the maximum production of said well during any month of the preceding six months.

RULE 12: Gas used on the lease shall not be charged against the allowable

D. BALANCING OF PRODUCTION

RULE 15(B): If at any time a well is overproduced in an

VI. SPECIAL RULES AND REGULATIONS FOR THE TAPACITO-PICTURED CLIFFS GAS POOL (CONT'D)

amount equalling six times its average monthly allowable for the last six months, it shall be shut-in during that month and each succeeding month until it is overproduced less than 6 times its average monthly allowable.

E. CLASSIFICATION OF WELLS

RULE 16(A): A well shall be classified as marginal if it has failed for six consecutive months to produce its average monthly allowable for the six months immediately preceding such reclassification provided such failure was not occassioned by curtailment to compensate for over-production, unless prior to such reclassification the operator or other interested party presents satisfactory evidence showing that the well should not be classified as marginal. However, a well shall not be classified as marginal if, during any one month of the six-month period, said well has demonstrated its ability to produce its six months average allowable.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the Tapacito-Pictured Cliffs Pool, except that gas used for drilling purposes or for maintaining the productivity of a well, shall be flared or vented unless specifically authorized by order of the Commission after notice and hearing.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Tapacito-Pictured Cliffs Gas Pool shall be the Pictured Cliffs formation.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

CASE No. 1937
Order No. R-1670

VII. SPECIAL RULES AND REGULATIONS FOR THE WEST KUTZ-PICTURED CLIFFS GAS POOL

(The West Kutz-Pictured Cliffs Gas Pool was created September 29, 1950 and prorationing was instituted March 1, 1955.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the West Kutz-Pictured Cliffs Gas Pool shall be 160 acres.

RULE 5(B): In order to qualify for exception to Rule 5(A) without notice and hearing a proposed non-standard gas proration unit in the West Kutz-Pictured Cliffs Gas Pool, in addition to the requirements of Rule 5(B) of the General Rules, may not exceed 2640 feet in length or width.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the West Kutz-Pictured Cliffs Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Commission after notice and hearing.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the West Kutz-Pictured Cliffs Gas Pool shall be the Pictured Cliffs formation.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

CASE No. 1937
Order No. R-1670

VIII. SPECIAL RULES AND REGULATIONS FOR THE BLANCO-MESAVERDE GAS POOL

(The Blanco Mesaverde Gas Pool was created February 25, 1949 and prorationing was instituted March 1, 1955. The Blanco-Mesaverde Gas Pool now includes acreage that was formerly included in the LaPlata Mesaverde, Northwest LaPlata Mesaverde, South LaPlata Mesaverde, and the Largo Mesaverde Gas Pools.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 2: Wells shall be located 990 feet from the outer boundary of either the Northeast or Southwest quarter of the section, subject to a variation of 200 feet for topographic conditions. Further tolerance shall be allowed by the Commission only in cases of extremely rough terrain where compliance would necessarily increase drilling costs.

RULE 5(A): A standard gas proration unit in the Blanco-Mesaverde Gas Pool shall be 320 acres.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the Blanco-Mesaverde Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Commission after notice and hearing.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The general and special rules and regulations contained in this order pertaining to the Blanco-Mesaverde Gas Pool shall be limited in their application to the present 4200-5100 foot productive horizon where the productive sands are contained between the top of the Cliff House Sand and the base of the Point Lookout Sand of the Mesaverde.

RULE 26: Surface Pipe. The surface pipe shall be set to a minimum depth of 100 feet, and where shallow potable water-bearing beds are present, the surface pipe shall be set to such shallow potable water bearing beds and a sufficient amount of cement shall be used to circulate the cement behind the pipe to the bottom of the cellar. This surface casing shall stand cemented for at least 24 hours before drilling plug or initiating tests. The surface casing shall be tested after drilling plug by bailing the hole dry. The hole shall remain dry for one hour to constitute

VIII. SPECIAL RULES AND REGULATIONS FOR THE BLANCO-MESAVERDE GAS POOL (CONT'D)

satisfactory proof of a water shut-off. In lieu of the foregoing test, the cement job shall be tested by building up a pressure of 1,000 psi, closing the valves, and allowing to stand thirty minutes. If the pressure does not drop more than 100 pounds during that period, the test shall be considered satisfactory. This test shall be made both before and after drilling the plug. The Commission shall be notified at least 24 hours prior to the conducting of any test.

RULE 27: Production String. The production string shall be set on top of the Cliff House Sand with a minimum of 100 sacks of cement and shall stand cemented not less than 36 hours before testing the casing. This test shall be made by building up a pressure of 1,000 psi, closing the valves, and allowing to stand thirty minutes. If the pressure does not drop more than 100 pounds during that period, the test shall be considered satisfactory.

RULE 28: All cementing shall be done by the pump-and-plug method. Bailing tests may be used on all casing and cement tests, and drill stem tests may be used on cement tests in lieu of pressure tests. In making bailing test, the well shall be bailed dry and remain approximately dry for thirty minutes. If any string of casing fails while being tested by pressure or by bailing tests herein required, it shall be recemented and retested or an additional string of casing should be run and cemented. If an additional string is used, the same test shall be made as outlined for the original string. In submitting Form C-101, "Notice of Intention to Drill," the number of sacks of cement to be used on each string of casing shall be stated.

RULE 29: Any completed well which produces any oil shall be tubed. This tubing shall be set as near the bottom of the hole as practicable, but in no case shall tubing perforations be more than 250 feet from the bottom. The bottom of the tubing shall be restricted to an opening of less than 1 inch or bullplugged in order to prevent the loss of pressure bombs or other measuring devices.

RULE 30: Any well which produces oil shall be equipped with a meter setting of adequate size to measure efficiently the gas, with this meter setting to be

VIII. SPECIAL RULES AND REGULATIONS FOR THE BLANCO-MESAVERDE GAS POOL (CONT'D)

installed on the gas vent or discharge line. Wellhead equipment for all wells shall be installed and maintained in first-class condition, so that static bottom hole pressures and surface pressures may be obtained at any time by a duly authorized agent of the Commission. Valves shall be installed so that pressures may be readily obtained on the casing and also on the tubing, wherever tubing is installed. All connections subject to well pressure and all wellhead fittings shall be of first-class material, rated at 2,000 psi working pressure and maintained in gas-tight condition. There shall be at least one valve on each bradenhead. Operators shall be responsible for maintaining all equipment in first-class condition and shall repair or replace equipment where gas leakage occurs.

RULE 31: Drilling boilers shall not be set closer than 200 feet to any well or tank battery. All electrical equipment shall be in first-class condition and properly installed.

RULE 32: Wells shall not be shot or chemically treated until the permission of the Commission is obtained. Each well shall be shot or treated in such a manner as will not cause injury to the sand or result in water entering the oil or gas sand, and necessary precautions shall be taken to prevent injury to the casing. If shooting or chemical treatment results in irreparable injury to the well or to the oil or gas sand, the well shall be properly plugged and abandoned.

RULE 33: Bradenhead gas shall not be used either directly or expansively in engines, pumps or torches, or otherwise wasted. It may be used for lease and development purposes and for the development of nearby leases, except as prohibited above. Wells shall not be completed as Bradenhead gas wells unless special permission is obtained from the Commission.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

CASE No. 1937
Order No. R-1670

I. GENERAL RULES AND REGULATIONS FOR THE PRORATED GAS POOLS OF SOUTHEASTERN NEW MEXICO

(See Special Pool Rules in each pool for orders applicable to those pools only. Special Pool Rules will be found in the same classification order as in the General section, and, unless the special rules conflict with the general rule, the general rule is also applicable.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 1: Any well drilled to the producing formation of a gas pool regulated by this order and within said pool or within one mile outside the boundary of that pool, and not nearer to nor within the boundaries of another designated pool producing the same formation, shall be spaced, drilled, operated, and prorated in accordance with the regulations in effect in that pool.

RULE 2: After the effective date of this order each well drilled or recompleted on a standard gas proration unit within a gas pool regulated by this order shall be located not closer than 330 feet to a quarter-quarter section line or subdivision inner boundary line and not closer to the outer boundary line than the footages set out in the table immediately below:

Standard Proration Unit	Footage From Unit Outer Boundary
160 acres	660 feet
320 acres	660 feet
640 acres	1,980 feet

RULE 3: The Secretary-Director of the Commission shall have authority to grant exception to the requirements of Rule 2 without notice and hearing where the application has been filed in due form and where the following facts exist and the following provisions are complied with:

1. The necessity for the unorthodox location is based on topographical conditions, or is occasioned by the recompletion of a well previously drilled to another horizon.

2. (a) The ownership of all oil and gas leases within a radius of 1,980 feet of the proposed location is common with the ownership of the oil and gas leases under the proposed location, or

(b) All owners of oil and gas leases within

such radius consent in writing to the proposed location.

(c) In lieu of Paragraph 2(b) of this rule, the applicant may furnish proof of the fact that said offset operators were notified by registered mail of his Application for Approval of an Unorthodox Location. (This information to offset operators should consist of the same information that is furnished to the Commission.) The Secretary-Director of the Commission may approve the application, if, after a period of at least 20 days following the mailing of said notice, no operator has made objection to the drilling of the unorthodox location. In the event an operator objects to the unorthodox location, the Commission shall consider the matter only after proper notice and hearing.

RULE 4: The provisions of Statewide Rule 104, Paragraph (k), shall not apply to the gas pools regulated by this order.

RULE 5(A): The acreage allocated to a gas well for proration purposes shall be known as the gas proration unit for that well. For the purpose of gas allocation in the gas pools regulated by this order, a standard proration unit shall consist of contiguous surface acreage and shall be substantially in the form of a square in pools having 160-acre or 640-acre standard proration units, and substantially in the form of a rectangle in pools having 320-acre standard proration units, and shall be a legal subdivision of the U. S. Public Land Surveys (quarter-section, section, or half-section, as applicable). A proration unit shall be considered to be a standard gas proration unit when it meets the above requirements and and consists of acreage within the appropriate tolerance set out below:

Standard Proration Unit	Acreage Tolerance For Standard Unit
160 acres	158-162 acres
320 acres	316-324 acres
640 acres	632-648 acres

Any gas proration unit containing acreage within the appropriate tolerance limit above shall be considered to contain the number of acres in a standard unit for the purpose of computing allowables.

RULE 5(B): In establishing a non-standard gas proration

unit for gas pools regulated by this order where the standard gas proration unit is 640 acres, the location of the well with respect to the two nearest boundary lines thereof shall govern the maximum amount of acreage that may be assigned to the well for the purposes of gas proration as follows:

Location	Maximum Acreage
660-660	160 acres
660-1980	320 acres

RULE 5(C): The Secretary-Director of the Commission shall have authority to grant an exception to Rule 5(A) without notice and hearing where application has been filed in due form and where the following facts exist and the following provisions are complied with:

1. The proposed non-standard proration unit consists of less acreage than a standard proration unit, or where the unorthodox size or shape of the tract is due to a variation in legal subdivision of the U. S. Public Land Surveys.

2. The non-standard gas proration unit consists of contiguous quarter-quarter sections and/or lots.

3. The non-standard gas proration unit lies wholly within a single governmental quarter section in pools with 160-acre standard proration units except the Tubb Gas Pool, and within a single governmental section in the Tubb Gas Pool and in all pools with 320-acre or 640-acre standard proration units.

4. The entire non-standard gas proration unit may reasonably be presumed to be productive of gas from the applicable gas pool.

5. The length or width of the non-standard gas proration unit does not exceed 2,640 feet in pools with 160-acre standard proration units, and does not exceed 5,280 feet in pools with 320-acre or 640-acre standard proration units.

6. The applicant presents written consent in the form of waivers from:

   (a) All operators owning interests outside the non-standard gas proration unit but in the same quarter section in pools having 160-acre standard proration units or in the same section in pools having 320-acre or 640-acre standard proration units, in which any part of the non-standard gas proration unit is situated, and

(b) All operators owning interests within 1,500 feet of the well to which such non-standard gas proration unit is proposed to be dedicated.

7. In lieu of subparagraph 6 of this rule, the applicant may furnish proof of the fact that said offset operators were notified by registered mail of his intent to form such non-standard gas proration unit. (This notification to offset operators should consist of the same information that is furnished to the Commission.) The Secretary-Director of the Commission may approve the application if, after a period of 30 days following the mailing of said notice, no operator has made objection to formation of such non-standard gas proration unit.

B. NOMINATIONS AND PRORATION SCHEDULE

RULE 6(A): At least 30 days prior to the beginning of each gas proration period, the Commission shall hold a hearing after due notice has been given. The Commission shall cause to be submitted by each gas purchaser its "Preliminary Nominations" of the amount of gas which each in good faith actually desires to purchase within the ensuing proration period, by months, from each of the gas pools regulated by this order. The Commission shall consider the "Preliminary Nominations" of purchasers, actual production, and such other factors as may be deemed applicable in determining the amount of gas that may be produced without waste within the ensuing proration period. "Preliminary Nominations" shall be submitted on a form prescribed by the Commission.

RULE 6(B): The term "gas purchaser" as used in these rules shall mean any "taker" of gas either at the well-head or at any point on the lease where connection is made for gas transportation or utilization. It shall be the responsibility of said "taker" to submit a nomination in accordance with Rule 6(A) and Rule 7 (A) of this order.

RULE 7(A): In the event a gas purchaser's market shall have increased or decreased, he may file with the Commission prior to the 10th day of the month a "Supplemental Nomination" showing the amount of gas he actually in good faith desires to purchase during the ensuing proration month from any gas pool regulated by this order. The Commission shall hold a public hearing between the 13th and 20th days of each month to determine the reasonable market demand for gas for the ensuing proration month, and shall issue a proration schedule setting out the amount of gas which each well may produce during the ensuing proration month along with such other

information as is necessary to show the allowable-production status of each well on the schedule. "Supplemental Nominations" shall be submitted on a form prescribed by the Commission.

RULE 7(B): The Commission shall include in the proration schedule the gas wells in the gas pools regulated by this order delivering to a gas transportation facility, or lease gathering system, and shall include in the proration schedule any well which it finds is being unreasonably discriminated against through denial of access to a gas transportation facility, which is reasonably capable of handling the type of gas produced by such well.

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 8(A): The total allowable to be allocated to each gas pool regulated by this order each month shall be equal to the sum of the "Preliminary" or "Supplemental Nominations" (whichever is applicable) for each pool, together with any adjustment which the Commission deems advisable. A monthly allowable shall be assigned to each well entitled to an allowable by allocating the pool allowable among all such wells in that pool in accordance with the procedure set out in the Special Pool Rules.

RULE 8(B): Allowables to newly completed gas wells shall commence in accordance with the provisions of the Special Pool Rules. No gas well shall be given an allowable until Form C-104 and Form C-110 have been filed, together with a plat (Form C-128) showing acreage attributed to said well and the location of all wells on the lease.

RULE 9(A): A well's "Acreage Factor" shall be determined to the nearest hundredth of a unit by dividing the acreage assigned to the well by 160 acres. However, the acreage tolerances provided in Rule 5(A) shall apply.

RULE 9(B): If, during a proration month, the acreage assigned to a well is increased, the operator shall notify the Commission in writing (Box 2045, Hobbs, New Mexico) of such increase by filing a revised plat (Form C-128). The increased allowable assigned the gas proration unit for the well shall be effective on the first day of the month following receipt of the notification by the Commission.

RULE 10(A): A marginal well shall be assigned an allowable equal to its maximum production during any month of the preceding gas proration period.

RULE 10(B): The pool allowable remaining after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells entitled to an allowable in such pool as provided for in the Special Pool Rules.

RULE 11: After notice and hearing, the Commission may assign minimum allowables in order to prevent the premature abandonment of wells.

RULE 12: The full production of gas from each well shall be charged against the well's allowable regardless of what disposition has been made of the gas; provided, however, that gas used on the lease for consumption in lease houses, treaters, compressors, combustion engines and other similar lease equipment shall not be charged against the well's allowable.

D. BALANCING OF PRODUCTION

RULE 13: The dates 7:00 a.m., January 1, and 7:00 a.m., July 1, shall be known as balancing dates, and the periods of time bounded by these dates shall be known as gas proration periods.

RULE 14(A): Underproduction: Any non-marginal well which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

RULE 14(B): Production during any one month of a gas proration period in excess of the allowable assigned to a well for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

RULE 15(A): Overproduction: Any well which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period, provided that such overproduction shall be made up during such succeeding period. Any well which has not made up the overproduction carried into a gas proration period by the end of such proration period shall be shut-in until such overproduction is made up. If, at any time, a well is overproduced an amount equalling six times

its current monthly allowable, it shall be shut-in during that month, and each succeeding month until the well is overproduced less than six times its current monthly allowable.

RULE 15(B): Allowable assigned to a well during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction carried into such period in determining the amount of overproduction, if any, which has not been made up.

RULE 15(C): The Commission may allow overproduction to be made up at a lesser rate than would be the case if the well were completely shut-in upon a showing at public hearing after due notice that complete shut-in of the well would result in material damage to the well.

RULE 15(D): Any allowable accrued to a well at the end of a proration period due to the cancellation of underage and the redistribution thereof shall be applied against the overproduction carried into said proration period.

E. CLASSIFICATION OF WELLS

RULE 16(A): After the production data is available for the last month of each gas proration period, any well which had an underproduced status at the beginning of the preceding gas proration period and which did not produce its allowable during at least one month of such preceding gas proration period may be classified as a marginal well, unless, prior to the end of said preceding gas proration period, the operator or other interested party presents satisfactory evidence to the Commission showing that the well should not be so classified. However, a well which in any month of said proration period has demonstrated its ability to produce its allowable for said proration period shall not be classified as a marginal well.

RULE 16(B): The Secretary-Director may reclassify a marginal or non-marginal well at any time the well's production data, deliverability data, or other evidence as to the well's producing ability justifies such reclassification.

RULE 17: A well which is classified as a marginal well shall not be permitted to accumulate underproduction, and any underproduction accrued to a well prior to its classification as a marginal well shall be cancelled.

RULE 18: If, at the end of a proration period, a marginal well has produced more than the total allowable assigned a non-marginal unit of corresponding size, for that period, the marginal well shall be reclassified as a non-marginal well and its allowable and net status adjusted accordingly.

RULE 19: A well which has been reworked or recompleted shall be classified as a non-marginal well as of the date of reconnection to a pipeline until such time as production data, deliverability data, or other evidence as to the well's producing ability indicates that the well should be classified as a marginal well.

RULE 20: All wells not classified as marginal wells shall be classified as non-marginal wells.

F. REPORTING OF PRODUCTION

RULE 21(A): The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Commission on Form C-115 in accordance with Rule 1114 of the Commission Rules and Regulations, so as to reach the Commission on or before the 24th day of the month next succeeding the month in which the gas was produced. The operator shall show on such report what disposition has been made of the gas produced.

RULE 21(B): Each purchaser or taker of gas in each of the designated gas pools regulated by this order shall submit a report to the Commission so as to reach the Commission on or before the 15th day of the month next succeeding the month in which the gas was purchased or taken.

RULE 21(C): Such report shall be filed on either Form C-111 or Form C-114 (whichever is applicable) with the wells being listed in approximately the same order as they are listed on the proration schedule.

RULE 21(D): Forms C-111 and C-114 referred to herein shall be submitted in duplicate, the original being sent to the Commission at Box 871, Santa Fe, New Mexico, the other copy being sent to Box 2045, Hobbs, New Mexico.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, produced from the gas pools regulated by this order shall be flared or vented except as provided in the Special Pool Rules.

RULE 23: Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the affected well. No further allowable shall be assigned to the affected well until all rules and regulations are complied with. The Proration Manager shall notify the operator of the well and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

RULE 24: All transporters or users of gas shall file gas well connection notices with the Commission as soon as possible after the date of connection, in accordance with the provisions of Rule 8(B) of the Special Pool Rules. (Rule 24 does not actually appear in pool rules, but is Commission policy and added for information and clarification.)

(See Special Pool Rules for each pool for orders applicable to that pool only. Special Pool Rules will be found in the same classification order as in the General section, and, unless the special rules conflict with the general rule, the general rule is also applicable.)

II. SPECIAL RULES AND REGULATIONS FOR THE BLINEBRY GAS POOL

(The Blinebry Gas Pool was created February 17, 1953, and prorationing was instituted January 1, 1954.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Blinebry Gas Pool shall be 160 acres.

(Also see Rule 29 below.)

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 8(A): The pool allowable remaining each month after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells entitled to an allowable in the proportion that each well's acreage factor bears to the total of the acreage factors for all non-marginal wells in the pool.

RULE 8(B): Allowables to newly completed gas wells shall commence on the date of connection to a gas transportation facility, as determined from an affidavit furnished to the Commission (Box 2045, Hobbs, New Mexico) by the purchaser, or the date of filing of Form C-104 and C-110 and a plat (Form C-128), whichever date is the later.

(Also see Rule 29 below.)

RULE 12: The production of intermediate or low pressure gas derived from the staging of the well fluids need not be charged against the well's gas allowable, provided that the said intermediate or low pressure gas is utilized in accordance with the provisions of Rule 34 below.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, shall be flared, vented or otherwise wasted in the Blinebry Gas Pool at any time after ninety (90) days from the date of completion of a well in said pool.

Any operator desiring to obtain an exception to the foregoing provision of this rule shall submit to the Secretary-Director of the Commission an application for such exception accompanied by a sworn statement setting forth the facts and circumstances which justify such exception. The Secretary-Director is hereby authorized to grant such exception when the granting of such is necessary to protect correlative rights, prevent waste, or prevent undue hardship on the applicant. The

II. SPECIAL RULES AND REGULATIONS FOR THE BLINEBRY GAS POOL (CONT'D)

Secretary-Director shall (a) grant the exception within 15 days following receipt of the application and statement, or (b) set the application for hearing before the Commission at a regularly scheduled monthly hearing; provided, however, that no such applicant shall incur any penalty by reason of a delay in setting the application for hearing. Public notice of the hearing of the application shall be published in the manner provided by law.

Should the Secretary-Director grant an exception to the provision of Rule 22, notification of such exception shall be distributed to the Commission's regular mailing list.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Blinebry Gas Pool shall extend from a point 75 feet above the "Blinebry Marker" to a point 300 feet below the "Blinebry Marker."

The "Blinebry Marker" shall be that point encountered in the Humble Oil and Refining Company State "S" Well No. 20, SW/4 NW/4 of Section 2, Township 22 South, Range 37 East, NMPM, at a depth of 5457 feet (Elevation 3380, Subsea Datum Minus 2077).

RULE 26: Any well drilled and completed in good faith prior to April 11, 1955, which well is situated within the horizontal boundaries of the Blinebry Gas Pool as herein defined, but which produces gas from a depth interval exceeding the vertical limits of the Blinebry Gas Pool as herein defined, is hereby validated and shall be classified as a gas well in the Blinebry Gas Pool, provided that said well conforms to the definition of a gas well in said pool as set out in Rule 27(A) of these rules, and provided that the well is classified as a gas well in the Blinebry Gas Pool under the rules, regulations and orders in effect on April 10, 1955.

RULE 27(A): A gas well in the Blinebry Gas Pool shall mean a well producing from within the vertical and horizontal limits of the Blinebry Gas Pool which:

1. Produces liquid hydrocarbons possessing a gravity of 51° API or greater, or

2. Produces liquid hydrocarbons possessing a

II. SPECIAL RULES AND REGULATIONS FOR THE BLINEBRY GAS POOL (CONT'D)

gravity of less than 51° API but with a producing gas-liquid ratio of 32,000 cubic feet of gas or more per barrel of liquid hydrocarbon.

RULE 27(B): A well producing from within the horizontal and vertical limits of the Blinebry Gas Pool and not classified as a gas well, as defined in Section (A) of this rule, shall be classified as an oil well in the Blinebry Oil Pool.

RULE 28: The Proration Manager may reclassify a well under Rule 27 if production data, gas-oil ratio tests or other evidence reflects the need for such reclassification.

For proration purposes, the effective date of such reclassification shall be the first day of the next succeeding month.

The Proration Manager will notify the operator of the reclassified well of such reclassification and the effective date thereof; provided, however, that operator may appeal such reclassification to the Secretary-Director of the Commission in writing.

RULE 29: In the event an oil well in the Blinebry Oil Pool is reclassified as a gas well in the Blinebry Gas Pool, the operator of such well will be afforded the opportunity to form a non-standard gas proration unit for the well; provided, however, that, until such unit is formed, such well shall be allocated a gas allowable commensurate with the acreage contained in the unit formerly dedicated to the oil well in the Blinebry Oil Pool.

In the event such reclassification should cause the occurrence of two gas wells producing from the Blinebry Gas Pool within a single proration unit, the sum total of the allowables allocated to the two wells shall be equivalent to the volume of gas allocated to a single proration unit; provided, however, that the operator of such wells shall have the option to determine the proportion of the assigned allowable to be produced by each individual well.

RULE 30: Acreage dedicated to a gas well in the Blinebry Gas Pool shall not be simultaneously dedicated to an oil well in the Blinebry Oil Pool, and the dual completion of a well so as to produce gas from the Blinebry Gas Pool and oil from the Blinebry Oil Pool is hereby prohibited.

II. SPECIAL RULES AND REGULATIONS FOR THE BLINEBRY GAS POOL (CONT'D)

pressure gas is commingled with other low-pressure gas produced on the lease, the operator shall estimate if necessary the volume produced by each well in each pool by using the ratios as reflected in the most recent tests submitted.

(E) The Secretary-Director of the Commission shall have authority to grant exception to the provisions set forth in Sections (A) through (D) of this rule, inclusive, where it can be shown that compliance with these rules is not economic or is impractical. Applications for exception shall be submitted in triplicate to the Oil Conservation Commission, P. O. Box 871, Santa Fe, New Mexico, with a copy of each application being furnished offset operators.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

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III. SPECIAL RULES AND REGULATIONS FOR THE CROSBY-DEVONIAN GAS POOL

(The Crosby-Devonian Gas Pool was created May 27, 1955, and gas prorationing was instituted April 1, 1957.)

A. WELL LOCATION AND SPACING REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Crosby-Devonian Gas Pool shall be 160 acres. (Note: The General Rules regarding administrative approval of non-standard units do not apply to the Crosby-Devonian Gas Pool.)

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 8(A): The pool allowable remaining each month after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells entitled to an allowable in the proportion that each well's acreage factor bears to the total of the acreage factors for all non-marginal wells in the pool.

RULE 8(B): Allowables to newly completed gas wells shall commence on the date of connection to a gas transportation facility, as determined from an affidavit furnished to the Commission (Box 2045, Hobbs, New Mexico) by the purchaser, or the date of filing of Form C-104, Form C-110 and Form C-128 or the approval of a non-standard proration unit or filing of an affidavit of communitization, whichever date is the later.

RULE 8(C): The allowable revision for a well after work-over or recompletion shall become effective:

(a) On the date of reconnection after workover, such date to be determined from Form C-104 as filed by the operators, or

(b) A date 15 days prior to the approval of Form C-104 by the Commission's office, (Box 2045, Hobbs, New Mexico); (Form C-104 shall specify the exact nature of the workover or remedial work; if the nature of the work cannot be explained on Form C-104, in that event, Form C-103 shall be also filed in accordance with Rule 1106 of the Commission's Statewide Rules and Regulations.)

whichever date is later.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Crosby-Devonian Gas

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II. SPECIAL RULES AND REGULATIONS FOR THE BLINEBRY GAS POOL (CONT'D)

RULE 31: At no time will the horizontal boundaries of the Blinebry Gas Pool conflict with or overlap the horizontal boundaries of the Terry-Blinebry Oil Pool.

RULE 32: Gas-liquid ratio tests and determination of the gravity of that liquid hydrocarbon recovered from wells in the Blinebry Gas Pool shall be conducted semiannually during the months of May and October on all wells located in and producing from the Blinebry Gas Pool. Results of such tests will be reported to the Commission on Form C-116 on or before the 15th day of June and the 15th day of November of each calendar year.

RULE 33: Bottom-hole pressure tests will be conducted semiannually during the months of May and October on all gas wells located to the north of an east-west line coinciding with the north lines of Sections 21, 22, 23 and 24, Township 21 South, Range 37 East, NMPM, Lea County, New Mexico, such wells to be producing from within the vertical and horizontal boundaries of the Blinebry Gas Pool and classified as gas wells under the rules contained in this order. Results of such tests will be reported to the Commission on Form C-124 on or before the 25th day of June and the 25th day of November of each calendar year.

All bottom-hole pressure tests, except tests on dually completed wells producing from the Blinebry Gas Pool, will be conducted in accordance with Rule 302 of the Rules of the Commission. Shut-in period will be 48 hours, datum elevation will be 2400 feet subsea, (-2400), and base temperature will be 100° Fahrenheit.

Bottom-hole pressures on dually completed wells producing gas from the Blinebry Gas Pool may be calculated from a 72-hour shut-in pressure at the wellhead, provided that an accurate determination of the fluid level in the hole is made employing sonic or other methods of equivalent accuracy. The gravity of the fluid in the hole shall be that gravity determined by averaging the gravities of those fluids produced on official test in the Blinebry Gas Pool during the regular semiannual gas-liquid ratio and gravity testing period next preceding the subject bottom-hole pressure test period. The gravity to be employed in the calculation of bottom-hole pressures during a particular testing period shall be determined by the Commission. All interested operators shall be duly notified of such determination by the Commission.

II. SPECIAL RULES AND REGULATIONS FOR THE BLINEBRY GAS POOL (CONT'D)

RULE 34: The following shall apply to all producing wells in the Blinebry Gas Pool:

(A) Gas produced from each well shall be produced into a separate high-pressure separator. The high-pressure gas shall then be metered separately prior to its entering a gas transportation facility.

(B) The distillate separated from the high-pressure gas in the high-pressure separator shall then be directed into a low-pressure separator. The distillate may be commingled with other distillate produced by any other well or wells producing from the Blinebry or Tubb Gas Pools following its separation from the high-pressure gas in the high-pressure separator, provided gas-distillate test facilities are available and periodic tests are made.

Following the separation of distillate and low-pressure gas in the low-pressure separator, the low-pressure gas shall be directed into a low-pressure gas gathering system, and said low-pressure gas need not be measured separately from other low-pressure gas produced on the lease, provided that certain test facilities are available and certain periodic tests made.

(C) Each year during the months of June and July each operator of each gas well producing from the Blinebry Gas Pool shall cause to be taken an annual gas-distillate ratio test. The results of such test shall be submitted to the Commission office (P. O. Box 2045, Hobbs, New Mexico) on or before August 15 following the test. The test shall outline the amount of high-pressure gas produced during the 24-hour test period, the amount of low-pressure gas produced during the test period, the high-pressure gas-distillate ratio, and the low-pressure gas-distillate ratio.

Failure to submit the required test by August 15 shall result in suspension of any further gas allowable until the date the required information is submitted.

(D) In submitting Form C-115 (Operator's Monthly Report) on wells producing from the Blinebry zone in which distillate is commingled and/or the low-

III. SPECIAL RULES AND REGULATIONS FOR THE CROSBY-DEVONIAN GAS POOL (CONT'D)

Pool shall include all the formations that can reasonably be considered to be of Devonian age.

RULE 26: Gas-liquid ratio tests shall be taken in accordance with the provisions of Rule 301 of the Commission Rules and Regulations as scheduled by the Commission.

RULE 27: The casing program for the field shall include three strings of casing set in accordance with the following plan:

(A) The surface string shall be new or reconditioned pipe with a mill test of not less than two thousand (2,000) pounds per square inch and shall be set and cemented at a depth of approximately five hundred (500) feet, such depth being sufficient to protect the fresh water bearing sands of the Santa Rosa formation.

Cementing shall be by the pump-and-plug method, and sufficient cement shall be used to fill the annular space back of the pipe to the surface of the ground or the bottom of the cellar. Cement shall stand a minimum of sixteen (16) hours under pressure and a total of twenty-four (24) hours before drilling the plug or initiating pressure tests. Before drilling the plug, this string shall be tested by the application of at least one thousand (1,000) pounds per square inch and, if at the end of thirty (30) minutes the pressure shows a drop of one hundred fifty (150) pounds per square inch or more, the cementing job shall be condemned. After corrective measures have been taken, the pipe shall again be tested in the same manner.

(B) The intermediate string shall consist of new or reconditioned pipe that has been tested to two thousand (2,000) pounds per square inch and shall be set at approximately thirty-six hundred (3,600) feet. Cementing shall be by the pump-and-plug method, and sufficient cement shall be used to fill the calculated annular space back of the pipe to a point one hundred (100) feet above the top of the Salado formation. The cement shall stand a minimum of twenty-four (24) hours under pressure and a total of thirty (30) hours before drilling plug or initiating tests. Casing shall be tested by the application of at least twelve hundred (1,200) pounds per square inch pump pressure. If, at the end of thirty (30) minutes, the pump pressure shows a drop of one hundred (100) pounds per square inch or more, the cementing job shall be condemned. After corrective measures have been taken,

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III. SPECIAL RULES AND REGULATIONS FOR THE CROSBY-DEVONIAN GAS POOL (CONT'D)

the pipe shall again be tested in the same manner.

(C) The producing or oil string shall be new or reconditioned casing that has been tested to four thousand (4,000) pounds per square inch and shall be set at a depth not less than the top of the Devonian formation. Cementing shall be with a minimum of three hundred fifty (350) sacks of cement applied by the pump-and-plug method and shall stand a minimum of twenty-four (24) hours under pressure and a total of forty-eight (48) hours before drilling the plug or initiating tests. After cementing, the casing shall be tested by pump pressure of at least thirty (30) minutes. If, at the end of 30 minutes the pressure shows a drop of one hundred (100) pounds per square inch or more, the cementing job shall be condemned. After corrective measures have been taken, the pipe shall again be tested in the same manner.

(General Pool Rules a!so apply unless in conflict with these Special Pool Rules)

IV. SPECIAL RULES AND REGULATIONS FOR THE EUMONT GAS POOL

(The Eumont Gas Pool was created February 17, 1953, and proration was instituted January 1, 1954. The Eumont Gas Pool now includes portions of the acreage once included in the Jalco and Langmat Pools (now Jalmat) and all of the acreage formerly in the Arrow and Hardy Pools.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Eumont Gas Pool shall be 640 acres.

RULE 5(B): Any well drilled to and producing from the Eumont Gas Pool, as defined herein, prior to August 12, 1954 at a location conforming with the spacing requirements effective at the time said well was drilled, shall be granted a tolerance not exceeding 330 feet with respect to the required distance from the boundary lines.

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 8(A): The pool allowable remaining each month after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells entitled to an allowable in the proportion that each well's acreage factor bears to the total of the acreage factors for all non-marginal wells in the pool.

RULE 8(B): Allowables to newly completed gas wells shall commence on the date of connection to a gas transportation facility, as determined from an affidavit furnished to the Commission (Box 2045, Hobbs, New Mexico) by the purchaser, or the date of filing of Form C-104, Form C-110, and a plat (Form C-128), whichever date is the later.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, shall be flared or vented from any well at any time after ninety (90) days from the date such well is completed. Any operator who desires to obtain an exception to the provisions of Rule 22 of Section I of this order shall submit to the Secretary-Director of the Commission an application for such exception with a sworn statement setting forth the facts and circumstances justifying such exception. The Secretary-Director is hereby authorized to grant such an exception whenever the granting of the exception is reasonably necessary to protect correlative rights, prevent waste, or prevent undue hardship on the applicant under all the acts and circumstances as set forth in the statement. The Secretary-Director shall either (a) grant

IV. SPECIAL RULES AND REGULATIONS FOR THE EUMONT GAS POOL (CONT'D)

the exception within 15 days after receipt of the application and statement or (b) thereafter set the application for hearing by the Commission at a regular monthly hearing; provided, however, that no such applicant shall incur any penalty by reason of a delay in setting the application for hearing. Notice of hearing of the application shall be published in the manner provided by law and the Rules of the Commission. If the exception is granted by the Secretary-Director, a list of such exceptions shall be distributed in the Commission's regular mailing list.

The flaring or venting of gas from any well in violation of any provision of this rule will result in suspension of any further allowable until further order of the Commission.

RULE 22(A): Within 15 days after any oil or gas well within the boundaries of the Eumont Gas Pool is connected to a gas transportation facility, the operator shall file Form C-110 designating the disposition of gas from the well.

RULE 22(B): No extraction plant processing any gas from the Eumont Gas Pool shall flare or vent such gas unless such flaring or venting is made necessary by mechanical difficulties or unless the gas flared or vented is of no commercial value.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Eumont Gas Pool shall extend from the top of the Yates formation to the base of the Queen formation, thereby including all of the Yates, Seven Rivers and Queen formations.

RULE 26(A): A gas well shall mean a well producing with a gas-oil ratio in excess of 100,000 cubic feet of gas per barrel of oil.

RULE 26(B): A well producing from the Eumont Gas Pool and not classified as a gas well, as defined in Section (A) of this rule, shall be classified as an oil well.

RULE 26(C): Oil wells producing from the Eumont Gas Pool shall be allowed to produce a volume of gas each day not exceeding the daily normal unit oil allowable multiplied by 10,000; provided, however, that such well shall not be allowed to produce oil in excess of the normal unit allowable as ordered by the Commission under the provisions of Statewide Rule 505.

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V. SPECIAL RULES AND REGULATIONS FOR THE JALMAT GAS POOL

(The Jalmat Gas Pool was created effective September 1, 1954 from a consolidation of the Jalco and Langmat Pools, which were created February 7, 1953. Gas prorationing was instituted in Jalco and Langmat January 1, 1954 and was continued after consolidation to form the Jalmat Gas Pool. The Jalmat Gas Pool now includes acreage that was formerly included in the Jal, Cooper-Jal, Eaves, Falby-Yates, Jalco, and Langmat Pools.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Jalmat Gas Pool shall be 640 acres.

RULE 5(B): Any well drilled to and producing from the Jalmat Gas Pool, as defined herein, prior to September 1, 1954 at a location conforming with the spacing requirements effective at the time said well was drilled shall be granted a tolerance not exceeding 330 feet with respect to the required distance from the boundary lines.

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 8(A): 1. The pool allowable remaining after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells in the pool as follows:

(a) Twenty-five percent (25%) of the remaining pool allowable shall be allocated among the non-marginal wells in the pool in the proportion that each well's "Acreage Factor" bears to the total "Acreage Factor" for all non-marginal wells in the pool.

(b) Seventy-five percent (75%) of the remaining pool allowable shall be allocated among the non-marginal wells in the pool in the proportion that each well's "AD Factor" bears to the total "AD Factor" for all non-marginal wells in the pool.

2. A well's "AD Factor" shall be determined by multiplying the well's "Acreage Factor" by its "Calculated Deliverability" (expressed in MCF per day). The "AD Factor" shall be computed to the nearest whole unit. In those instances where there is more than one well on a proration unit, the "Calculated Deliverability" for the unit shall be determined by averaging the "Calculated Deliverabilities" of all the wells on the unit.

3. Annual deliverability tests shall be taken on all gas wells in the Jalmat Gas Pool in a manner and at

V. SPECIAL RULES AND REGULATIONS FOR THE JALMAT GAS POOL (CONT'D)

such time as the Commission may prescribe. The results of such tests shall determine a well's "Calculated Deliverability". The annual deliverability tests taken each year shall be used in calculating allowables for wells in the Jalmat Gas Pool for the succeeding twelve month period beginning July 1 of that year.

4. No well shall be assigned an allowable until a deliverability test has been filed with the Commission and approved.

5. The Secretary-Director of the Commission shall have authority to exempt marginal wells from the requirement of taking an annual deliverability test in those instances where the deliverability of the well is of such low volume as to have no significance in the determination of the well's allowable.

RULE 8(B): Allowables to newly completed gas wells shall commence:

1. On the date of connection to a gas transportation facility, such date to be determined from an affidavit furnished to the Commission (Box 2045, Hobbs, New Mexico) by the purchaser;

2. The latest filing date of Form C-104, C-110 or C-128; or

3. A date 45 days prior to the date upon which the well's deliverability and shut-in pressure test is reported to the Commission on Form C-122-C;

whichever date is later.

RULE 8(C): Retests and tests taken after recompletion or workover shall be taken in the same manner as provided in Rule 8(A) 3 above, and any change in the well's "Calculated Deliverability" resulting therefrom shall become effective:

1. On the date of reconnection after workover, such date to be determined from Form C-104 as filed by the operator; or

2. A date 45 days prior to the date upon which a well's deliverability and shut-in pressure test is reported to the Commission on Form C-122-C; or

3. A date 45 days prior to the receipt and approval of Form C-104 by the Commission Office (Box

V. SPECIAL RULES AND REGULATIONS FOR THE JALMAT GAS POOL (CONT'D)

2045, Hobbs, New Mexico). (Form C-104 shall specify the exact nature of the workover or remedial work. If the nature of the work cannot be explained on Form C-104, in that event, Form C-103 shall also be filed in accordance with Rule 1106 of the Commission's Statewide Rules and Regulations. Form C-128 (Well Location and Acreage Dedication Plat) shall be submitted by the operator at any time there is a change in the acreage dedicated to said well.),

whichever date is later.

G. GENERAL

RULE 22: No gas, either dry gas or casinghead gas, shall be flared or vented from any well at any time after ninety (90) days from the date such well is completed. Any operator who desires to obtain an exception to the provisions of Rule 22 of Section I of this order shall submit to the Secretary-Director of the Commission an application for such exception with a sworn statement setting forth the facts and circumstances justifying such exception. The Secretary-Director is hereby authorized to grant such an exception whenever the granting of the exception is reasonably necessary to protect correlative rights, prevent waste, or prevent undue hardship on the applicant under all the acts and circumstances as set forth in the statement. The Secretary-Director shall either (a) grant the exception within 15 days after receipt of the application and statement or (b) thereafter set the application for hearing by the Commission at a regular monthly hearing; provided, however, that no such applicant shall incur any penalty by reason of a delay in setting the application for hearing. Notice of hearing of the application shall be published in the manner provided by law and the Rules of the Commission. If the exception is granted by the Secretary-Director, a list of such exceptions shall be distributed in the Commission's regular mailing list.

The flaring or venting of gas from any well in violation of any provision of this rule will result in suspension of any further allowable until further order of the Commission.

RULE 22(A): Within 15 days after any oil or gas well within the boundaries of the Jalmat Gas Pool is connected to a gas transportation facility, the operator shall file Form C-110 designating the disposition of gas from the well.

RULE 22(B): No extraction plant processing any gas from

V. SPECIAL RULES AND REGULATIONS FOR THE JALMAT GAS POOL (CONT'D)

the Jalmat Gas Pool shall flare or vent such gas unless such flaring or venting is made necessary by mechanical difficulties or unless the gas flared or vented is of no commercial value.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25(A): The vertical limits of the Jalmat Gas Pool shall extend from the top of the Tansill formation to a point 100 feet above the base of the Seven Rivers formation, thereby including all of the Yates formation, except,

RULE 25(B): In the area described immediately below, the vertical limits of the Jalmat Gas Pool shall extend from the top of the Tansill formation to a point 250 feet above the base of the Seven Rivers formation, thereby including all of the Yates formation:

TOWNSHIP 24 SOUTH, RANGE 36 EAST, NMPM
Section 13: SE/4 NE/4, SE/4
Section 23: E/2 E/2
Section 24: All
Section 25: N/2
Section 26: E/2 NE/4

TOWNSHIP 24 SOUTH, RANGE 37 EAST, NMPM
Section 18: SW/4 NW/4, W/2 SW/4
Section 19: W/2
Section 30: NW/4

RULE 26(A): A gas well shall mean a well producing with a gas-oil ratio in excess of 100,000 cubic feet of gas per barrel of oil.

RULE 26(B): A well producing from the Jalmat Gas Pool and not classified as a gas well shall be classified as an oil well.

RULE 26(C): Oil wells producing from the Jalmat Gas Pool shall be allowed to produce a volume of gas each day not exceeding the daily normal unit oil allowable multiplied by 10,000; provided, however, that such wells shall not be allowed to produce oil in excess of the normal unit allowable as ordered by the Commission under the provisions of Rule 505.

RULE 27: That portion of the Rhodes Storage Area lying within the defined limits of the Jalmat Gas Pool shall be exempted from the applicable provisions of the Jalmat Gas Pool Rules. The Rhodes Storage Area shall include the

V. SPECIAL RULES AND REGULATIONS FOR THE JALMAT GAS POOL (CONT'D)

following described area:

TOWNSHIP 26 SOUTH, RANGE 37 EAST, NMPM
Section 4: W/2 NW/4, SE/4 SE/4, W/2 SE/4, SW/4
Section 5: All
Section 6: NE/4 NW/4, NE/4, SE/4 SE/4, N/2 SE/4
Section 7: NE/4 NE/4
Section 8: N/2, N/2 S/2, SE/4 SW/4, S/2 SE/4
Section 9: All
Section 10: W/2 NW/4, SE/4 NW/4, S/2
Sections 15 and 16: All
Section 17: E/2 NW/4, E/2
Sections 21 and 22: All
Section 23: SW/4 NW/4, SW/4
Sections 26, 27, and 28: All
Section 29: E/2 NE/4

RULE 28: The dual completion of a well so as to produce oil from the Yates and oil from the Seven Rivers or Queen formations is hereby prohibited.

RULE 29: Acreage dedicated to a gas well in the Jalmat Gas Pool shall not be simultaneously dedicated to an oil well in the Jalmat Gas Pool.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

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VI. SPECIAL RULES AND REGULATIONS FOR THE JUSTIS GAS POOL

(The Justis Gas Pool was created January 1, 1950, and gas proration was instituted January 1, 1954. The standard proration unit was changed from 160 acres to 320 acres October 3, 1957.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Justis Gas Pool shall be 320 acres.

C. ALLOCATION AND GRANTING ALLOWABLES

RULE 8(A): The pool allowable remaining each month after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells entitled to an allowable in the proportion that each well's acreage factor bears to the total of the acreage factors for all non-marginal wells in the Pool.

RULE 8(B): Allowables to newly completed gas wells shall commence on the date of connection to a gas transportation facility, as determined from an affidavit furnished to the Commission (Box 2045, Hobbs, New Mexico) by the purchaser, or the date of filing of Form C-104, Form C-110 and a plat (Form C-128), or the date of application for a non-standard gas proration unit as provided in Rule 5-C, of the General Rules.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25(A): The vertical limits of the Justis Gas Pool shall be defined as follows:

> From the top of the Glorieta formation, found at a depth of 4599 feet (Elevation 3080, Subsea Datum - 1519) in the Gulf Oil Corporation McBuffington Well No. 8, located 350 feet from the South line and 1980 feet from the West line of Section 13, Township 25 South, Range 37 East, NMPM, Lea County, New Mexico, to a point 40 feet above the marker encountered at 4879 feet (Subsea Datum - 1799) in said McBuffington Well No. 8.

RULE 25(B): The Hamilton Dome Westates Carlson Federal "A" Well No. 1, located in the NW/4 of Section 25, Township 25 South, Range 37 East, NMPM, Lea County, New Mexico, as the completion existed on April 22, 1959, shall be considered to be completed within the vertical limits of the Justis Gas Pool.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

CASE No. 1937
Order No. R-1670

VII. SPECIAL RULES AND REGULATIONS FOR THE TUBB GAS POOL

(The Tubb Gas Pool was created February 17, 1953, and proration was instituted January 1, 1954.)

A. WELL LOCATION AND ACREAGE REQUIREMENTS

RULE 5(A): A standard gas proration unit in the Tubb Gas Pool shall be 160 acres.

C. ALLOCATION AND GRANTING OF ALLOWABLES

RULE 8(A): The pool allowable remaining each month after deducting the total allowable assigned to marginal wells shall be allocated among the non-marginal wells entitled to an allowable in the proportion that each well's acreage factor bears to the total of the acreage factor for all non-marginal wells in the pool.

RULE 8(B): Allowables to newly completed gas wells shall commence on the date of connection to a gas transportation facility, as determined from an affidavit furnished to the Commission (Box 2045, Hobbs, New Mexico) by the purchaser, or the date of filing of Form C-104, Form C-110 and the plat (Form C-128), or the date of application for a non-standard gas proration unit as provided in Rule 5(C) of the General Rules, whichever date is the later.

RULE 12: The production of intermediate or low pressure gas derived from the staging of the well fluids need not be charged against the well's gas allowable, provided that the said intermediate or low pressure gas is utilized in accordance with the provisions of Rule 27 below.

H. MISCELLANEOUS SPECIAL POOL RULES

RULE 25: The vertical limits of the Tubb Gas Pool shall extend from a point 100 feet above the "Tubb Marker" to a point 225 feet below the "Tubb Marker". Said "Tubb Marker" shall be that point encountered in the Humble Oil and Regining Company State "S" Well No. 20 at a depth of 5921 feet (Elevation 3380, Subsea Datum Minus 2541).

RULE 26(A): An oil well in the Tubb Gas Pool shall be defined as a well which produces hydrocarbons possessing a gravity of 45° API or less.

RULE 26(B): An oil well in the Tubb Gas Pool shall have dedicated thereto a proration unit consisting of 40 acres, more or less, being a governmental quarter-quarter section legal subdivision of the United States Public Land Surveys.

AROUND THE WORLD

Hilton Hotel

FORT WORTH, TEXAS

March 27, 1961

New Mexico Oil & Gas Conservation Commission
Santa Fe, New Mexico

Attention: Document & Record Division

Gentlemen:

Enclosed herewith find certified copies of Testimony in Case No. 1641 , dated July 13, 1960, Case 1641, dated July 15, 1959 and Case No. 1641, dated May 7, 1959.

May I express my sincere appreciation to the Commission and its members for loaning this testimony to the writer.

Yours Very truly,

J. J. Hudson

JJH:pvb

HOME OF THE SKYSCRAPER POOL

CASE No. 1937
Order No. R-1670

VII. SPECIAL RULES AND REGULATIONS FOR THE TUBB GAS POOL (CONT'D)

Report) on wells producing from the Tubb zone in which distillate is commingled and/or the low-pressure gas is commingled with other low-pressure gas produced on the lease, the operator shall estimate if necessary the volumes produced by each well in each pool by using the ratios as reflected in the most recent tests submitted.

(E) The Secretary-Director of the Commission shall have authority to grant exception to the provisions set forth in Sections (A) through (D) of this rule, inclusive, where it can be shown that compliance with these rules is not economic or is impractical. Applications for exception shall be submitted in triplicate to the Oil Conservation Commission, P. O. Box 871, Santa Fe, New Mexico, with a copy of each application being furnished offset operators.

(General Pool Rules also apply unless in conflict with these Special Pool Rules)

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN BURROUGHS, Chairman

MURRAY E. MORGAN, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

esr/

Case 1641
EPNG Ex 3
6/7/54

PROPOSED FIELD RULES FOR ANGELS PEAK GALLUP OIL POOL

RULE 1. Any well drilled a distance of one mile or more outside the boundary of the Angels Peak Gallup Oil Pool shall be classified as a wildcat well. Any well drilled less than one mile outside the boundary of the Angels Peak Gallup Oil Pool shall be spaced, drilled, operated and prorated in accordance with the regulations in effect in the Angels Peak Gallup Oil Pool.

RULE 2. Each well drilled or recompleted within the Angels Peak Gallup Oil Pool on a standard proration unit after the effective date of this rule shall be drilled not closer than 660 feet to any boundary line of the tract nor closer than 330 feet to a quarter-quarter section line or subdivision inner boundary line. Any well drilled to and producing from the Angels Peak Gallup Oil Pool prior to the effective date of this Order at a location conforming to the spacing requirements effective at the time said well was drilled shall be considered to be located in conformance with this rule.

RULE 3. The Secretary-Director of the Commission shall have authority to grant exception to the requirements of Rule 2 without notice and hearing where a verified application therefor has been filed in due form and the necessity for the unorthodox location is based on topographical conditions or is occasioned by the recompletion of a well previously drilled to another horizon.

Applicants shall furnish all offset operators to the proposed drilling unit and all operators owning acreage within a 1980-foot radius of the subject well a copy of the application to the Commission, and applicant shall include with his application a list of names and addresses of all operators within such radius, together with a stipulation that proper notice has been given said operators at the addresses given. The Secretary-Director of the Commission shall wait at least 20 days before approving any such unorthodox location, and shall approve such unorthodox location only in the absence of objection of any offset operators. In the event an operator objects to the unorthodox location the Commission shall consider the matter only after proper notice and hearing.

RULE 4. (a) Each well completed or recompleted in the Angels Peak Gallup Oil Pool as an oil well shall be located on a tract consisting of approximately 80 acres comprising any two contiguous quarter-quarter sections of a single governmental section, being a legal subdivision of the United States Public Lands Survey, and each well completed or recompleted in the Angels Peak Gallup Oil Pool as a gas well shall be located on a tract consisting of approximately 320 acres comprising any two contiguous quarter sections of a single governmental section, being a legal subdivision of the United States Public Lands Survey.

(b) The Secretary of the Commission shall have authority to grant an exception to Rule 4 (a) without notice and hearing where application has been filed in due form and where the following facts exist and the following provisions are complied with.

1. The non-standard proration unit consists of contiguous quarter-quarter sections or lots.

2. The non-standard proration unit lies wholly within a single governmental section.

3. The entire non-standard proration unit may reasonably be presumed to be productive of gas, and/or oil.

4. The length of width of the non-standard gas proration unit does not exceed 5280 feet, and the length of width of the non-standard oil proration unit does not exceed 2640 feet.

5. That applicant presents written consent in the form of waivers from all offset operators and from all operators owning interests in the section in which any part of the non-standard gas proration unit is situated and which acreage is not included in said non-standard gas proration unit.

6. In lieu of Paragraph 5 of this Rule, the applicant may furnish proof of the fact that all of the aforesaid operators were notified by registered mail of his intent to form such non-standard gas proration unit. The Secretary of the Commission may approve the application, if, after a period of 30 days following the mailing of said notice, no operator has made objection to the formation of such non-standard gas or oil proration unit.

RULE 5. The provisions of Paragraph (k) of Statewide Rule 104 shall not apply to the Angels Peak Gallup Oil Pool, San Juan County, New Mexico.

RULE 6. An oil well in the Angels Peak Gallup Oil Pool shall be a well producing with a gas-oil ratio of less than 30,000 cubic feet of gas per barrel of oil.

RULE 7. A gas well in the Angels Peak Gallup Oil Pool shall be any well producing with a gas-oil ratio of 30,000 cubic feet of gas per barrel of oil or more.

RULE 8. No acreage shall be simultaneously dedicated to an oil well and to a gas well in the Angels Peak Gallup Oil Pool.

RULE 9. No gas, either dry gas or casinghead gas, produced from the Angels Peak Gallup Oil Pool shall be flared or vented.

RULE 10. In order to prevent waste, the gas-oil ratio limitation for the Angels Peak Gallup Oil Pool shall be 2,000 cubic feet of gas per barrel of oil produced.

RULE 11. The monthly gas production from each well and from each common source of supply shall be metered separately, and the gas production and associated liquid hydrocarbon production therefrom shall be reported to the Commission in accordance with the applicable Commission Rules and Regulations.

RULE 12. Gas-oil ratio tests shall be taken in the Angels Peak Gallup Oil Pool in the months of March and April and September and October each year in addition to the initial gas-oil ratio tests required under Statewide Rule 301. In accordance with the provisions of Statewide Rule 301-B, the results of these gas-oil ratio tests shall be reported to the Commission on Form C-116 no later than the 10th of the month following the close of the survey period and shall become effective on the first day of the second month following the close of the survey period.

RULE 13. In order to obtain needed reservoir data, bottom hole pressure tests shall be taken immediately following the gas-oil ratio tests required in Rule 12 and reported to the Commission on Form C-124 in compliance with the provisions of Statewide Rule 302, provided, however, that the well shall remain shut-in a minimum of 72 hours and then calculated to a sea level datum of +500 feet.

RULE 14. (a) Any oil well completed on a tract of less than 80 acres in the Angels Peak Gallup Oil Pool shall be permitted to produce an allowable equivalent to the amount determined by ratio which has the acreage dedicated to the unit as its numerator and 80 acres as its denominator times the normal unit allowable for an 80-acre oil well producing at the depth of the Angels Peak Gallup reservoir.

(b) Any gas well completed on a tract of less than 320 acres in the Angels Peak Gallup Oil Pool shall be permitted to produce an allowable equivalent to the amount determined by ratio which has the acreage dedicated to the unit as its numerator and 320 acres as its denominator times the normal unit allowable for a 320-acre gas well producing at the depth of the Angels Peak Gallup reservoir.

(c) For purposes of determining the permitted gas production, the allowable of a top allowable oil well shall be determined by multiplying the normal unit allowable for the Northwest Area by a factor of 2.77, as provided in Statewide Rule 505. The gas limit for a normal 80-acre unit will then be determined in accordance with the limiting ratio as hereinabove set out and in accordance with Statewide Rule 506. Gas wells as classified in compliance with this Order will be permitted to produce up to four times the permitted 80-acre gas limit based on the actual number of acres dedicated to the particular gas well. For purposes of this Rule, any well that has between 316 and 324 acres dedicated to it shall be deemed to be a standard gas unit.

Sub-back 4000

PROPOSED SPECIAL RULES AND REGULATIONS IN THE
ANGELS PEAK GALLUP GAS POOL

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
CASE 4000 EXHIBIT No. 3
CASE 4000 Rehearing

A. WELL LOCATION AND ACREAGE REQUIREMENTS

Rule 1:

Pertains to pool wells and wildcat wells--General Rules applicable.

Rule 2:

Pertains to spacing--General Rules applicable because General Rules provides "except as provided in the Special Pool Rules."

Special Rule 2:

Each well drilled or recompleted within the Angels Peak Gallup Gas Pool on a standard proration unit, after the effective date of this Rule, shall be drilled not closer than 660' to any boundary line of the tract, nor closer than 330' to a quarter-quarter section line or subdivision inner boundary line. Any well drilled to and producing from the Angels Peak Gallup Gas Pool prior to the effective date of this Order, at a location conforming to the spacing requirements in effect at the time said well was drilled, shall be considered to be located in conformance with this Rule.

Rule 3:

Pertains to exceptions to the spacing provisions--General Rules applicable.

Rule 4:

Pertains to the exception of these rules to statewide Rule 104, paragraph (k)--General Rules applicable.

Special Rule 5 (A):

The acreage allocated to an oil or gas well for proration purposes shall be known as the oil or gas proration unit for that well. Each well completed or recompleted in the Angels Peak Gallup Gas Pool on a standard proration unit as a gas well shall be located on a proration unit on approximately 320 acres comprising any two contiguous quarter sections of a single governmental section being a legal subdivision of the U. S. Public Land Surveys, and each well completed or recompleted in the Angels Peak Gallup Gas Pool on a standard proration unit as an oil well shall be located on a proration unit of approximately 80 acres comprising any two contiguous quarter-quarter sections of a single governmental section being a legal

subdivision of the U. S. Public Land Surveys. Any gas proration unit containing between 316 and 324 acres shall be considered to contain the number of acres in a standard unit for the purposes of computing allowables.

Rule 5 (B):

Provides for administrative approval for non-standard proration units--General Rules applicable.

B. NOMINATIONS AND PRORATION SCHEDULE

Rule 6 (A):

Provides for preliminary nominations--General Rules applicable.

Rule 6 (B):

Defines the term "gas purchasers"--General Rules applicable.

Rule 7 (A):

Provides for supplemental nominations--General Rules applicable.

Rule 7 (B):

Provides that wells shall be listed on a proration schedule--General Rules applicable.

C. ALLOCATION AND GRANTING OF ALLOWABLES

Rule 8 (A):

Provides that total allowable of the pool shall be equal to the preliminary or supplemental nominations with any adjustments which the Commission deems advisable--General Rules applicable.

Rule 8 (B) 1:

Provides no gas well to be given an allowable until certain forms have been filed--General Rules applicable.

2. Provides that deliverability test must be taken--General Rules applicable.

Special Rule 4 (B) 3:

No oil well shall be given an allowable until Form C-104 and Form C-116 have been filed, together with a plat (Form C-128) showing acreage attributed to said well and the location of all wells on the lease.

Rule 6 (C):

Provides when allowables to newly completed gas well shall commence General Rules applicable.

Special Rule 6 (D):

Allowables to wells whose classification has changed from oil to gas, based on the results of a gas-oil ratio test, will commence on the effective date of the new gas-oil ratio as provided in Special Rule 4; provided that:

1) A deliverability test is taken in conformance with the provisions of Order R-333-C and 3, as amended by Order R-333-I and is submitted to the Commission within 45 days of the effective date of reclassification. In no event will a gas allowable be granted for a date more than 45 days prior to the date the well's initial deliverability and shut-in pressure test is reported to the Commission on Form C-122-A, in conformance with the provisions of Orders R-333-C and 3, as amended by Order R-333-I;

2) A plat, Form C-128, showing the acreage attributed to said gas well and the location of all wells on the lease, and a new Form C-104 and Form C-116 has been filed.

Rule 9 (A):

Provides method for calculating "A factor" ... General Rules applicable.

Rule 9 (B):

Provides for allowable which shall be assigned to ... General Rules applicable.

Rule 9 (C) 1 and 2:

Provides for specific method of calculating allowables ... General Rules applicable.

Rule 9 (D):

Provides that deliverability tests become effective on ... of the year following the year in which test is taken. ... General Rules applicable.

Special Rule 9 (E):

1. Oil wells in the Angels Peak Gallup Gas Pool on an ... standard proration unit shall be permitted to produce ... based on the normal unit allowable for Northwestern New ... times a proportional factor of 2.77 times the limiting gas-oil ratio for the Angels Peak Gallup Gas Pool.

2. Gas wells in the Angels Peak Gallup Gas Pool shall be ... to produce, subject to market demand fluctuations, up to ... the permitted 80 acre gas limit (over a six months proration period) as determined above, ... ratio -- the numerator of which is the number of acres ... to the particular gas well and the denominator of which ...

Rule 10 (A):

Provides for procedures in case acreage assigned to a well ... increased -- ... General Rules applicable.

Rule 10 (B):

Provides for effective date of a new allowable due to ... deliverability after retest or after recompletion or ... General Rules applicable.

Rule 10 (C):

Provides that deliverability be determined in accordance with the provisions of Order R-333-C and D, as amended by R-333-E, and provides for exceptions to annual deliverability test requirements -- General Rules applicable.

Special Rule 10 (C):

Gas wells in the Angels Peak Gallup Gas Pool shall have deliverability tests taken in conformance with the procedure outlined in Section b (procedure pertaining to the Mesa Verde Formation) of Order R-333-C and D, as amended by Order R-333-E.

Rule 11:

Provides that the Commission may assign minimum allowables in order to prevent premature abandonment -- General Rules applicable.

Rule 12:

Provides that all production shall be charged against the well's allowable -- General Rules applicable.

D. BALANCING OF PRODUCTION

Rule 13:

Provides for balancing dates and proration periods -- General Rules applicable.

Rule 14 (A):

Provides that underproduction accrued in one proration period may be carried forward into the next proration period before cancellation -- General Rules applicable.

Rule 14 (B):

Provides for method of making up underproduction -- General Rules applicable.

Rule 15 (A):

Provides that overproduction accrued in one proration period may be carried forward into the next proration period -- General Rules applicable.

Rule 15 (B):

Provides that any time a well is six times overproduced its current allowable it shall be shut-in until it is underproduced less than six times its current allowable -- General Rules applicable.

Rule 15 (C):

Provides for method of making up overproduction-- General Rules applicable.

Rule 15 (D):

Provides that overproduction may be made up at a lesser rate than complete shut-in --
General Rules applicable.

Rule 15 (E):

Provides that allowable assigned to a well through cancellation and redistribution shall be applied against overproduction -- General Rules applicable.

B. CLASSIFICATION OF WELLS

Rule 16 (A):

Provides for classification of marginal well--General Rules applicable.

Rule 16 (B):

Provides that Secretary-Director may reclassify wells--General Rules applicable.

Rule 17:

Provides that a marginal well is not permitted to accumulate underproduction--General Rules applicable.

Rule 18:

Provides for method of reclassification of a marginal well to a non-marginal well--General Rules applicable.

Rule 19:

Provides that a reworked or recompleted well shall be classified as non-marginal upon reconnection--General Rules applicable.

Rule 20:

Provides that all wells not classified as marginal wells shall be classified as non-marginal wells--General Rules applicable.

F. REPORTING OF PRODUCTION

Rules 21 (A) (B) (C) and (D):

Provides that gas production shall be metered separately and reported to the Commission in accordance with appropriate Statewide Rules--General Rules applicable.

G. GENERAL

Rule 22:

No flare provision--General Rules applicable.

Rule 23:

Provides that failure to comply with Order will result in cancellation of allowable -- General Rules applicable.

Rule 24:

Provides that all transporters shall file connection notices -- General Rules applicable.

H. MISCELLANEOUS SPECIAL POOL RULES

Special Rule 25:

The vertical limits of the Angels Peak Gallup Gas Pool shall be the Gallup Formation.

Special Rule 26:

A gas well in the Angels Peak Gallup Gas Pool shall be any well producing with a gas-oil ratio of 30,000 cu. ft. of gas per bbl. of oil, or more.

Special Rule 27:

An oil well in the Angels Peak Gallup Gas Pool shall be a well producing with a gas-oil ratio of less than 30,000 cu. ft. of gas per bbl. of oil.

Special Rule 28:

Gas-oil ratio tests shall be taken on all wells in the Angels Peak Gallup Gas Pool and on all wells producing from the Gallup Formation within one mile of the boundaries of the Angels Peak Gallup Gas Pool during the first fifteen days of the months of January, April, July, and October of each year. Tests shall be 24-hour tests, being the final 24 hours of a 72-hour period during which the well shall be produced at a constant rate of production to be determined by the operator, but in no event shall the rate be less than that necessary to produce the gas limit if the well is capable of producing the gas limit. Results of such tests shall be filed on Commission Form C-116 within ten days after the close of each test period and shall become effective on the first of the month following the test period. At least 72 hours prior to commencement of any such gas-oil ratio tests, each operator shall file with the Aztec office of the Commission a Test Schedule for its wells, specifying the time

each of its wells is to be tested. Copies of the Test Schedule shall also be furnished to all offset operators. The Secretary-Director may extend the 15-day testing period if future development indicates that 15 days does not allow sufficient time for operators to adequately test all of their wells.

Special Rule 29:

No acreage shall be simulatancously dedicated to an oil well and to a gas well in the Angels Peak Gallup Gas Pool.

Special Rule 30:

In order to prevent waste, the gas-oil ratio limitation for the Angels Peak Gallup Gas Pool shall be 4,000 cu. ft. of gas per bbl. of oil produced.

EXHIBIT 5

PROPOSED FIELD RULES FOR ANGELS PEAK GALLUP OIL POOL

RULE 1. Any well drilled a distance of one mile or more outside the boundary of the Angels Peak Gallup Oil Pool shall be classified as a wildcat well. Any well drilled less than one mile outside the boundary of the Angels Peak Gallup Oil Pool shall be spaced, drilled, operated and prorated in accordance with the regulations in effect in the Angels Peak Gallup Oil Pool.

RULE 2. Each well drilled or recompleted within the Angels Peak Gallup Oil Pool on a standard proration unit after the effective date of this rule shall be drilled not closer than 660 feet to any boundary line of the tract nor closer than 330 feet to a quarter-quarter section line or subdivision inner boundary line. Any well drilled to and producing from the Angels Peak Gallup Oil Pool prior to the effective date of this Order at a location conforming to the spacing requirements effective at the time said well was drilled shall be considered to be located in conformance with this rule.

RULE 3. The Secretary-Director of the Commission shall have authority to grant exception to the requirements of Rule 2 without notice and hearing where a verified application therefor has been filed in due form and the necessity for the unorthodox location is based on topographical conditions or is occasioned by the recompletion of a well previously drilled to another horizon.

Applicants shall furnish all offset operators to the proposed drilling unit and all operators owning acreage within a 1980-foot radius of the subject well a copy of the application to the Commission, and applicant shall include with his application a list of names and addresses of all operators within such radius, together with a stipulation that proper notice has been given said operators at the addresses given. The Secretary-Director of the Commission shall wait at least 20 days before approving any such unorthodox location, and shall approve such unorthodox location only in the absence of objection of any offset operators. In the event an operator objects to the unorthodox location the Commission shall consider the matter only after proper notice and hearing.

RULE 4. (a) Each well completed or recompleted in the Angels Peak Gallup Oil Pool as an oil well shall be located on a tract consisting of approximately 80 acres comprising any two contiguous quarter-quarter sections of a single governmental section, being a legal subdivision of the United States Public Lands Survey, and each well completed or recompleted in the Angels Peak Gallup Oil Pool as a gas well shall be located on a tract consisting of approximately 320 acres comprising any two contiguous quarter sections of a single governmental section, being a legal subdivision of the United States Public Lands Survey.

(b) The Secretary of the Commission shall have authority to grant an exception to Rule 4 (a) without notice and hearing where application has been filed in due form and where the following facts exist and the following provisions are complied with.

1. The non-standard proration unit consists of contiguous quarter-quarter sections or lots.

2. The non-standard proration unit lies wholly within a single governmental section.

3. The entire non-standard proration unit may reasonably be presumed to be productive of gas and/or oil.

4. The length of width of the non-standard gas proration unit does not exceed 5280 feet, and the length of width of the non-standard oil proration unit does not exceed 2640 feet.

5. That applicant presents written consent in the form of waivers from all offset operators and from all operators owning interests in the section in which any part of the non-standard gas proration unit is situated and which acreage is not included in said non-standard gas proration unit.

6. In lieu of Paragraph 5 of this Rule, the applicant may furnish proof of the fact that all of the aforesaid operators were notified by registered mail of his intent to form such non-standard gas proration unit. The Secretary of the Commission may approve the application, if, after a period of 30 days following the mailing of said notice, no operator has made objection to the formation of such non-standard gas or oil proration unit.

RULE 5. The provisions of Paragraph (k) of Statewide Rule 104 shall not apply to the Angels Peak Gallup Oil Pool, San Juan County, New Mexico.

RULE 6. An oil well in the Angels Peak Gallup Oil Pool shall be a well producing with a gas-oil ratio of less than 30,000 cubic feet of gas per barrel of oil.

RULE 7. A gas well in the Angels Peak Gallup Oil Pool shall be any well producing with a gas-oil ratio of 30,000 cubic feet of gas per barrel of oil or more.

RULE 8. No acreage shall be simultaneously dedicated to an oil well and to a gas well in the Angels Peak Gallup Oil Pool.

RULE 9. No gas, either dry gas or casinghead gas, produced from the Angels Peak Gallup Oil Pool shall be flared or vented.

RULE 10. In order to prevent waste, the gas-oil ratio limitation for the Angels Peak Gallup Oil Pool shall be 2,000 cubic feet of gas per barrel of oil produced.

RULE 11. The monthly gas production from each well and from each common source of supply shall be metered separately, and the gas production and associated liquid hydrocarbon production therefrom shall be reported to the Commission in accordance with the applicable Commission Rules and Regulations.

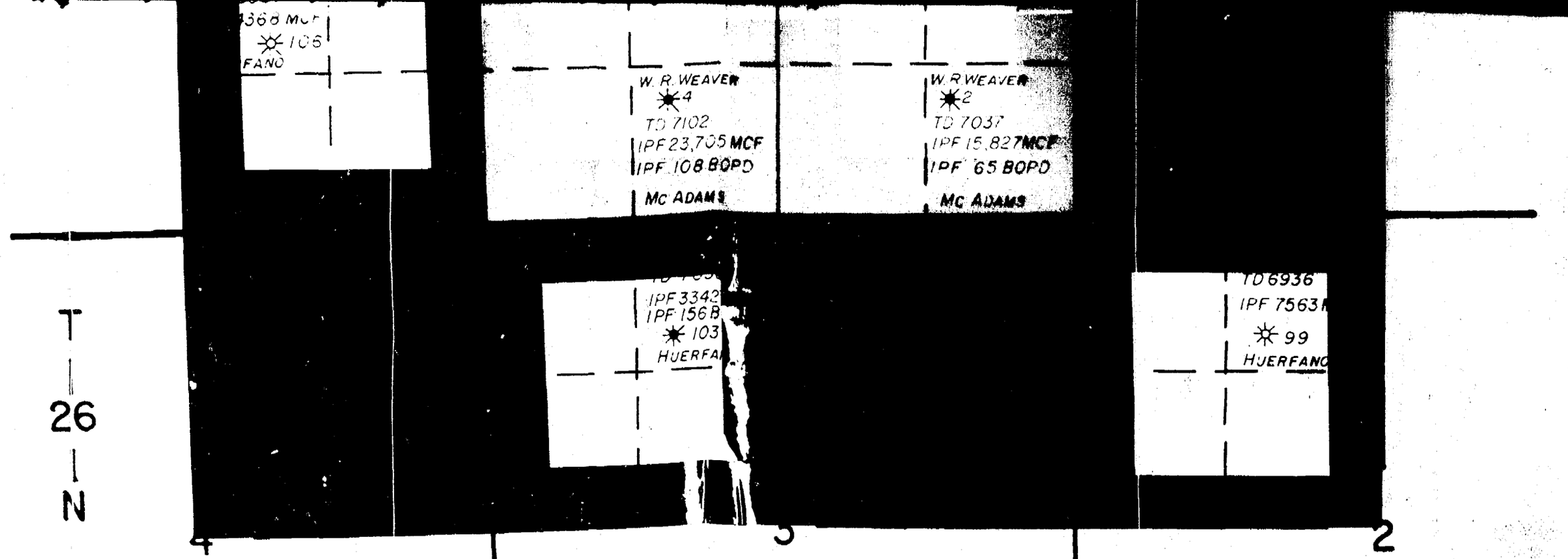
RULE 12. Gas-oil ratio tests shall be taken in the Angels Peak Gallup Oil Pool in the months of March and April and September and October each year in addition to the initial gas-oil ratio tests required under Statewide Rule 301. In accordance with the provisions of Statewide Rule 301-B, the results of these gas-oil ratio tests shall be reported to the Commission on Form C-116 no later than the 10th of the month following the close of the survey period and shall become effective on the first day of the second month following the close of the survey period.

RULE 13. In order to obtain needed reservoir data, bottom hole pressure tests shall be taken immediately following the gas-oil ratio tests required in Rule 12 and reported to the Commission on Form C-124 in compliance with the provisions of Statewide Rule 302, provided, however, that the well shall remain shut-in a minimum of 72 hours and then calculated to a sea level datum of +500 feet.

RULE 14. (a) Any oil well completed on a tract of less than 80 acres in the Angels Peak Gallup Oil Pool shall be permitted to produce an allowable equivalent to the amount determined by ratio which has the acreage dedicated to the unit as its numerator and 80 acres as its denominator times the normal unit allowable for an 80-acre oil well producing at the depth of the Angels Peak Gallup reservoir.

(b) Any gas well completed on a tract of less than 320 acres in the Angels Peak Gallup Oil Pool shall be permitted to produce an allowable equivalent to the amount determined by ratio which has the acreage dedicated to the unit as its numerator and 320 acres as its denominator times the normal unit allowable for a 320-acre gas well producing at the depth of the Angels Peak Gallup reservoir.

(c) For purposes of determining the permitted gas production, the allowable of a top allowable oil well shall be determined by multiplying the normal unit allowable for the Northwest Area by a factor of 2.77, as provided in Statewide Rule 505. The gas limit for a normal 80-acre unit will then be determined in accordance with the limiting ratio as hereinabove set out and in accordance with Statewide Rule 506. Gas wells as classified in compliance with this Order will be permitted to produce up to four times the permitted 80-acre gas limit based on the actual number of acres dedicated to the particular gas well. For purposes of this Rule, any well that has between 316 and 324 acres dedicated to it shall be deemed to be a standard gas unit.



ANGEL PEAK GALLUP POOL SPACING

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EPNG EXHIBIT NO. 1-A
CASE 1641 De Novo

HUERFANO UNIT (COMM.)

NOT COMMITTED

B.D.C. 4

R — 10 — W

T

27

HUERFANO UNIT

W. P. WEAVER
1
TD 6,185
IPF 9010 MCF
IPF 72 BOPD
MC ADAMS

W. P. WEAVER
3
TD 7085
IPF 11,912 MCF
IPF 10 BOPD
MC ADAMS

N

34

GAS-OIL RATIO TEST
ANGELS PEAK GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO

Operator Lease & Well	Test Date	Oil Prod. BOPD	GOR Cu. Ft./Bbl.
W. R. Weaver			
McAdams No. 1	3-28-59	23	88,550
McAdams No. 2	3-28-59	28	120,930
McAdams No. 3	3-28-59	104	5,221 Oil
McAdams No. 4	3-28-59	28	116,636
El Paso Natural Gas			
Huerfano Unit No. 99	3-26-59	43	55,506
Huerfano Unit No. 103	3-15-59	23	98,947
Huerfano Unit No. 105	3-28-59	87	11,210 Oil
Huerfano Unit No. 106	4-30-59	59	62,983
Huerfano Unit No. 107	3-29-59	290	2,573 Oil
Huerfano Unit No. 92	4-11-59	8	47,375
Pan American Petroleum Corp.			
McAdams "B" No. 1	6-30-59	28	10,173 Oil
McAdams "B" No. 2	7-5-59	112	4,220 Oil

Pan Am.

Ex #3A

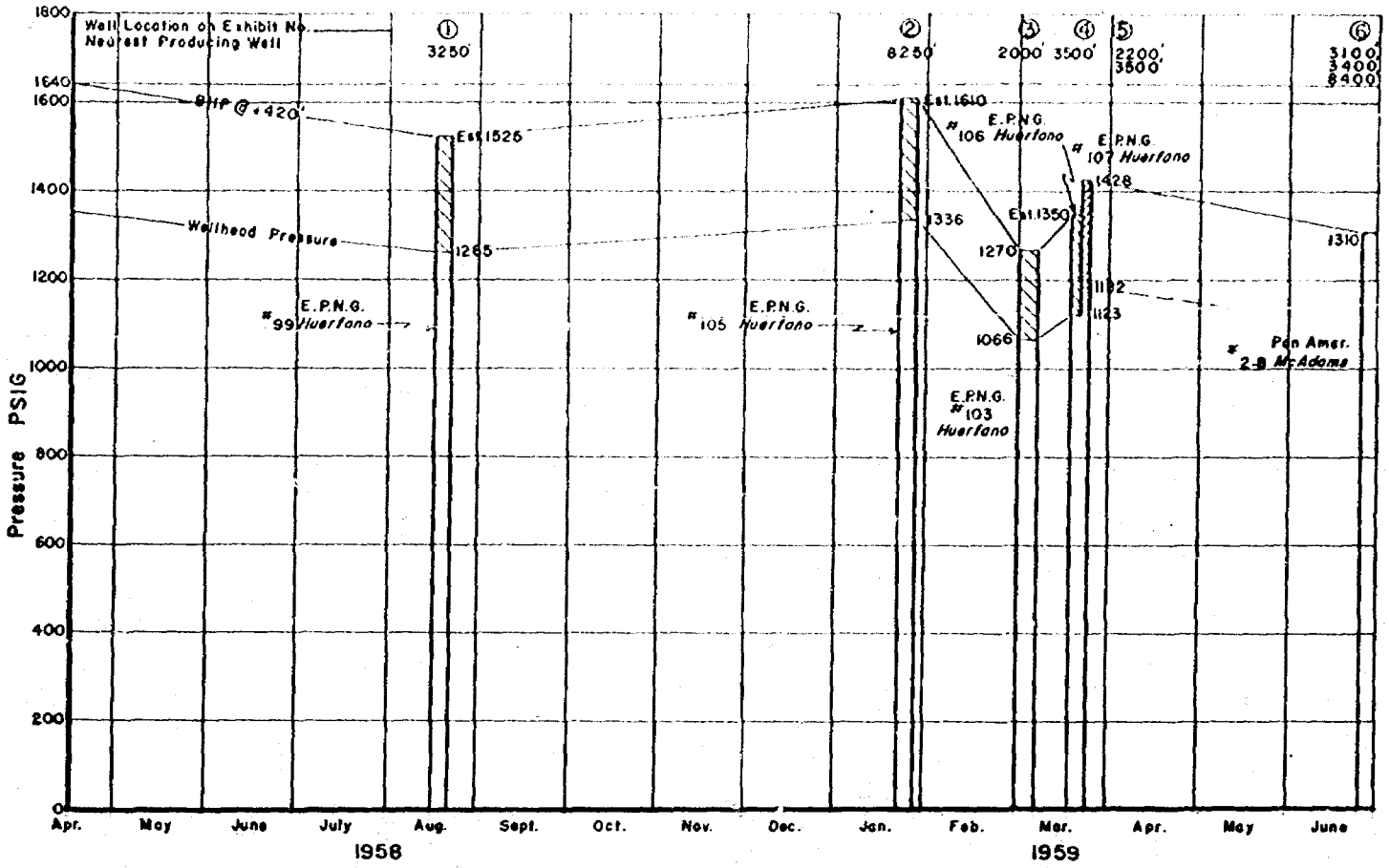
PRESSURE DATA
ANGELS PEAK GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO

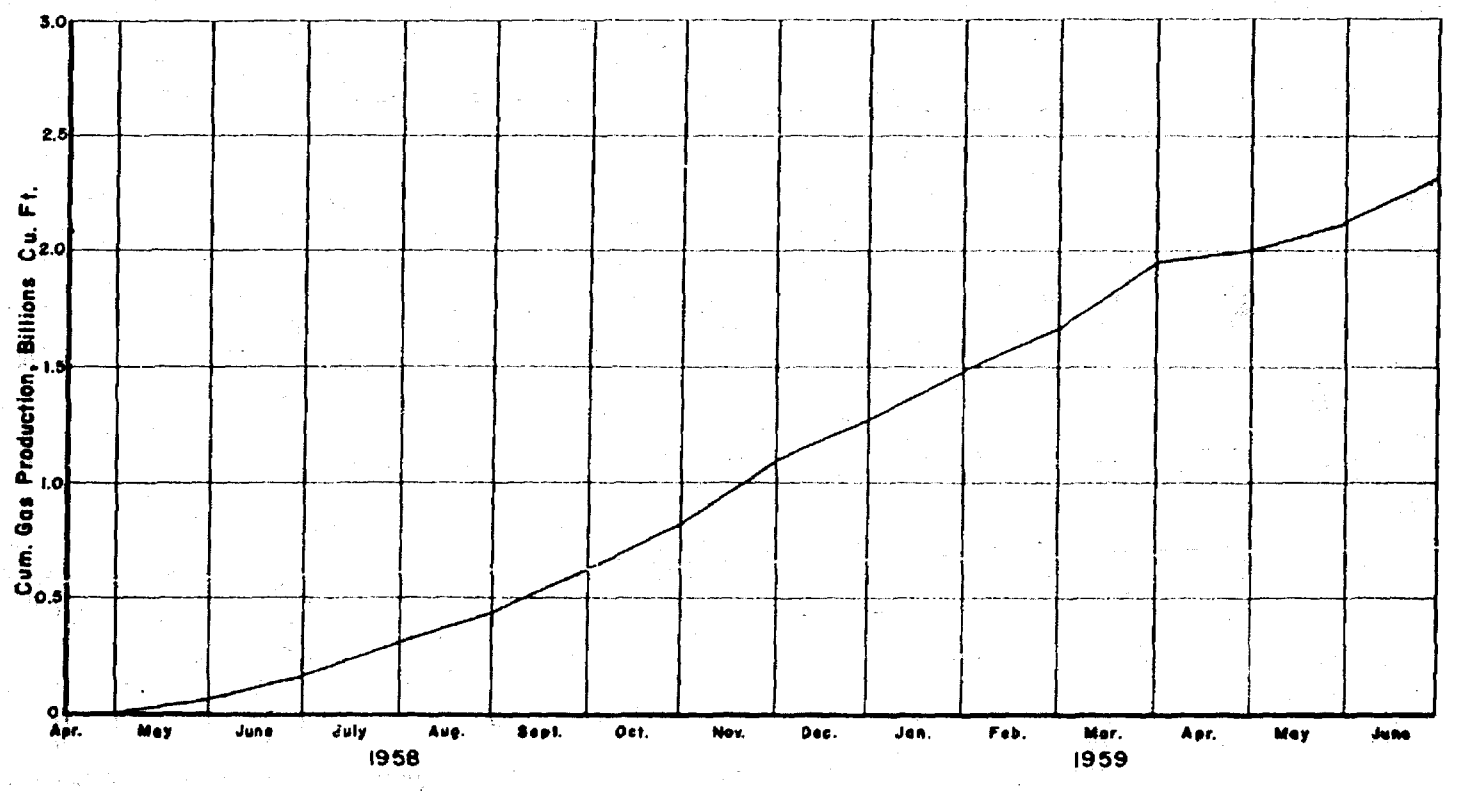
Operator Lease & Well	Shut-In Surface Pressure PSIG (Dead Wt. Meas.)	Shut-In Time-Days	Date Pressure Measured	Date of First Prod. (NMOGEC)	Cum. to Test Date - MCF (NMOGEC)	Calculated BHP - PSIG (Datum +450)	Bomb Meas. BHP - PSIG (Datum +450)
W. R. Weaver							
McAdams No. 1	1356	7	4-29-58	April, 1958	1;486	1620	
	1090	7	12-6-58		350,903	1300	
McAdams No. 2	1187	7	8-20-58	May, 1958	169,847	1410	
	1094	7	12-6-58		354;231	1303	
	1066	7	6-15-59		522,700	1268	
McAdams No. 3	1218	7	9-3-58	Nov., 1958	0	1450	
	757	7	10-23-58		0	Non-representative Surf. Press.	
McAdams No. 4	1081	7	8-27-58	Sept.,1958	0	1290	
	976	7	12-22-58		475;200	1162	
	956	7	6-15-59		765,200	1140	
El Paso Natural Gas Co.							
Huerfano Unit No. 92	1325	7	7-3-58	April,1959	0	1575	
	1333	7	3-20-59		0	1585	
Huerfano Unit No. 99	1269	7	8-19-58	Feb., 1959	0	1512	
Huerfano Unit No. 103	1088	9	1-17-59	March,1959	0	1295	
	1066	42	3-4-59		0	1270	1267
Huerfano Unit No. 106	1123	7	3-20-59	April,1959	0	1320	
Huerfano Unit No. 107	1182	33	3-25-59	April,1959	0	1412	1425
Pan American							
McAdams "B" No. 2	--	3	6-26-59	--	0	--	1300

NOTE: May and June, 1959, Production estimated to be equal to allowable.

Case 1641
Exhibit No. 4
Witness

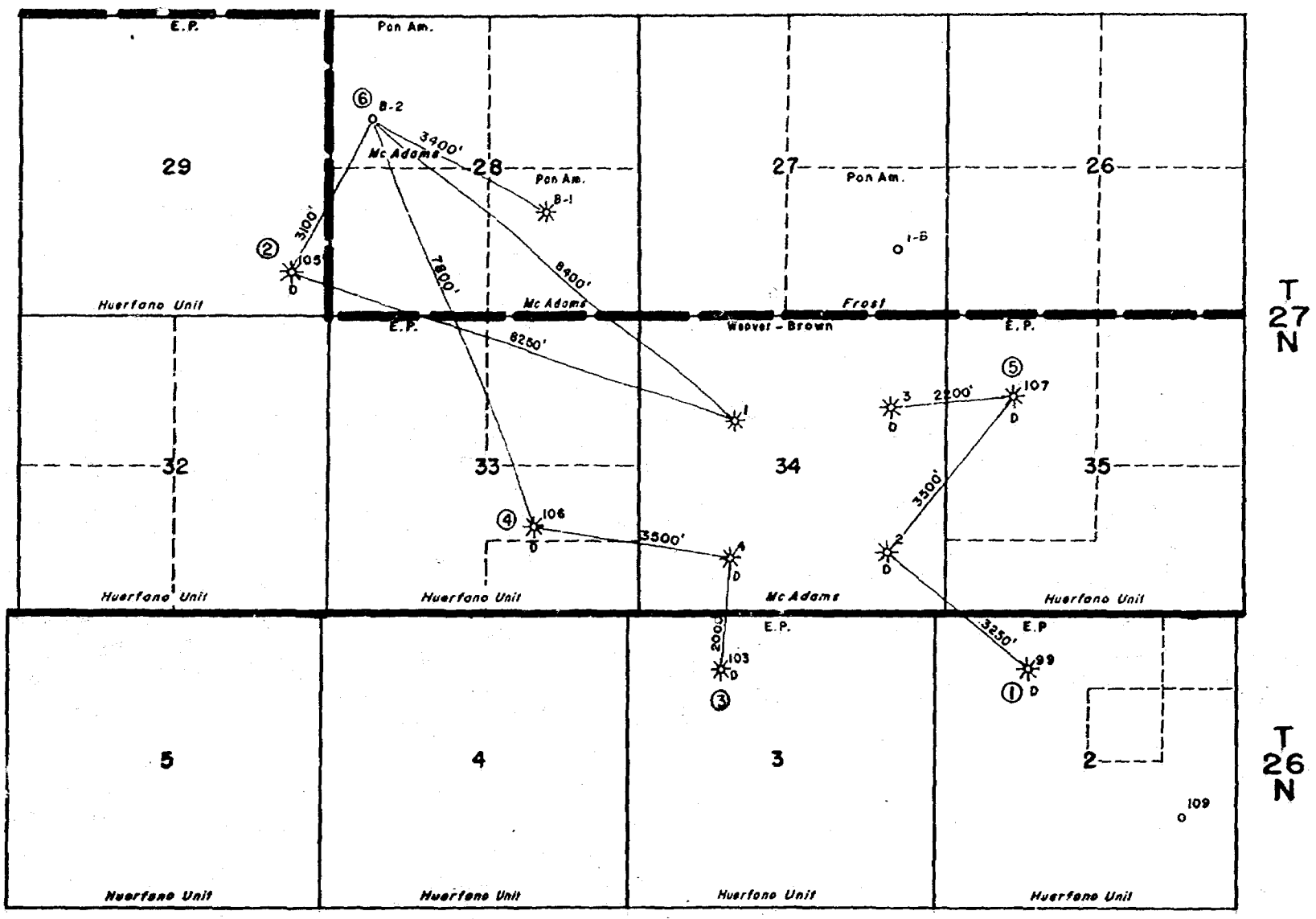
ANGELS PEAK GALLUP FIELD
INITIAL SHUT-IN PRESSURES AND CUMULATIVE GAS PRODUCTION VERSUS TIME





Case 1641
Exhibit No. 4
Witness

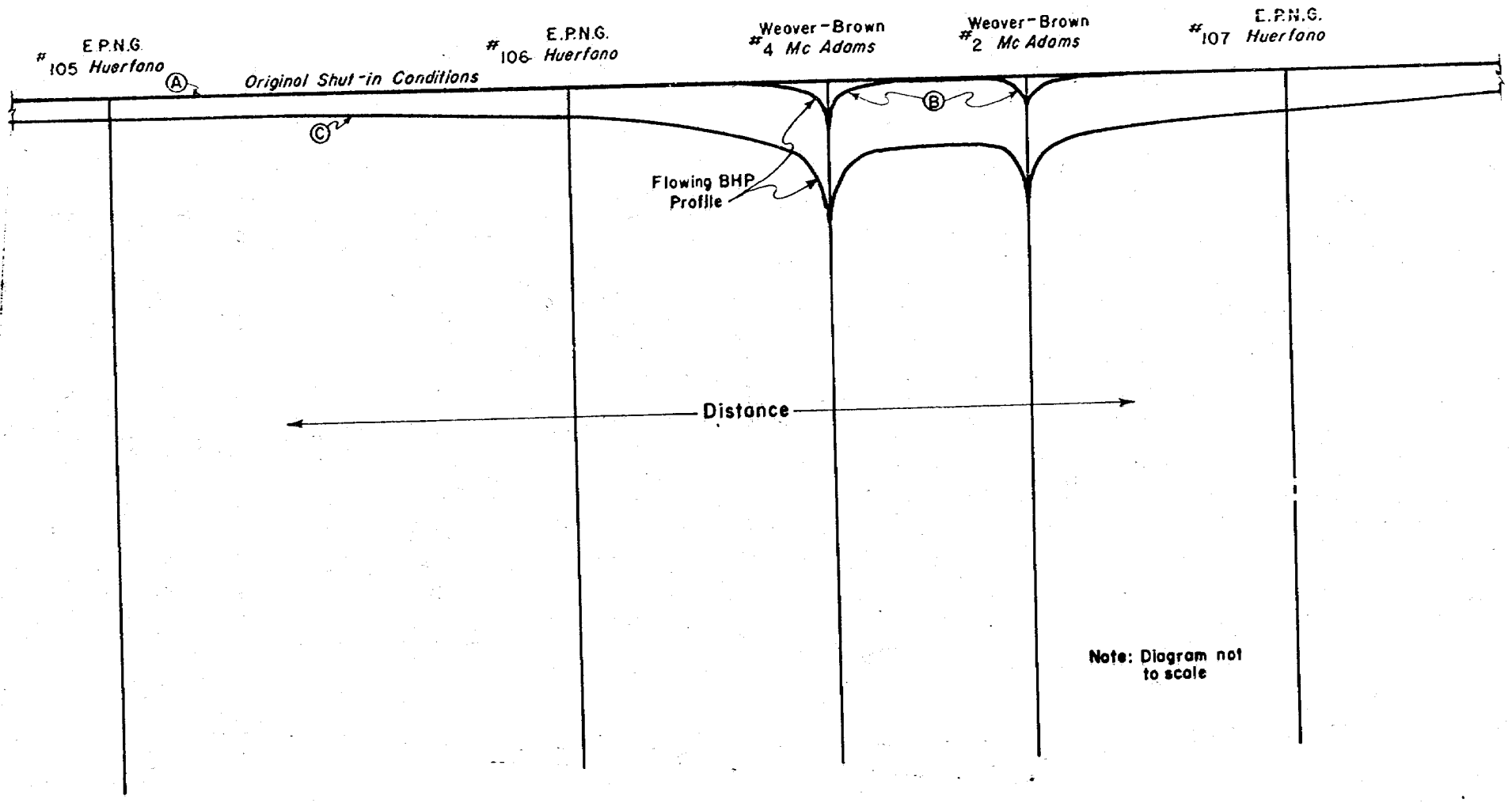
PLAT SHOWING PORTION OF THE ANGELS PEAK GALLUP FIELD



Scale: 2" = 1 Mile

Case 1641
Exhibit No. 2-D
Witness Ethers

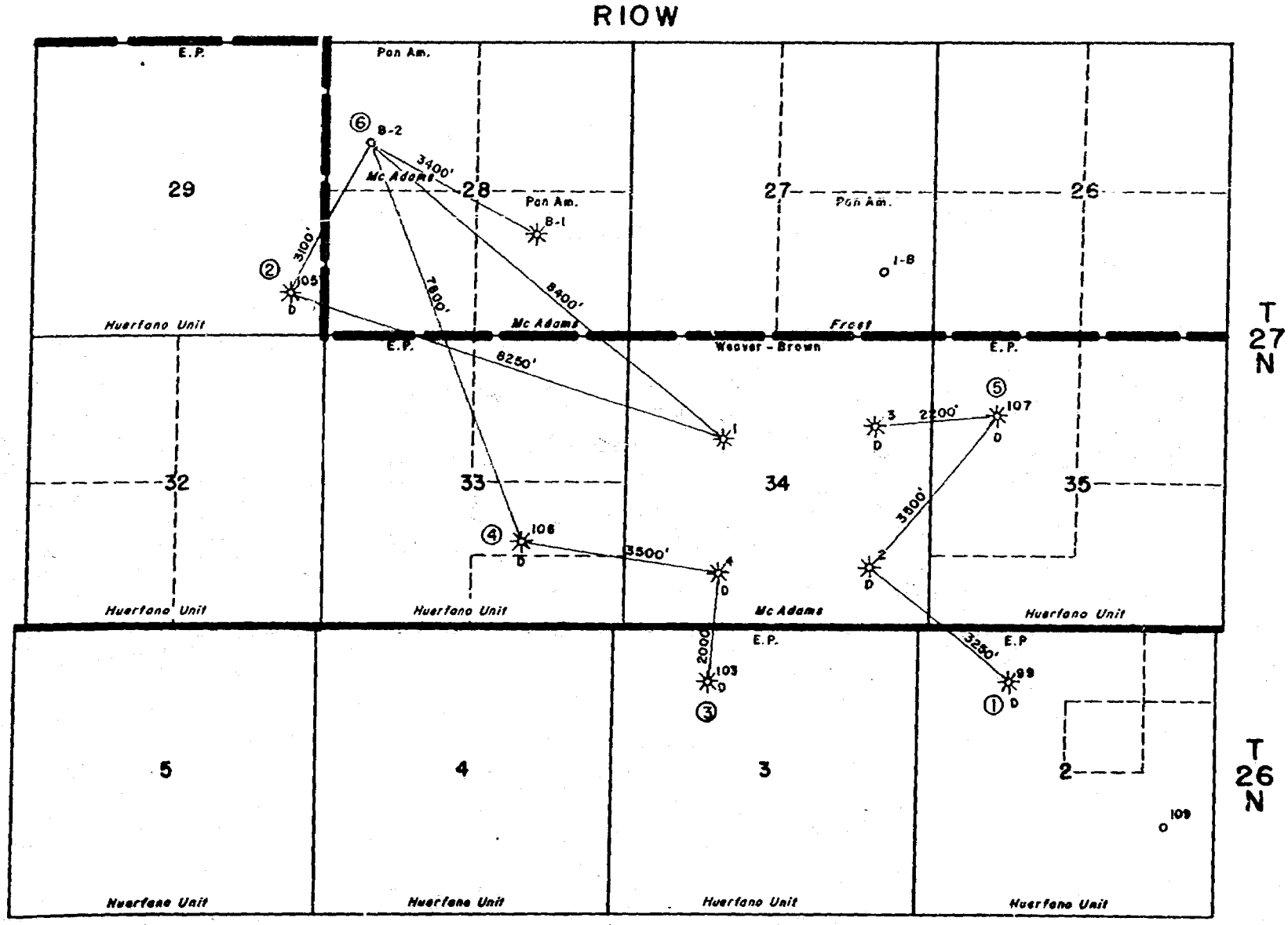
ANGELS PEAK GALLUP FIELD
Reservoir Pressure Profile Under Producing Conditions



Note: Diagram not to scale

Case 1641
Exhibit No. 3-P
Witness

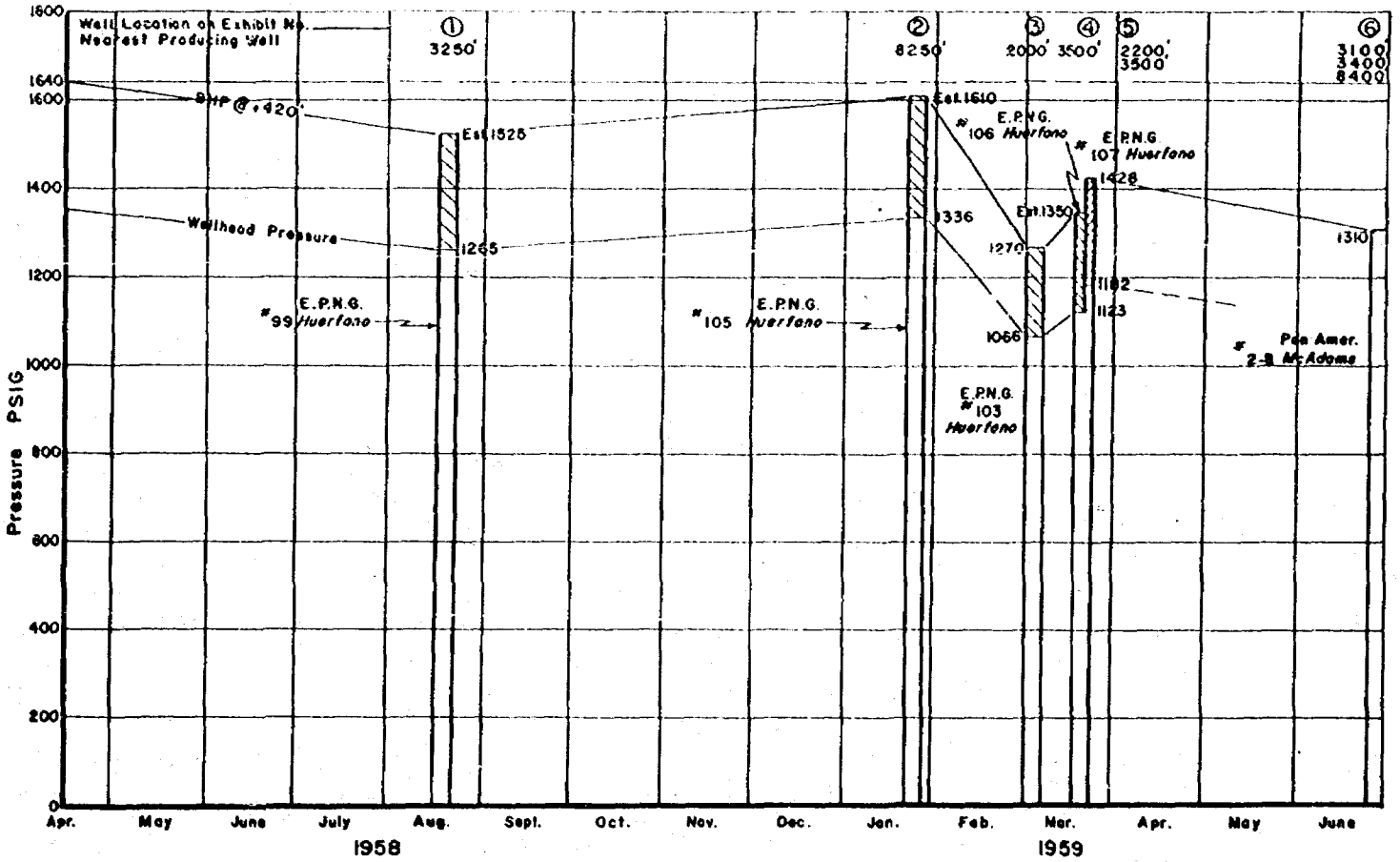
PLAT SHOWING PORTION OF THE ANGELS PEAK GALLUP FIELD

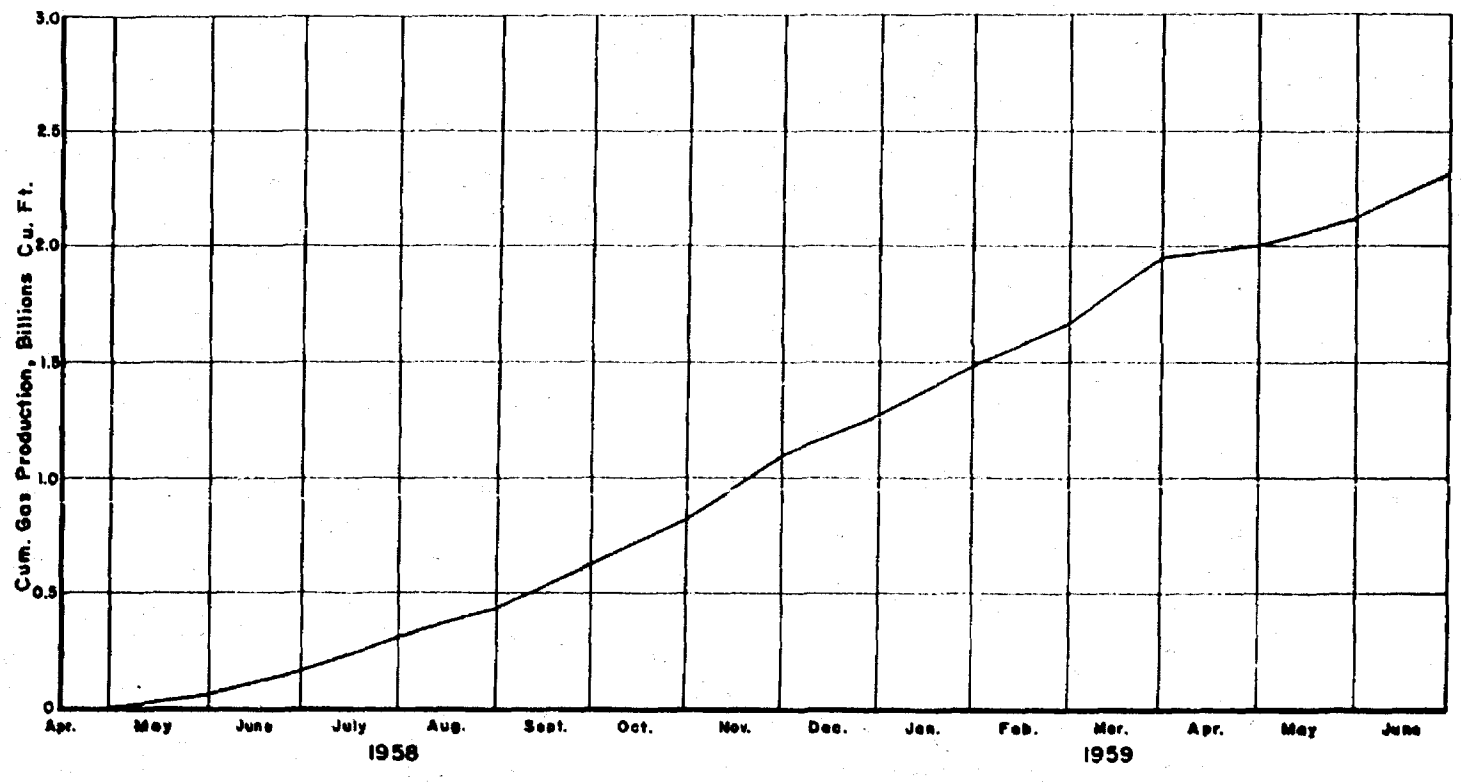


Scale: 2" = 1 Mile

Case 1041
Exhibit No. 10
Witness

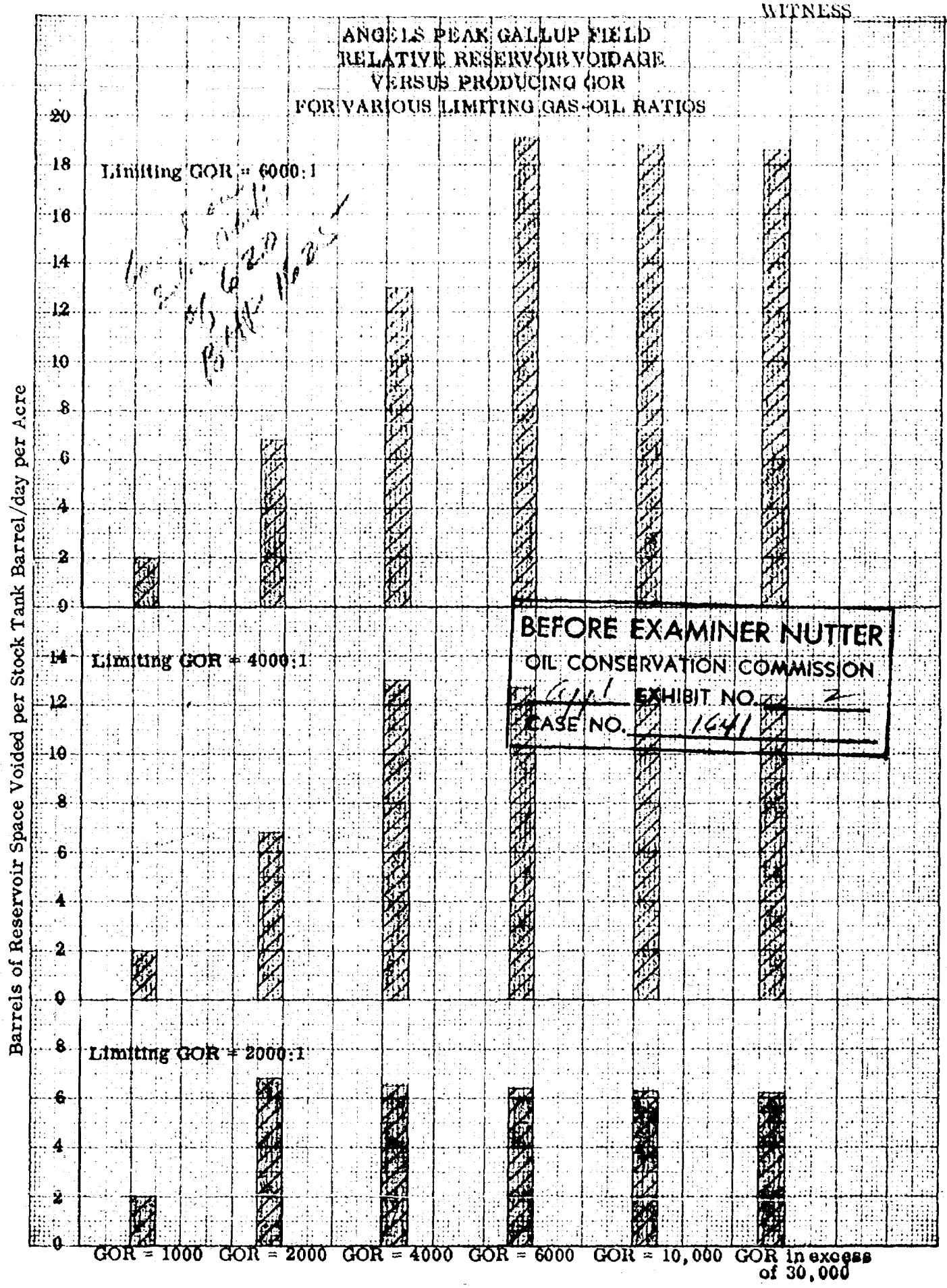
ANGELS PEAK GALLUP FIELD
INITIAL SHUT-IN PRESSURES AND CUMULATIVE GAS PRODUCTION VERSUS TIME





CASE 1641
EPNG EXHIBIT NO. 2
WITNESS

ANGELS PEAK GALLUP FIELD
RELATIVE RESERVOIR VOIDAGE
VERSUS PRODUCING GOR
FOR VARIOUS LIMITING GAS-OIL RATIOS

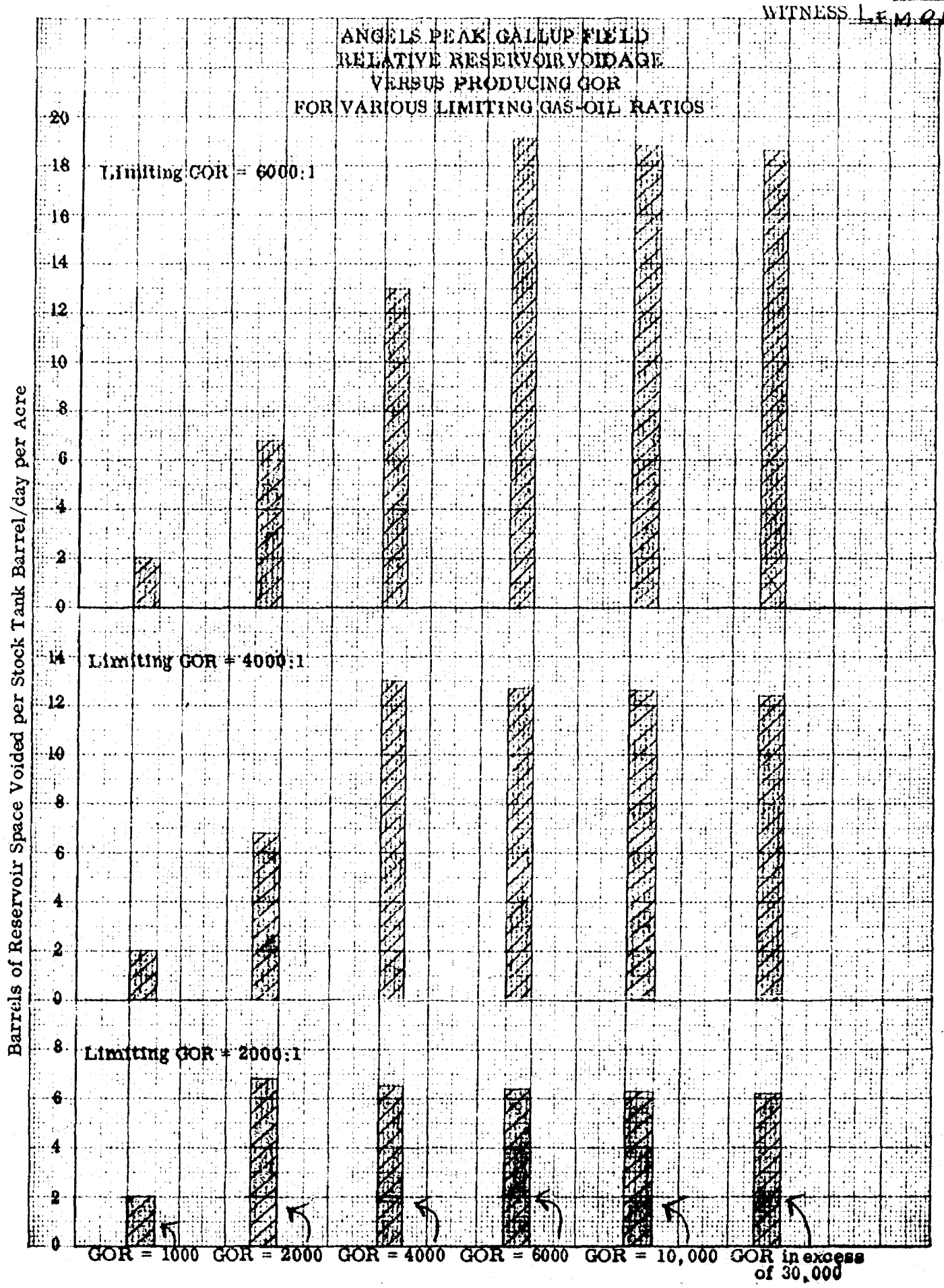


BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
EXHIBIT NO. 2
CASE NO. 1641

K&E 10 X 10 TO THE CM. 359-14G
KEUFFEL & ESSER CO.

APNG

CASE 1641
EXHIBIT NO. 2
WITNESS LEMON



K&E 10 X 10 TO THE CM. 359-14G
KEUFFEL & ESSER CO.

359-12

Exhibit No. 2
BHP vs. Cumulative Production
Huerfano Unit No. 99
Angels Peak Gallup Field
San Juan Co., N. Mex.

Po = 1515 (8-12-58)

Bottom Hole Pressure, psig

1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100

80-acre Drainage
160-acre Drainage
320-acre Drainage
640-acre Drainage

0
1000
2000
3000
4000
5000

Cumulative Production, MMCF

Effective Aug 1, 1951

memo

For the proof necessary for the issuance of lease oil allowable in addition to the basic allowable should be issued stating that well No. ___ Sec. 26 N. S. 1 E. ___ Pool is hereby authorized to produce ___ MCF of gas per day during the month of ___ in addition to the basic allowable of lease oil heretofore assigned.

No ~~oil~~ oil allowable would be necessary as lead oil would be authorized on C 116.

The new order should:

1. Revise location rule. 330' from ~~property~~ boundary of 40 acre tract & notification requirement for non-std locations.
2. Require the filing of Form C 116 along with Form C 104 to establish an initial oil allowable — after one lease oil has been assigned. Eliminate the 30 to 60 day test.

K.P. test will suffice for first quarterly test.

3. Establish quarterly G.O.R. surveys during the months of Jan, April, July and October and require an operator to file a test schedule with the Commission office in Aztec with copies to ~~offset wells~~. offset owners —

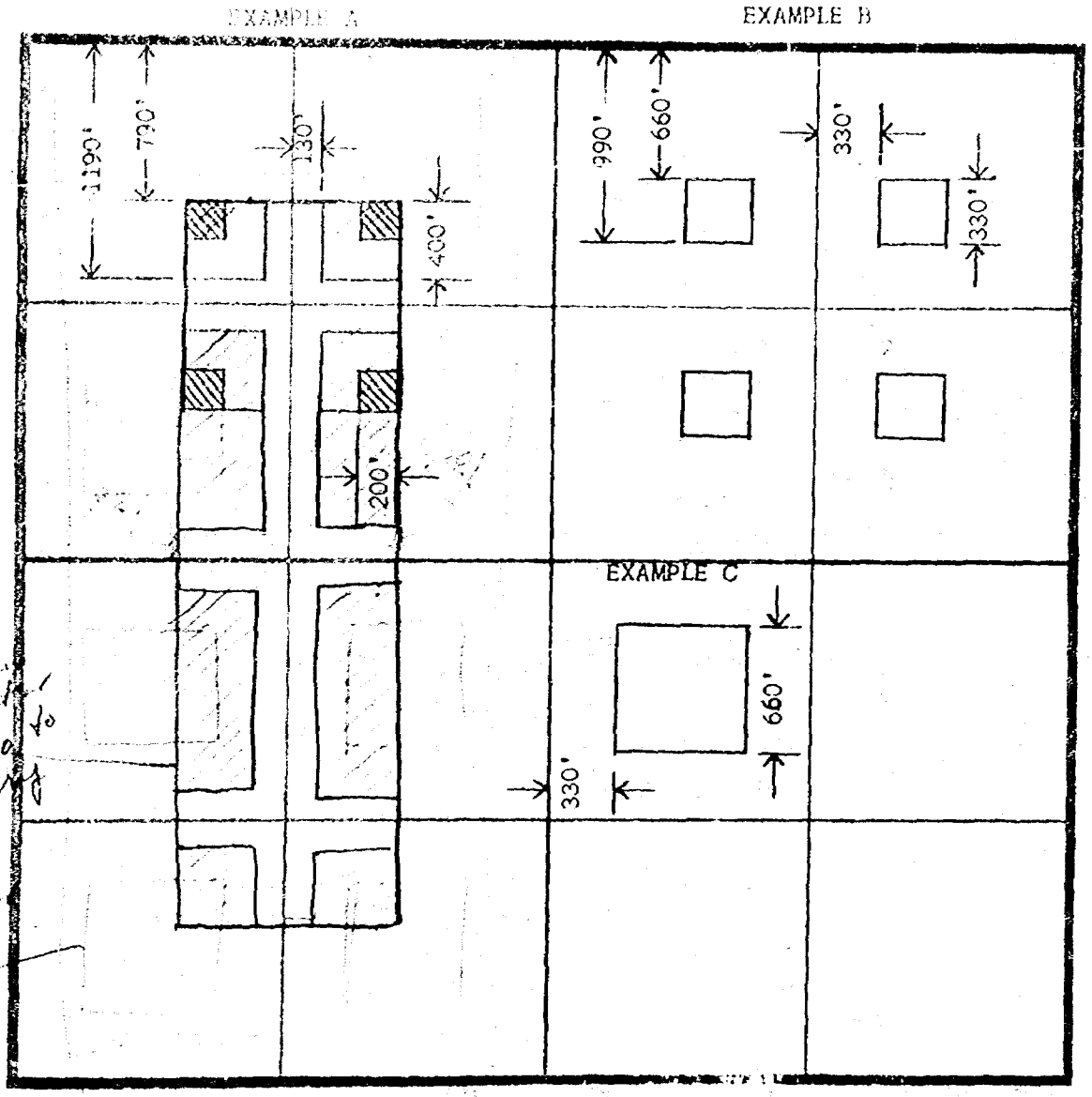
4. Provide a grace period to secure gas connection before no flare rules would apply on new wells —

Talk with Randall

1 year Order
no flare — limit on new wells

STANDARD GAS PRORATION UNIT LOCATIONS IN NEW MEXICO ACCORDING TO RULE 104 OF THE GENERAL RULES AND REGULATIONS

Sec. ..... Township No. ..... of Range No. .....



EXAMPLE A - Shows Standard Gas Well location in San Juan, Rio Arriba and Sandoval Counties. 200' crosshatched square shows portion of 400' square which is a standard location for oil or gas wells. These locations may be used in any quarter section.

EXAMPLE B - Shows standard gas well location for the State, except San Juan, Rio Arriba and Sandoval Counties. These locations may be used in any quarter section.

EXAMPLE C - Shows Standard Oil Well location for the State. This location may be used for a wildcat oil or gas well except in San Juan, Rio Arriba and Sandoval Counties. This location may be used in any quarter quarter section.

11/19/56

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

COPY

August 11, 1959

Mr. Oliver Seth
Box 828
Santa Fe, New Mexico

Dear Mr. Seth:

On behalf of your clients, Stanley Jones, and El Paso Natural Gas Company, we enclose two copies of Order No. R-1363-B and Order R-1410-A issued by the Oil Conservation Commission on August 11, 1959.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ir/

Enclosures

(1410-A) Copy sent to: J. Ben Howell, Burns Erebo, Hobbs office, Legal Office | Order 1363-B to Eddy Co (Artesia) Hobbs office, Dick Newman

FORM 446 4-58

PAN AMERICAN PETROLEUM CORPORATION

OIL AND GAS BUILDING

ALEX CLARKE, JR.
DIVISION ENGINEER

MAIN OFFICE
1959 JUN 25 AM 8:22

FORT WORTH, TEXAS

[illegible], 1959

File: [illegible]

Subject: Application for Dellovo [illegible]

Mr. A. L. Porter
New Mexico Oil Conservation Commission
Capitol Annex Building
Santa Fe, New Mexico

Dear Sir:

Case 1641 was the application of W. R. Weaver for special rules and regulations for the Angels-Peak Gallup Pool, San Juan County, New Mexico. This case was originally set for April 22, 1959, but was continued to May 7, 1959, when it was held before Daniel Nutter, Examiner. As a result of this hearing, Order No. R-1410 was issued on May 28, 1959. Pan American, as unit operator, in subject pool appeared and participated in such hearing, and was adversely affected by the above mentioned Order No. R-1410.

The above order finds among other things, "that the evidence--does not establish that a well in said pool can drain in excess of 80 acres". Actually all evidence presented was to the effect that wells in this pool would drain greatly in excess of 80 acres. It is extremely significant that while the three operators who participated in this hearing were not in complete agreement on each and every rule proposed, the technical witnesses for all three did agree that a well would drain greatly in excess of 80 acres. There was not a scintilla of evidence to the contrary.

Pan American is of the opinion that the subject matter of this hearing is of such extreme importance that it should be heard before the entire Commission. Therefore, under the provisions of Rule 1220 of Rules and Regulations of the New Mexico Oil Conservation Oil Commission, Pan American respectfully requests that Case 1641 be heard, denovo, before the Commission at a regular hearing.

Very truly yours,

[signature]

ARH:lg

cc: [illegible] Morrell
El Paso Natural Gas Company
P. O. Box 1492
El Paso, Texas

James Purdie
P. O. Box 466
Albuquerque, New Mexico

Received
July 2, 1959

GOVERNOR
JOHN BURROUGHS
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
MURRAY E. MORGAN
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY DIRECTOR

P. O. BOX 871
SANTA FE

September 16, 1960

Mr. Burns Errebo
Simms Building
Box 466
Albuquerque, New Mexico

Re: Case No. 1641
Order No R-1410-C
Applicant:
W. R. Weaver

Dear Sir:

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

Very truly yours,

A. L. PORTER, Jr.,
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC x

Other

Kirk Newman
Guy Buell
Oliver Seth
Ben Howell
[illegible] Mainey
Jason Kellahin

July 15th

MAIN OFFICE OCC

1959 JUN 15 AM 11:31

BEFORE THE

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF EL PASO NATURAL GAS COMPANY FOR A DE NOVO HEARING BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO TO RECONSIDER CASE NO. 1641, ORDER NO. R-1410 OF SAID COMMISSION, BEING THE APPLICATION OF W. R. WEAVER FOR THE PROMULGATION OF SPECIAL RULES AND REGULATIONS GOVERNING THE DRILLING, SPACING, AND PRODUCTION OF WELLS IN THE ANGELS PEAK-GALLUP OIL POOL, SAN JUAN COUNTY, NEW MEXICO, AND THE ORDER OF SAID COMMISSION WITH RESPECT THERETO.

CASE NO. 1641

APPLICATION FOR DE NOVO HEARING
BEFORE THE COMMISSION

COMES NOW El Paso Natural Gas Company, a Delaware corporation with license to do business in the State of New Mexico, hereinafter called "Applicant," and files this, its application for a de novo hearing before the New Mexico Oil Conservation Commission to reconsider the application of W. R. Weaver for the promulgation of special rules and regulations governing the drilling, spacing, and production of wells in the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico, and the order of said Commission promulgating special rules and regulations pursuant thereto, being Order No. R-1410, and for grounds therefor would respectfully show:

I

Hearing was had on this case before an examiner on May 7, 1959 at Santa Fe, New Mexico, and said Order No. R-1410 was issued on the 28th day of May, 1959 by the Commission.

II

In the fifth finding of the Commission in the said Order, the Commission found "that the evidence indicates that one well in the Angels Peak-Gallup Oil Pool can efficiently and economically drain 80 acres, and conversely, it does not establish

that a well in said pool can drain in excess of 80 acres." Applicant would show that there is no evidence that was presented at said examiner hearing to support this finding of the Commission, and that such finding is without factual basis and is contrary to the evidence presented.

III

Rule 2 of said Order states "Each well completed or recompleted in the Angels Peak-Gallup Oil Pool shall be located on a unit containing 80 acres, more or less, which consists of either the North half or the South half of single governmental quarter section." Applicant would show that there is no evidence that has been presented in the hearing above-mentioned to support the Commission's determination that the North half or the South half of a single governmental quarter section should comprise a drilling unit.

IV

Applicant would show that a well in the Angels Peak-Gallup Oil Pool which produces gas only, or which produces gas in conjunction with oil at a gas-oil ratio of 30,000 cubic feet or more of gas to one barrel of oil, should be classified as a gas well.

V

Applicant would show that the allocation of 80 acres for each oil well in said pool should have no applicability to gas wells. Drilling units, comprised of acreage not to exceed 320 acres for each unit, should be set up by said special rules and regulations for gas wells. The special rules and regulations promulgated by the Commission should be changed to permit an allocation of acreage not to exceed 320 acres for one gas well in the Angels Peak-Gallup Oil Pool and such rules and regulations should prevent the allocation of such acreage to more than one gas well in said pool in order to prevent waste by the drilling

of unnecessary wells, pursuant to Section 65-3-14(b), New Mexico Statutes Annotated which states:

> "The Commission may establish a proration unit for each pool, such being the area that can be efficiently and economically drained and developed by one well, and in so doing the Commission shall consider the economic loss caused by the drilling of unnecessary wells, the protection of correlative rights, including those of royalty owners, the prevention of waste, the avoidance of the augmentation of risks arising from the drilling of an excessive number of wells, and the prevention of reduced recovery which might result from the drilling of too few wells."

WHEREFORE, Applicant requests that this matter be set down for a de novo hearing before the Commission at the next regular hearing date following the expiration of fifteen (15) days from the date of filing hereof pursuant to the requirements of Rule 1220, Rules and Regulations of the New Mexico Oil Conservation Commission, and that on such de novo hearing the Commission issue rules and regulations to include classifying a gas well in said pool as above described, and for allocating acreage not to exceed 320 acres for each gas well in said pool, and to prevent the allocation of such acreage to more than one well in said pool, and for such other and further relief at law or in equity to which Applicant may show itself justly entitled.

SETH, MONTGOMERY, FEDERICI & ANDREWS

By Alan Seth

Garrett C. Whitworth

Garrett C. Whitworth

Attorneys for El Paso Natural Gas Company

1 x 11 C !

INITIAL BOTTOM HOLE PRESSURE DATA
ANGELS PEAK GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO

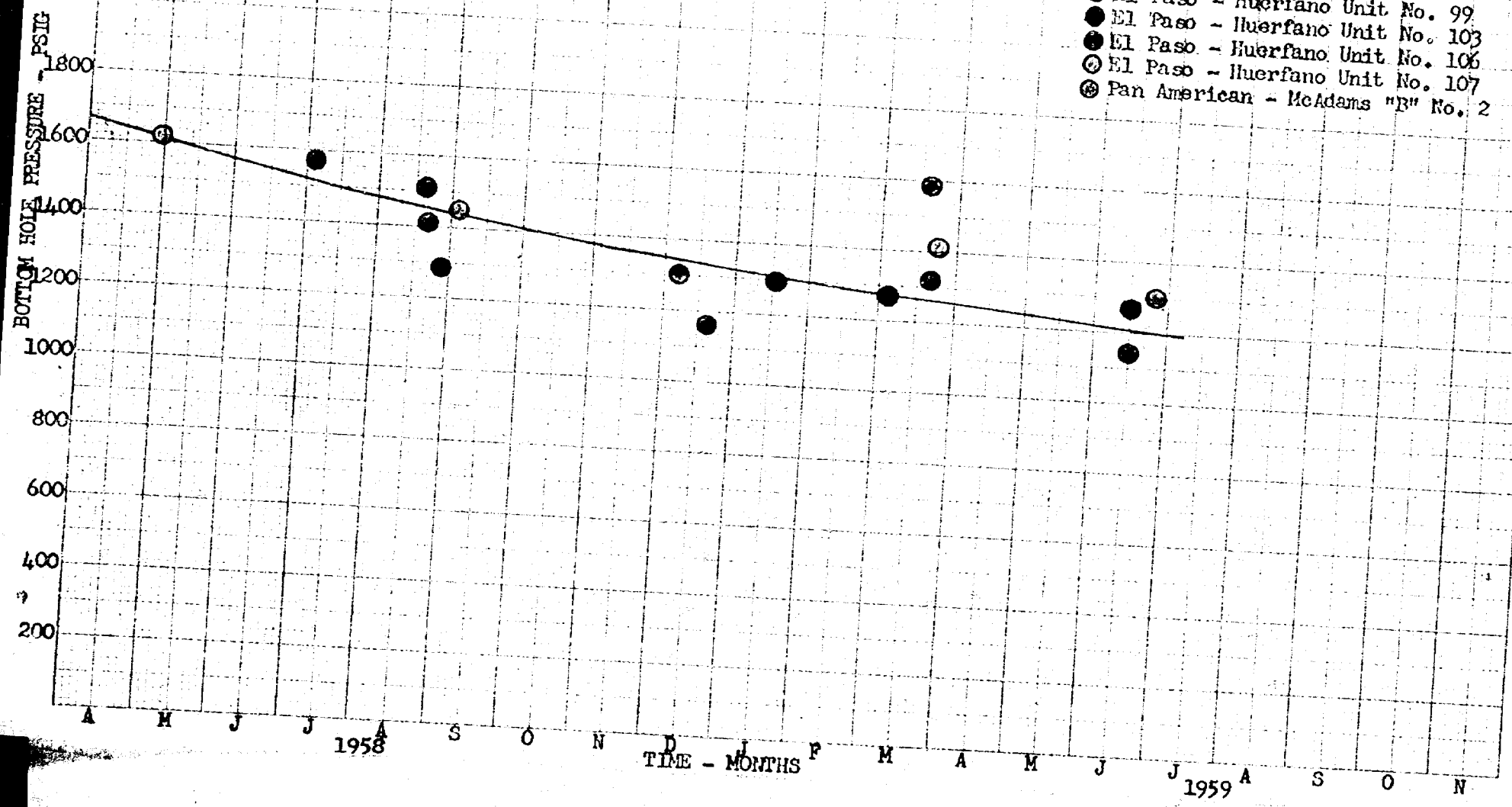
Operator Lease & Well	Date of Press. Meas.	Shut-In Time -- Days	Initial BHP-PSIG (Datum +450)	Distance To Nearest Producing Well - Ft.	Pressure Draw Down PSIG	Minimum Drainage Area-Acres	Pressure Draw Down % of Orig Pressure
W. R. Weaver McAdams No. 1	Apr. 29,1958	7	1620	Original Reservoir Pressure			
El Paso Natural Gas Co. Huerfano Unit 99	Aug. 19,1958	7	1512	3,100	108	693	6.7
W. R. Weaver McAdams No. 4	Aug. 27,1958	7	1290	2,450	330	433	20.4
McAdams No. 3	Sept. 3,1958	7	1450	2,600	170	488	11.5
El Paso Natural Gas Co. Huerfano Unit No. 103	Jan. 17,1959	9	1295✓	1,980	325	283	20.0
	Mar. 4, 1959	42	1270*	1,980	350	283	21.6
Huerfano Unit No. 92	Jan. 22,1959	7	1585	15,500	35	17,300	2.6
Huerfano Unit No. 106	Mar. 20,1959	7	1320	3,550	300	909	18.5
Huerfano Unit No. 107	Mar. 25,1959	33	1425*	2,175	195	341	12.0
Pan American McAdams "B" No. 2	June 26,1959	3	1390*	3,100	320	693	19.8

* BHP measured with BHP Bomb.

Exhibit 5-A

BOTTOM HOLE PRESSURE VS. TIME
(DATUM + 450)
ANGELS PEAK GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO

- Weaver - McAdams No. 1
- Weaver - McAdams No. 2
- Weaver - McAdams No. 3
- Weaver - McAdams No. 4
- El Paso - Huerfano Unit No. 92
- El Paso - Huerfano Unit No. 99
- El Paso - Huerfano Unit No. 103
- El Paso - Huerfano Unit No. 106
- El Paso - Huerfano Unit No. 107
- Pan American - McAdams "B" No. 2



EXHIBITS (REHEARING)

CASE 1641:

JULY 15, 1959

[redacted]

Case No.

1641

Application, Transcript,
Small Exhibits, Etc.

[redacted]

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE 1641

TRANSCRIPT OF PROCEEDINGS

APRIL 22, 1959

DEARNLEY - MEIER & ASSOCIATES
GENERAL LAW REPORTERS
ALBUQUERQUE NEW MEXICO
Phone CHapel 3-6691

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
APRIL 22, 1959

IN THE MATTER OF:

CASE 1641 Application of W. R. Weaver for the promulgation of special rules and regulations governing the Angels Peak-Gallup Oil Pool. Applicant, in the above-styled cause, seeks an order promulgating special rules and regulations governing the drilling, spacing and production of oil and gas wells in the Angels Peak-Gallup Oil Pool in San Juan County, New Mexico.

BEFORE:

Daniel S. Nutter, Examiner

T R A N S C R I P T O F P R O C E E D I N G S

MR. NUTTER: Next case on the docket will be Case 1641.

MR. PAYNE: Case 1641. Application of W. R. Weaver for the promulgation of special rules and regulations governing the Angels Peak-Gallup Oil Pool.

MR. ERREBO : Mr. Payne, Mr. Examiner, we have received an objection from El Paso Natural Gas Company to this case being heard before an examiner. I wonder if the El Paso attorney has any comment on that?

MR. WHITWORTH: Garrett Whitworth, El Paso Natural Gas Company. El Paso Natural Gas Company withdraws its objection, Mr. Nutter, and we will proceed with the hearing.

MR. NUTTER: Thank you, Mr. Whitworth. Does anyone

have anything to offer in this case?

MR. ERREBO: In view of this withdrawal and in view of the desire of El Paso to have additional time to study this matter, the applicant is willing to and desires that this Commission continue this matter to a later date; we prefer some date early in May, if possible.

MR. PAYNE: Would May the 7th be satisfactory with you, Mr. Errbo?

MR. ERREBO: Yes, it would.

MR. NUTTER: Is there objection to the continuance of Case 1641 to May the 7th before the same Examiner? If not, the case will be continued to May 7th.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, J. A. Trujillo, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in Stenotype and reduced to typewritten transcript by me, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 23rd day of April, 1959, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Joseph A. Trujillo
NOTARY PUBLIC

My Commission Expires:

October 5, 1960

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1641, heard by me on 4-22, 1959.

Examiner
New Mexico Oil Conservation Commission

DEARNLEY - MEIER & ASSOCIATES
GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
Phone CHapel 3-6691

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE 1641

TRANSCRIPT OF HEARING

JULY 15, 1959

DEARNLEY - MEIER & ASSOCIATES
INCORPORATED
GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
3-6691 5-9546

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JULY 15, 1959

IN THE MATTER OF:

CASE 1641 (Hearing De Novo) Application of El Paso Natural Gas Company for a hearing de novo before the Oil Conservation Commission in Case No. 1641, Order R-1410, which was an application by W. R. Weaver for the promulgation of special rules and regulations governing the drilling, spacing, and production of wells in the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico.

BEFORE:

Gov. John Burroughs
Murray Morgan
A. L. Porter

TRANSCRIPT OF PROCEEDINGS

MR. PORTER: The hearing will come to order, please. Next case to be heard will be Case 1641.

MR. PAYNE: Case 1641. (Hearing De Novo) Application of El Paso Natural Gas Company for a hearing de novo before the Oil Conservation Commission in Case No. 1641, Order R-1410, which was an application by W. R. Weaver for the promulgation of special rules and regulations governing the drilling, spacing, and production of wells in the Angels Peak-Gallup Oil Pool, San Juan County, New Mexico.

I might mention at this point that when this case was advertised,

El Paso was the only one who, up to that point, had filed an application for hearing De Novo. Pan American subsequently filed one also.

MR. PORTER: Before we get into this case, I would like to announce that the next to be heard will be Case 1420, and then Case 1722, and then we will go back to Case 1637.

We will proceed now with Case 1641. I would like to have appearances in this case at this time.

MR. NEWMAN: Kirk Newman of Roswell, New Mexico, and Guy Buell of Fort Worth, Texas, a member of the Texas Bar, representing Pan American Petroleum Corporation.

MR. ERREBO: Burns Errebo and James E. Sperling, Modrall, Seymour, Sperling, Roehl & Harris of Albuquerque, representing W. R. Weaver.

MR. PAYNE: Is Pan American ready to proceed?

MR. BUELL: Yes, sir, we are ready.

MR. PORTER: Mr. Buell, will you proceed, please?

MR. BUELL: We are perfectly willing and able, Mr.Porter. I wonder if Weaver would rather go first since it is their application?

MR. ERREBO: The application is of El Paso, and I believe that Pan American, Weaver did not file any application for a Hearing De Novo.

MR. BUELL: I was being courteous. We are ready. We have one witness, Mr. Marshall, who has not been sworn.

(Witness sworn)

MR. ANDREWS: May it please the Commission, I came in just a little bit late. I hadn't realized you had called this case until just this moment. I appear for El Paso Natural Gas, and Mr. Howell thought you were going to take the other case up first, and he was to meet me here just shortly after one-thirty. He should be along most any moment; and I'm not familiar with it.

MR. MORGAN: Any objection to Pan American going ahead since they are also the applicant in the case?

MR. ANDREWS: I am not familiar with it.

MR. MORGAN: Do you have any objection?

MR. ANDREWS: I think that would be satisfactory.

MR. PORTER: I probably should have announced the order of the cases prior to the recess. However, I didn't think, and I see Mr. Howell is coming in.

MR. ANDREWS: I don't know if the record yet shows the appearance hereon of Seth, Montgomery, Federici & Andrews, and Ben R. Howell for El Paso Natural Gas Company.

CHARLES MARSHALL,

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Marshall, will you state your full name, by whom you are employed, in what capacity and what location, please?

A Charles B. Marshall, with Pan American Petroleum Corporation. I am a petroleum engineer for -- in the Farmington office.

Q Mr. Marshall, you've testified at prior Commission hearings, have you not?

A Yes, sir.

Q Your qualifications as a petroleum engineer are a matter of public record?

A Yes, sir.

MR. BUELL: Any questions, Mr. Porter?

MR. PORTER: No, sir. His qualifications are acceptable.

Q Mr. Marshall, have you made a reservoir study and evaluation of the Angels Peak-Gallup Pool?

A Yes, sir, I have.

Q Based on that study, are you prepared at this time to make certain recommendations relative to regulating and prorating this pool?

A Yes, sir.

Q Briefly, right here at the outset, would you summarize your recommendations so that this Commission can follow and analyze your testimony in the light of your recommendations?

A Yes, sir. I would like to recommend that oil wells completed in the Angels Peak-Gallup Field be spaced and prorated on an 80-acre proration unit; that the allowable for these oil wells be assigned in accordance with statewide Rule 505; three, that the gas wells in this Field be allowed to have up to and in-

cluding 320 acres assigned to them; four, that a limiting gas-oil ratio of 2,000 to 1 be assigned; five, that gas wells be assigned an allowable equal to the gas limit for an 80-acre oil well, on an acreage basis, that is, a well which had,a gas well which had 320 acres assigned to it would have a gas allowable equal to four times the gas limit of an 80-acre oil well. And six, I would like to -- I would recommend that a gas well be classified as any well producing with a gas-oil ratio in excess of 25,000 cubic feet per barrel, an oil well classification be defined as any well producing with a gas-oil ratio of less than 25,000 cubic feet per barrel.

(Thereupon, Applicant's Exhibit No. 1-A was marked for identification.)

Q Mr. Marshall, I direct your attention now to what has been marked as Pan American's Exhibit No. 1-A. What does that exhibit reflect?

A Exhibit 1-A is a structure map of the Angels Peak-Gallup Field which is contoured on top of the Gallup pay sand in this Field. The contour interval is 25 feet.

Q Does that Exhibit reflect the boundary outline of El Paso's Huerfano unit?

A Yes, El Paso operated Huerfano unit is bounded by a dashed heavy blue line.

Q Does the area of that unit exceed the limits of your map to the South and to the East?

A Yes, sir, the Hueftone unit extends off of this map to the South and East.

Q All right, sir. Within the productive area of the Field and within the unit boundary, there are two tracts that are not committed to the unit. How have you designated those tracts?

A Of the tracts that are within the unit area, which are not committed to the unit, in which there is some development taking place in the Gallup, or is taking place, I have outlined in purple. These two tracts are Section 34, Township 27 North, Range 10 West, and the E/2 of Section 19, Township 27 North, Range 10 west.

Q Now, one of those non-committed tracts is Mr. Weaver's tract, and it has four wells on it, does it not?

A Yes, sir.

Q Now, the other tract, who operates it?

A Frontier Refining Company.

Q Does it have a well on it at this time?

A They are presently, I believe, in the process of completing a well on this structure.

Q All right, sir. What is the significance of these horizontal green lines? I notice one to the North and one to the South of your Exhibit.

A These green lines are the approximate limits of commercial production based on the information which is available to date on this Field.

Q And the one to the North being your approximate limit of the oil production, the one to the South the approximate limit of the gas production?

A Yes, sir.

Q What is the purpose of the orange band that's on Exhibit 1-A?

A This reservoir contains both gas and oil. As you can note from the contour map, it is dipping to the North, going down to the North. The area above this orange band is gas-saturated, and below, or to the North, is oil-saturated. The orange band itself represents the area of transition between gas and oil, or the area in which gas is immediately overlying the oil and in contact with it.

Q All right, sir. How do you depict the gas-oil contact on Exhibit 1-A?

A I've shown the vertical elevations of the gas-oil contact by a dashed red line. This gas-oil contact at the present time is at plus 430 feet.

Q Now, you say "at the present time." What was your picture of the gas-oil contact at the time of Case 1616?

A Plus 420 feet above sea level.

Q And you have since moved that contact up 10 feet?

A Yes, sir.

Q Why have you done that, Mr. Marshall?

A From information that was available, and the information

that was available at the time of the previous case, indicated that at that time the gas-oil contact was at plus 420 feet. We have since -- since that time information has become available that indicates that the gas-oil contact is presently at 400 and -- plus 430 feet, and has moved from plus 420 feet to plus 430 feet.

Q All right, sir. Going back to the Field limits for just a moment, how is this Field defined generally to the northwest and generally to the southeast, are the limits known?

A The development has not defined the limits of the Field either to the southeast or northwest. Consequently, since the limits are not known in either of these directions, in order to have an area to consider, I arbitrarily cut off the reservoir on each of these flanks. This limit is shown by the irregular solid blue line.

Q How have you distinguished oil wells and gas wells on Exhibit 1-A?

A Gas wells on this Exhibit are shown as a star with a circle around it colored in red. The oil wells are shown as a green circle with a solid dot in the middle. Also, wells which are presently in the process of completing or drilling are shown by two concentric white circles. One well appears on the map which is not a Gallup completion, but I used it for control on structure as well as pay development, and I have shown that well with a cross.

Q All right, sir. What is the significance of the numbers in red opposite each well?

A That is the latest available gas-oil ratio in each of the wells.

Q Now, you introduced an exhibit similar to this in Case 1616, did you not?

A Yes, sir.

Q When you compare this exhibit with that exhibit, is the oil area larger or smaller?

A The oil area is larger.

Q What caused that change, Mr. Marshall?

A One, the vertical rise in the gas-oil contact caused the oil area to become larger and also by virtue of structural control, which was obtained on the recent drilling of Pan American's "C A" McAdams "B" No. 2, located in the NW/4 of Section 28, Township 27 North, Range 10 West. Structure control and pay development control available from that well indicated a nosing of the structure to the north, which increased the oil area size.

(Thereupon, Pan American's Exhibit No. 2-A was marked for identification.)

Q All right, sir. I direct your attention now to what has been marked as Pan American's Exhibit No. 2-A. What is that exhibit?

A Exhibit 2-A is a cross section, the trace of which is shown on Exhibit 1-A as being AA Prime. This section runs from the southeast -- from the southwest to the northeast, starts with El Paso's Huerfano unit 104, goes on through Huerfano unit 103, W. R.

Weaver's McAdams No. 3, Pan American's C.A.McAdams "B" No. 1, and a stick log is shown on Pan American's J.C.Gordon "B" 1. This is the well that is not a Gallup completion and is shown as a cross in Exhibit 1-A. An electrical log was not available on this well to the proper scale, so I used the stick log. The electrical log is available for interpretation, and this log indicates that the main Gallup sand is not developed at that location.

Q Mr. Marshall, from the standpoint of the purpose of this hearing, what is the significance of Exhibit 2-A?

A Exhibit 2-A presents in cross section view the Angel Peak-Gallup reservoir through the area of the trace. As you can see, the pay development in the Angels Peak-Gallup Field is a rather generally dipping monocline, or it is more or less a sand lens that dips to the north. The fact that this reservoir contains both gas and oil is shown by the colors. The red represents the area that is saturated with gas, and the green area, that is saturated with oil. The gas-oil contact in cross section view naturally appears as a horizontal line at plus 430 feet.

Q All right, sir. Where on this cross section would we see the orange band that you have on your Exhibit 1-A? Where would that area be on this cross section?

A That would be the area where the gas or pink color immediately overlies and is in contact with the green or oil.

Q Where is that on that exhibit, immediately to the left of Weaver's McAdams No. 3?

A Yes, sir, to look at this area in a horizontal plane, you would see what is represented by the orange band on Exhibit 1-A.

Q Mr. Marshall, did you introduce an exhibit similar to this in Case 1616?

A Yes, sir.

Q What were the differences, if any?

A I have moved the gas-oil contact to plus 430 feet.

Q By the use of that cross section, Mr. Marshall, would you show me just what happened to move that gas-oil contact up? Did oil move up into the dry gas cap, is that --

A Yes, along this line of contact where the oil is in immediate contact with the gas, the oil moved up a vertical distance of 10 feet.

Q All right, sir. Upon what data do you base that conclusion, Mr. Marshall?

A The data available from the performance of W. R. Weaver's McAdams No. 3, as well as the information which has since become available by the drilling of Pan American's C.A.McAdams "B" No. 2.

Q What happened to Weaver's McAdams No. 3 that indicates movement of oil up into the gas cap?

A This well was originally drilled into the main Gallup pay and encountered gas, I believe reported approximately 5800 MCF of gas daily. Subsequent to that time, the well went to oil. We have pressure information, pressures taken approximately two months apart, which support the fact that at the time the first

pressure was made, it was evidently the column. the well bore was filled with nothing but gas. And at the time the second pressure was made, it was evident that there was oil in the well bore. This information, of course, was available at the prior hearing. However, it was the only information which was available that indicated any move in the contact, and as there had been considerable production in this area, this Section 34 was the first development, it was my opinion that it could very easily be a local condition in that the oil had migrated into the gas cap only in this area.

Q Excuse me for interrupting, Mr. Marshall, I want to be sure I understand. In other words, all these data were available to you at the time of Case 1616. It was your opinion at that time that that was simply a highly localized condition due to the production of gas in that area?

A It was my opinion that that could very well be what it was.

Q You felt that, generally speaking, the contact was still at plus 420?

A Yes, sir.

Q All right. What has happened to make you change your mind in that regard?

A The fact that since the -- since that time, we have -- Pan American has drilled the C.A.McAdams "B" No. 2. This well encountered the top of the main Gallup pay at plus 421 feet. Had the gas-oil contact been at plus 420 or thereabouts, we would have ex-

pected a very high gas-oil ratio on this well, due to the ratios of oil and gas. However, the ratio, measured ratio on completion of the McAdams "B" 2 was 4220. This ratio is exactly what would be predicted in view of the fact that the initial bottom hole pressure measured on the McAdams "B" 2 was 1300 pounds, and showing that the completion had taken place, and we can explain the fact, in fact, predict almost exactly that the ratio would have been in the neighborhood of 4,000. Therefore, that meant that there was evidently no free gas in the vicinity of the well, so that supported the further increase in the gas-oil contact or movement of the gas-oil contact up.

Q Roughly, Mr. Marshall, about how far is Pan American's McAdams "B" 2 from Weaver's McAdams 3?

A It's approximately two miles. That distance coupled with the fact that we had information on the movement of the contact here and here, which more or less centrally locates it with respect to this portion of the reservoir is -- proves that the contact had moved up generally throughout the reservoir.

Q Mr. Marshall, what happens when oil migrates into a dry gas cap?

A It goes -- migrates into the gas cap and establishes a residual oil saturation which is not ever recoverable. It --

Q To reduce that to layman's language, or lawyer's language, would you call that waste?

A Yes, sir.

Q In other words, it is your testimony here that waste has occurred?

A Yes, sir. Undoubtedly, by virtue -- no fault of anyone because the Field was developed in the way it was discovered, in the gas column first, that waste has taken place because of that fact.

Q All right, sir. One other thing I wish you would clear up for me, Mr. Marshall. You attributed the completion gas-oil ratio of 4200 to 1 on your McAdams "B" 2 as being caused by depletion. That well, that was a completion GOR, that well had never produced. How could that be caused by depletion?

A We know that the reservoir pressure prior to any development was approximately 1620 pounds. The fact that the McAdams "B" 2 had an initial pressure of 1300 pounds indicated that the area around that well was being depleted through production of other wells in the reservoir, not from production of it because it had not produced.

Q I see. What, in your opinion, Mr. Marshall, is the approximate solution gas-oil ratio in this pool?

A Between 500 and 600 cubic feet per barrel.

Q All right, sir. Assume along with me that communication in this pool was restricted and that production from other wells had not affected the area of the McAdams "B" 2, and that the well had been completed with a completion pressure approximating 1600 pounds. What, then, in your opinion, would have been the

gas-oil ratio?

A Somewhat less than the solution ratio, which would be somewhat less than somewhere between 500 and 600 cubic feet per barrel.

Q All right, sir. You are recommending a limiting ratio of 2,000 to 1, are you not?

A Yes, sir.

Q And you stated that, in your opinion, the solution ratio is 500 to 600 to 1?

A Yes, sir.

Q Why do you recommend a limiting ratio higher than the solution ratio?

A We have an example in the McAdams "B" 2 of the fact that the ratio increases with depletion. Although it is desirous to produce oil as efficiently as possible and from low ratio wells there is a practical matter concerned in that the ratio continually increases from the time the well begins to produce, so that if you assigned, although it would be absolutely more efficient initially to assign a limit at the solution ratio, if you did that, it would be only a short matter of time until it would be necessary to increase it. It is my opinion that 2,000 is a reasonable value above the solution ratio to offer a practical gas-oil ratio limit to apply on this case.

Q All right, Mr. Marshall. As a result of the Examiner Hearing on this case, an order was issued adopting a 4,000 to 1

limiting ratio?

A Yes, sir.

Q In your opinion, as an engineer, which ratio would better serve conservation, a 4,000 to 1 limiting ratio or a 2,000 to 1 limiting ratio?

A There is no doubt that in the reservoir, being the type that it is, the 2,000 cubic feet per barrel gas-oil ratio would result in less waste than the 4,000.

(Thereupon, Pan American's Exhibit No. 3 was marked for identification.)

Q All right, sir, you want to return to your seat now. We are through with those exhibits. I direct your attention now, Mr. Marshall, to what has been marked as Pan American's Exhibit No. 3. What is that exhibit?

A Exhibit 3 is a tabulation of gas-oil ratios of various wells in the Angel Peak-Gallup Field showing the well, the date the gas-oil ratio was measured, the oil production, and the gas-oil ratio. These ratios are the same that I have put in red on Exhibit 1-A.

Q While we are speaking of ratios, Mr. Marshall, let me ask you this. In this pool, could you have any difficulty satisfying yourself as to whether a well is an oil well or a gas well?

A No, sir, the ratios are of such magnitudes that there is no difficulty in determining whether a well is a gas well or an oil well.

Q Projecting your thoughts on ahead a little, now, to a later stage of depletion, do you anticipate that you will ever have any trouble in this pool telling whether a well is an oil or gas well?

A As long as the reservoir is -- if the reservoir can be prorated in such a manner as to prevent any further movement of this gas-oil contact, or to prevent -- permit a stabilized gas-oil contact, which I think the various points of the recommendations I made will do, as long as we can maintain a contact stable, I don't see how there could be any difficulty in future classification of a well as to whether it is a gas well or an oil well.

Q All right, sir. Do you have any further comments on Exhibit 3-A before we go on?

A No, sir.

MR. BUELL: May I ask the Reporter. All of your Exhibits will have an "A" after them. If I forget it, will you add it for me?

(Thereupon, Pan American's Exhibit 4-A was marked for identification.)

Q Look at Exhibit 4, Mr. Marshall. What is that Exhibit?

A Exhibit 4 is a tabulation.--

Q 4-A, pardon me.

A Exhibit 4-A is a tabulation of the present data which is available in the -- from wells in the Angels Peak-Gallup Field.

The tabulation lists the shut-in surface pressure, the time that the well had been shut-in prior to measurement of the surface pressure, the date the pressure was measured, the date that the particular well first produced, the cumulative production to the time the test was made, the calculated bottom hole pressure datum of plus 4450 feet, and where available, the bomb measured bottom hole pressure at a datum of plus 4450 feet.

Q That Exhibit, or rather the data on that Exhibit seems to be more or less self-explanatory. Do you want to comment on it at all?

A One thing I would like to point out is that you'll note, next to the last column is headed "Calculated Bottom Hole Pressure." These pressures were calculated by knowing the shut-in surface pressures as well as certain characteristics of the gas. The accuracy of this method of calculating bottom hole pressures is rather vividly referred to by the Huerfano unit 103. A pressure conducted in March of 1959, the surface -- shut-in surface pressure was 1,066 pounds, using the method of calculating that was used to calculate the remainder of bottom hole pressure, a bottom hole pressure of 1,270 pounds was calculated; on the same date at the same time, a bottom hole pressure which was measured with a bottom hole pressure bomb was 1267 pounds. Also, on the Huerfano unit 107, the calculated pressure was 1442, and the measured 1425. This indicates the rather good accuracy of the method used to calculate the bottom hole pressures.

(Thereupon, Pan American's Exhibit 5-A was marked for identification.)

Q All right, sir. Look at Exhibit 5-A now, please, Mr. Marshall. What is that Exhibit?

A Exhibit 5-A is a graphical representation of the tabular information which was presented by Exhibit 4-A. The graph is a plot of bottom hole pressure versus time. The Exhibit is colored -- coded to show the pressures taken on individual wells. For example, all the yellow dots are pressures taken on Weaver McAdams No. 1.

Q Mr. Marshall, as a reservoir engineer, what is the significance of the data you see reflected on that graphical Exhibit?

A The significance is the fact that a trend is established. These pressures were measured throughout the reservoir at random points in the reservoir at various wells, and at random times; yet they line up in a trend. Now, this indicates that regardless of where you measure the reservoir pressure, or when you measure it, you are going to be on this trend, which means that each producing well is not only, the pressure is not only being influenced by it but is being influenced by other wells that are producing since the trend is established.

Q All right, sir. Do you have any further comments on that Exhibit?

A No, sir.

(Thereupon, Pan American's Exhibit No. 6-A was marked for identification.)

Q Look now at Exhibit 7-A, Mr. Marshall. I beg your pardon, Exhibit 6-A. What does that Exhibit reflect?

A Exhibit 6-A is a tabulation of initial bottom hole pressures of various wells in the Angels Peak-Gallup Field. It shows the date the pressure was measured, the shut-in time in days, the initial bottom hole pressure prior to any production from the various wells, the distance to the nearest producing well in feet, the pressure drawdown caused by interference in pounds per square inch, the minimum drainage area indicated by this pressure interference, the pressure drawdown expressed as a percent of the original reservoir pressure.

Q These data on that Exhibit, Mr. Marshall, seem to be pretty much self-explanatory. Do you have any comment on that Exhibit?

A Yes, sir. I would like to make this comment. In determining the amount of pressure interference or the area that a well will drain, there are two methods to ascertain the area that a well will drain. One is if you have a situation where you have a reservoir which has been discovered and wells subsequently completed, completed after the discovery, and have pressures measured on them prior to any production from them, will show interference from the wells that had previously been producing. Now, that is one way that you can show pressure interference and determine the drainage areas.

Another way is what has been known as, called a formal interference test. This method employs the idea that if you drill a well a considerable distance or a distance from another well, which is producing, or other wells in the reservoir which are producing, and then measure -- the initial pressure on that well, and then observe the pressure with it not producing, but observing the effect of other wells producing on the well that you have shut-in, if the pressure is drawn down from the shut-in well by virtue of production from other wells, you have established communication and pressure interference. Now, an example of this method is the first method, I'll say first, all of the pressures on this Exhibit, Exhibit 6-A, show the first method in that they are all subsequently completed wells which had pressures, initial pressures less than the initial reservoir pressure, thus indicating that they had been influenced by other producing wells. In regard to the second method or interference test, the Huerfano unit No. 103, in January of 1959, January the 17th, prior to any production from the well, had a bottom hole pressure of 1295 pounds. Now, this well was continued as -- in a shut-in status, it was not produced, and another pressure was measured forty-two days later. At this time the pressure had declined to 1270 pounds, which, of course, conclusively proves that pressure communication between this well and other producing wells existed.

Q All right, sir. Is that all, Mr. Marshall?

A Yes, sir.

(Thereupon, Pan American's Exhibit No. 7-A was marked for identification.)

Q Would you go on, now, to Exhibit 7-A, please? What is that Exhibit?

A Again I've taken the information in the tabular form and put it in a graphical form. Exhibit 7-A is a graphical representation of the tabular information which appeared in Exhibit 6-A. It is a plot of bottom hole pressures versus time, initial bottom hole pressure versus time for the various wells where initial bottom hole pressures were available.

Q What is the significance of that Exhibit, Mr. Marshall, from the standpoint of this hearing?

A This Exhibit vividly demonstrates the influence that wells other than the well on which the pressure was taken which was shut-in wells and were not producing, shows the influence of wells that were producing, the reservoir pressure measured at points where there was no production, as indicated by the curve, was declining at a rate, or rate of decline that would have been expected.

Q Have all the initial pressures of subsequently completed wells been below the virgin original reservoir pressure?

A Yes, sir.

Q Is that what Exhibit 7-A shows?

A Yes, sir.

Q All right, sir. You are going to have to go back to the

board now. Let me direct your attention to Exhibit 8-2. Just flip them all down.

(Thereupon, Pan American's Exhibit No. 8-A was marked for identification.)

Q What is that Exhibit, Mr. Marshall?

A As I've stated before, by taking the pressure information that's available from the various wells in the field and tabulating it in the manner in which Exhibit 6-A was tabulated, it is evident that communication, that the wells in this reservoir are capable of draining wide areas, and also by taking the information, the same information and putting it in a graphical form, it is very vivid, the conclusion is drawn that the wells in this reservoir are draining wide areas. Now, it helps me to see it on the surface, so what I've done with Exhibit 8-A is for each well for which we had an initial reservoir pressure is take a blowup of the area around that well from this map, from Exhibit 1-A, 8-A, is a blowup of the area around the W. R. Weaver McAdams No. 2 and the El Paso Huerfano unit No. 99. As you can see, the initial pressure taken on Huerfano unit 99 taken prior to any production from that well was 1512 pounds per square inch. This was 108 pounds less than the original reservoir pressure in that area, in the field. That conclusively shows that the pressure at this well -- the pressure at this well was being drawn down by production from other wells in the area. Now, the nearest producing well to the Huerfano unit 99 is the W. R. Weaver McAdams No. 2. It is located approximately 3100 feet from the Huerfano unit 99; this is the nearest well which had produced. The fact that the pressure had drawn down so

far out here indicates, in fact, conclusively proves that the No. 2, the Weaver No. 2 had to be draining an area, a minimum area of 693 acres. I've indicated this minimum area of 693 acres by the circle.

Q Why do you say minimum, Mr. Marshall?

A The magnitude of the pressure drawdown, which in this case was 108 pounds, proves that the well was undoubtedly draining more than 693 acres. Had the well been draining only 693 acres, you would have expected the pressure at this point of 99 to be very close to the original reservoir pressure.

Q I see.

A However, it was 108 pounds less.

Q This may seem like a foolish question to you, Mr. Marshall, but I am going to ask it anyway. The initial pressure on this unit No. 99 Well was below original virgin reservoir pressure. Now, is there any way that pressure could have been lowered by the shrinkage of the reservoir rock by anything you can think of? Is there any way that pressure could have been lowered except through production from other wells in the same reservoir?

A No, sir, there would have been no other way to decline the pressure. This well was not produced except by production of other wells producing from the same source.

(Thereupon, Pan American's Exhibit No. 9-A was marked for identification.)

Q I direct your attention, now, to Exhibit 9-A, Mr. Marshall. Is that an Exhibit similar to 8-A?

A Yes, sir. Exhibit 9-A is a blowup of the area on Exhibit 1-A around the Weaver McAdams No. 3 and McAdams No. 4. The

initial measured pressure on the No. 4, Weaver No. 3 was 1,999 pounds, or 339 pounds less than the original reservoir pressure. This undoubtedly conclusively proves that the well had been influenced or that interference and drainage had taken place by virtue of production of other wells. The nearest producing well at that time to the No. 4 was the Weaver No. 1. This well is located approximately 2,450 feet away. The fact that the pressure had been drawn down at this point, 2,450 feet from the nearest producing well, conclusively proves that the Weaver No. 1 was draining a minimum of 433 acres. Again, because of the magnitude of pressure drawdown, it was undoubtedly draining more than 433 acres.

(Thereupon, Pan American's Exhibit No. 10-A was marked for identification.)

Q All right, sir. Would you go to Exhibit 10-A, please? That is a similar Exhibit, Mr. Marshall, and I wish for purposes of brevity and time saving, would you just give the name of the wells involved, the pressure drawdown, and the indicated minimum drainage area?

A Yes, sir. This Exhibit is the area of the Weaver No. 1 and the Weaver No. 3. The initial pressure on the No. 3, which is an oil well now, was 450 pounds, or a drawdown of 170 pounds. This conclusively proves that the No. 1, the nearest producing well, was draining a minimum of 488 acres.

(Thereupon, Pan American's Exhibit No. 11-A was marked for identification.)

Q All right, sir. Go on, now, to Exhibit 11-A and briefly tell us what it shows.

[illegible] Exhibit No. [illegible] the pressure information which was available from the [illegible] Huerfano No. 106. This well had an initial pressure of 1320 pounds, or 300 pounds less than the initial reservoir pressure. The well evidently was interfered by other wells, the nearest of which is the Weaver McAdams No. 4, 1980 feet and, therefore, a minimum drainage area for the No. 4 of 283 acres.

Q All right. By that Exhibit, you don't purport to show that the furthest away that largest area that well will drain was 283, do you, Mr. Marshall?

A 283, no, sir. The fact that is 283 is only because of the location of the well. It was located only 1980 feet from the Weaver No. 4. Now, the fact that this pressure had drawn down 325 pounds by virtue of production from the No. 4 showed that the well was probably draining an area considerably, but larger than the 283 acres, but the well is so located that that would be the minimum drainage.

(Thereupon, Pan American's Exhibit No. 12-A was marked for identification.)

Q All right, sir, would you go to Exhibit 12-A, please?

A Exhibit 12-A is a similar Exhibit showing the pressure information which was available from the Huerfano No. 106. Its initial pressure was 1320 pounds, or 300 pounds less than the initial reservoir pressure. The nearest well to the 106 is the Weaver McAdams No. 4, which is at a distance of 3550 feet. This proves that the No. 4 was draining a minimum of 909 acres.

(Thereupon, Pan American's Exhibit No. 13-A was marked for identification.)

Q All right. Will you go to Exhibit 13-A and tell us what it reflects?

A Exhibit 13-A shows the pressure information which was available from the Huerfano unit No. 107. It had an initial pressure of 1425 pounds, which is 195 pounds less than the original reservoir pressure. This means that the drawn down pressure was caused by production from other wells, the nearest of which is the Weaver No. 3 at 2175 feet, and showing the drainage area of 341 acres. Now, you'll note that both the Weaver No. 3 and the Huerfano unit 107 are oil wells. This Exhibit conclusively proves that not only a gas well but an oil well will drain in excess of 341 acres.

(Thereupon, Pan American's Exhibit No. 14-A was marked for identification.)

Q All right, sir, go on down to Exhibit 14-A.

A Exhibit 14-A shows the pressure information available from Pan American's McAdams "B" 2, a recently drilled well. The pressure -- bottom hole pressure was measured on this well prior to any production, and it had a pressure of 1300 pounds, or 320 pounds less than the original reservoir pressure. The nearest well was the Huerfano unit 105, which is an oil well, and it is located 3100 feet away. Also, the Pan American McAdams No. "B" 2 is an oil well. Now, the magnitude of the pressure interference between these two wells conclusively proves that an oil well can also drain in excess of 693 acres.

Q In other words, Mr. Marshall, based on Exhibits 13-A and 14-A, we see in this pool that oil wells are capable of draining extremely larger areas, do we not?

A Yes, sir, because of the excellent characterization of the reservoir, and they can also drain relatively wide areas.

Q Do you have any other comments on those Exhibits?

A No, sir.

Q Let's briefly review your recommendations, Mr. Marshall. What size proration unit do you recommend for oil wells in this pool?

A I recommend an 80-acre proration unit for an oil well.

Q All right, sir. We previously discussed your recommended limiting GOR of 2,000 to 1. Unless you have any further comment in that regard, we will go on to another recommendation.

A No, sir, I have no further comment.

Q All right, sir. Let me back up a minute. You do certainly feel or are you a little redundant after your testimony? But you certainly feel that an oil well will efficiently drain in excess of 80 acres, do you not?

A Yes, sir.

Q All right, sir. What size proration unit are you recommending for gas wells in this pool? Let me back up, Mr. Marshall. Instead of saying proration unit, what size, what amount of acreage are you recommending to be assigned to a gas well?

A Up to and including 320 acres per well.

Q In your opinion, Mr. Marshall, will a gas well in this pool effectively drain in excess of 320 acres?

A Yes, I think the data indicates, supports and proves that a gas well will drain considerably more than 640 acres.

Q Do you feel that if the gas cap of this pool is developed to a density of 320 acres, it can be effectively depleted?

A Yes, sir, definitely.

Q You feel that way. Then, you must feel that any greater density than one gas well with 320 acres would result in the drilling of unnecessary wells?

A Yes, sir, I do.

Q All right, sir. Would you state again the allowable that you would assign to a gas well in this pool?

A I would assign an allowable to the gas well equal to the gas limit for the oil well, 80-acre oil well on the surface basis;if the gas well has 320-acres assigned to it, it would receive four times the gas requirement for an 80-acre oil well.

Q And you are recommending the normal unit allowable for an oil well under Rule 505?

A Yes, sir.

Q You have recommended as defining a gas well as any well producing with a ratio of 25,000 to 1?

A Yes, sir.

Q And an oil well is anything below that figure?

A Yes.

Q Do you think we will have any trouble in defining a gas well and an oil well?

A Not so long as the gas-oil contact remains stable.

Q All right, sir. You testified that the gas-oil contact has already moved up structure, up into the gas cap approximately ten feet, have you not?

A Yes, sir, by virtue of the fact,the way the field was developed it has moved up.

Q In view of that, let me ask you this question, Mr.

Marshall. Are you familiar with the order that was issued as a result of the Examiner Hearing in this case?

A Yes, sir, I am.

Q Do you recall that that order contained a provision that after or starting July the 15th no oil well whose casinghead gas was not gathered and saved could produce?

A Yes.

Q In other words, it prohibits the flaring of casinghead gas?

A Yes, sir.

Q Are Pan American's oil wells in this pool connected to a gathering system?

A No, sir.

Q Do you know of a formal casinghead gas gathering system, as such, in the field?

A No, sir.

Q What stage of development would you say this pool was in, initial stage of development?

A Yes, sir, it is still in the initial stages of development.

Q Pan American's oil wells are shut-in, are they?

A Yes, sir.

Q Let me ask you this, Mr. Marshall. Assume for me that the oil wells remain shut-in, the gas wells continue to produce, what will happen to our gas-oil contact?

A Well, as I stated, because the way the reservoir was developed, the gas area being developed first, a certain amount of waste is taking place by virtue of production from the gas cap and

no production from the oil wells. Of course, if we shut-in the oil wells now,then the problem will only be compounded and we will further -- cause further waste of oil by virtue of its moving into the dry gas cap.

Q Mr. Marshall, no one likes to make a choice between one type of waste as opposed to another type, but I'm going to ask you to make a change -- choice. Which, in your opinion, would cause the greater amount of waste, the flaring on a temporary basis of the casinghead gas from the oil wells -- I say temporary, meaning until they can be connected, and the gas gathering saved. Would that cause more waste or will more waste result through shutting these oil wells in and allowing the oil to migrate into the dry gas cap?

A It is my opinion that far more waste would result by shutting in the oil wells now at this stage and allowing oil to migrate into the gas cap, oil which will not be recovered,than the small amount of casinghead gas that will be flared over the period until the wells are connected to a cashinghead gas gathering system.

Q Do you have any other comments you would like to make, Mr. Marshall?

A No, sir, I believe not.

MR. BUELL: May it please the Commission, I would like to make a brief explanatory statement. Our testimony has shown that waste has occurred in the field. We said it had because it has, but we do not want that testimony in any way to be taken as critical of either the Commission or of Mr. Weaver. It was one of those things that unfortunately none of us could control. Also, I

would like for the record to be crystal clear in this regard, and that is that Ion Western is in complete sympathy with the Commission's efforts to eliminate the flaring of casinghead gas where it is economical and practical to do so. We think our past actions in this regard bare that out, but we have so many unusual factors in this pool. We have the unusual factor that has just been discussed, of having oil in intimate communication with gas. We have the additional practical factors of this field being in the initial stage of development. Actually, I don't believe anyone at this time has sufficient data available to him to adequately plan a gathering system. Data obtained from our McAdams "B" 2, for instance, which has just recently been completed, indicates that the oil area is going to be larger than we had ever anticipated. In view of the unusual factors, I would like to move at this time that in order to prevent waste, the Commission authorize us to return our oil wells to production.

MR. PORTER: Mr. Buell, your motion will be considered along with the entire consideration of the case and in any subsequent order that may be issued. Does anyone have a question of Mr. Marshall?

MR.PAYNE: Yes, sir.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Marshall, wouldn't it be in the interest of conservation to reinject this gas back into the gas cap?

A Which gas are you referring to?

Q The casinghead gas that you are not allowed to flare

at the present time [illegible] which you say you cannot gather economically.

A Under ideal conditions, it would be. However, we would be injecting gas from one property into the property of another person, which I don't imagine would be too desirable.

Q Aren't you a big owner in the Huerfano unit?

A Pan American?

Q Yes.

A I believe somewhere in the order of a third.

Q Don't you think also the Commission should look at this thing, the pool as a whole, rather than on the basis of individual properties?

A I think that the Commission should look at it with the idea in mind, of course, to prevent the avoidable waste that could occur as well as to protect the correlative rights of all the people involved in the reservoir.

Q Now, couldn't you prevent waste by reinjecting this gas rather than getting an exception to the no-flare provision?

A Providing I could get permission to do so, yes.

Q Now, referring to your earlier testimony, Mr. Marshall, I believe you said that waste has been caused in this pool ever since the entry of the most recent order, is that correct?

A No, sir.

Q When has this waste that has occurred -- when has it taken place?

A The chief amount of waste that has taken place took place prior to the reclassification of the field from a gas field

to an oil field.

Q Has any waste taken place subsequently?

A By virtue of the history of the field it is rather -- I believe, if I am not mistaken, that for some period after the initial order, the field was produced with a ratio of 2,000 to 1, and subsequent to that an order was issued which produced the field at a ratio of 4,000 to 1. During the period the field was producing at 2,000 to 1, there could have been some. I doubt that any significant waste has taken place. I believe that some waste was taking place during the period that the reservoir was being produced at a ratio of 4,000 to 1.

Q All right, sir. That is due to the oil migrating up structure into the dry sands, is that correct?

A Yes, sir.

Q So what you are saying is that the gas withdrawal rates have been too high?

A Yes, sir, in general.

Q Now, isn't it true that under your proposal, a gas well will be allowed to produce twice what it is now allowed to produce?

A Well, the well itself, but the acreage voidage, or the relative voidage between the gas well and the oil well will be essentially equal. In fact, it will be in favor of the oil well. The oil wells will be voiding more than the gas well. The small amount of the voidage created by the oil as far as the relative voidage, it being equal, the gas well will not be voiding more than twice the oil wells.

Q Aren't they essentially equal, the voidage of the gas-oil, as opposed to the oil well?

A At 4,000 to 1?

Q Yes, sir.

A No, sir. At 4,000 to 1, the wells -- let's see now, the wells which are drilled on 160-acre spacing now have an allowable of around 600 MCF per day. The oil wells under the present rule have an allowable of 150 barrels a day with a limiting ratio of 4,000. The voidage is, of course, in favor a little bit of the oil well. It is approximately equal, that's correct. You are right. At the present time it is approximately equal.

Q Now, doesn't your theory of waste by the migration of oil into the dry sand, isn't that contingent upon the possibility that the entire gas cap will be drilled up on 80 acres?

A No, sir, I don't believe it is. If the entire gas cap were drilled on 80 acres, that would mean that the voidage from the gas well would be 1200 MCF per day for 160 acres. Now, that is twice the voidage that my recommendation proposes, so that if the gas wells are drilled on 80 acres and developed on 80 acres, the voidage would be twice as much. If they are not developed on 80 acres, which I don't see how we can avoid in various areas, the waste would only occur by virtue of the fact that we would allow inefficient oil wells to produce oil because of the high limiting ratio. As far as the voidages, they would be equal. If we assume that all of the oil wells can produce at a ratio of 4,000 to 1, I doubt seriously, as this field is developed, in fact, I know Pan American "B" 1 had a gas-oil ratio so small we couldn't

measure it. If they can produce at 4,000 to 1, we will be all right, but I don't believe they have been able to.

Q What is the smallest proration unit that you can economically drill a gas well under?

A In this particular reservoir?

Q Yes, sir.

Q I would say that a reasonable -- to obtain a reasonable return, it would require 320 acres.

Q Now, isn't a gas well under your proposal going to get 1,200,000 cubic feet of gas per day?

A That gas well that is drilled on 320 acres, yes, sir.

Q Now, a gas well only gets 600,000 cubic feet?

A Yes.

Q So there would be twice as much oil migrating into the dry sand under your proposal as there is now?

A Well, it depends; not if -- it depends on what you are assuming. the development is going to be, the development density.

Q That's what I am trying to pin down. You assume that the gas cap is going to be drilled out on 80 acres, do you not?

A Yes, sir. I believe that's the order.

MR. PAYNE: I believe that's all.

QUESTIONS BY MR. PORTER:

Q Mr. Marshall, I believe you recommended a 25,000 to 1 dividing line between an oil well and a gas well; that is gas-oil ratio.. And I believe you also testified that the gas-oil ratios would increase in this pool --

A Yes, sir.

Q -- as it nears depletion?

A Yes, sir.

Q You also said that you didn't have any difficulty distinguishing between an oil and gas well. I can't reconcile all those statements.

A Well, sir, the oil portions, the gross characteristics and the rock characteristics are such that we would expect an increase in ratio as the reservoir is depleted. Now, based on those characteristics, the peak and ratio, or the ratio should peak and start down a little bit at a gas-oil ratio for the oil well of somewhere around 10,000 to 12,000 cubic feet per barrel. Now, by that time, under this proposal, the gas reservoir is going to be depleted. In other words, at the instant of depletion, we have all the oil out that we are going to get out, and the gas there may be still -- we have all the gas we are going to get out. If they were separated and we had the oil area with the characteristics it has, and the gas area with the characteristics it has, the ratio on an oil well would never get over 12,000 to 1; it would start down during the latter stages of depletion. Now, if we put them together, what the ideal conditions are, to try to cause that to exist simultaneously or simultaneous depletion, and by the time the field is so far depleted, the pressure in the gas cap will be so low that there wouldn't be -- it wouldn't be economical to recover any more, and the ratio of the oil well would not have gotten over 12,000 cubic feet per barrel.

Q But that's pretty much of an assumption, you think?

A No, sir. I think from what we've heard the reservoir that if we prorate it in a manner so that it will work together, which I believe we can do --

Q In other words, according to your recommendation?

A Yes, sir. In accordance with my recommendation.

MR. PORTER: Anyone else have a question of Mr. Marshall?

MR. HOWELL: Ben Howell, representing El Paso Natural Gas.

QUESTIONS BY MR.HOWELL:

Q Mr. Marshall, I believe the testimony has previously shown that on Pan American's Exhibit No. 1-A the Weaver Brown wells are located on Section No. 34, which is outlined in purple on the Exhibit, is it not?

A Yes, sir.

Q Now, there is one well in each quarter section which is completed in the Gallup formation on that Section, is there not?

A Yes, sir.

Q And looking at the surrounding sections, it appears that there is no well completed in the SW/4 of Section 35, which adjoins to the East, is that correct?

A Yes, sir.

Q And that there is no well completed in the NE/4 of Section 3, lying directly to the South, is that correct?

A Yes, sir.

Q And that there is no well completed in the NE/4 of

Section 22, which lies directly to the East, is that not so?

A Yes, sir.

Q Now then, if [illegible] one of these offsetting [illegible], what would be the effect of the completion of those additional three wells in the gas cap with reference to waste? Would it increase or decrease the waste?

A Now, what rate do we --

Q Assuming that the present rule that we are now complaining about is to remain in effect, and that each of those wells would be permitted to produce on the basis of that rule?

A There would be waste occurring by virtue of the fact that we have got the oil wells back here producing at a limit of 4,000 to 1, and they can't make 4,000 to 1 or probably can't, and we will have more migration into the gas cap which will cause waste.

Q The drilling of three wells in those locations will increase the withdrawals from the gas cap under the present rules, would it not?

A Yes, sir.

Q Based upon your testimony as to the area which one well will drain in this pool, would you consider the drilling of each of these three locations to be an unnecessary well?

A Yes, sir, I definitely would.

MR. HOWELL: Thank you.

MR. PORTER: Mr. Errebo.

QUESTIONS BY MR. ERREBO:

Q Mr. Marshall, referring to your Exhibit No. 1, the

northernmost, is that a blue or a green line there? I think it is a green line.

A Yes.

Q That represents the limit of commercial production, is that what you identify that as?

A Represents my limits of commercial production.

Q You mean by that, that any well drilled inside of that line would be a commercial well?

A Yes, sir.

Q Would you recommend that your management drill a well anywhere inside that line at this time?

A Yes, sir. I'm in the process of recommending some wells back here, a well back up here in Section 20.

Q How is the Jack Frost No. 1 doing now, Mr. Marshall?

A Well, sir, I'm not sure. We, at the present time, have just completed a restimulation of the well.

Q Does it have its load oil back?

A No, sir, not from the restimulation.

Q And it still doesn't have its load oil back after it was fraced the second time, is that it?

A That's correct.

Q Do you think at the present time you have enough information that you would recommend that an offset to that well be drilled, say, to the northwest?

A Well, sir, we have a very excellent offset to that well. The Huerfano unit 107, I believe, flows with a small choke around 150 to 160 barrels a day, so that the payout in that area

[illegible] further development.

Q I am talking about -- actually there [illegible]. That is still within the [illegible], isn't it?

A You mean in the same [illegible]?

Q Yes, sir, that's what I mean.

A I would naturally want to [illegible] -- await the result of Jack Frost. However, by virtue of the fact that we thought enough to have the pay section -- to restimulate that well, I believe that -- it is my opinion that evidence will become available from that well that will support additional development.

Q Actually, as poorly as that well performed, it would be rather foolish to move off and not try to do -- salvage something out of that deal, isn't it?

A Well, yes, sir, it would have been foolish to move off. I would like to make my point clear about the -- what was the question now?

Q Well, I think you have answered my question that I previously asked you. Now, with regard to the performance of Weaver No. 3, that's the oil well, I would like for you to state for me, please, what it is that led you to believe that that well shows a movement of the oil column toward the gas cap?

A Well, the well was initially drilled in -- I believe the well was drilled in with gas, and it was reported that on penetration of the top of the pay sand, the well produced 5800 MCF of gas per day, and in accordance with the report, I see there was no liquid. At the present time this well produces 104 barrels of oil per day, or according to the test conducted March 28,1959,

produced [illegible], with a gas-oil ratio of [illegible]. I cannot believe that it is possible that the production tabulated in the records of that well at the time it was drilled and at the time that test was taken.

Q Mr. Marshall, would the method of producing that well have any effect upon the apparent gas-oil ratio?

A The method of producing it?

Q Yes.

A Very negligible effect, in my opinion.

Q Do those wells tend to load up with oil when they are shut-in?

A No, sir.

Q They don't?

A No. In fact, you'll notice on one of the previous pressure Exhibits we had, we had a surface pressure measured on the Huerfano unit 107, which is undoubtedly an oil well. It produces with a ratio of 2,573 and flows 140 to 150 barrels of oil per day. A bottom hole pressure was run on that well after a seven-day shut-in. Some gradient steps were taken every several feet, and the well was indicated to have absolutely no fluid in it at the time the pressure was measured.

Q Let's go back to this McAdams No. 3 again, Mr. Marshall. Now, do you know whether that well loads up or not, with oil?

A I have an indication that it does at some time. In fact, one of the reasons for my conclusion that the oil cap has moved into that well is two pressures that were taken which showed -- that one taken in -- I forget the date, but two months

prior to the second pressure, there was no oil in the well bore, and on the second pressure, the pressure indicated that there was oil in the well bore.

Q You know how much oil there was in there?

A No, sir. I can make an estimate.

Q Well, let me ask you this, then, Mr. Marshall. Excuse me, were you through on that?

A Yes, go ahead.

Q Do you know what the producing practices of W. R. Weaver have been in producing this well? By that, I mean do you know whether it has been produced continuously or do you know whether it has been produced for a period and then shut-in for a period and then produced for a period and so on?

A No, sir.

Q Now, if that well did load up, and you've indicated by your testimony that it would have oil in the bore, then, if it were produced continuously over a period of a month, and, say, shut-in only twice, then, you would have a certain amount of oil production which would result from the opening up of the well, wouldn't you, that would be in excess of its normal producing?

A Yes, sir. Of course, that oil had to come from somewhere that was loading the well bore, which, in my opinion, was coming because the contact was moving up.

Q Now then, if that -- would you say, then, that you get an additional amount of oil when you first open the well up and it slugs out?

A Well, I would say this. A ratio measured on a well

immediately after opening it for a short period of time probably wouldn't be representative. You would want to have some production to stabilize the well; the fact that this well evidently stabilized at 10½ barrels of oil per day.--

Q Well then, Mr. Marshall, wouldn't it be true that the more times you shut that well in, and then open it again, during the month, as the number of times increased, that you opened and shut it, you would have an increase in amount of oil produced during that month as compared, for instance, to a month when you open and shut the well a fewer number of times, isn't that correct?

MR. BUELL: May it please the Commission, I feel that Mr. Errebo is trying to get Mr. Marshall to criticize Weaver and Brown's operations, which Mr. Marshall is not going to do. We assume Mr. Weaver and Mr. Brown are prudent operators, we assume the data they submit to the Commission is representative, and we so use it.

MR. ERREBO: If it please the Commission, what I'm trying to develop here is that I think the method of operating this well, that I have just been through on this line of questioning has a very definite relationship to the gas-oil ratio that will be indicated. Therefore, the change in gas-oil ratio that Mr. Marshall says has occurred, I think it very well varies with the change in operating conditions. Now, that's the point I'm trying to develop with it.

MR. BUELL: Mr. Errebo, are you admitting that the data your client submitted is not representative? Surely not.

MR. PORTER: Objection overruled.

A I would like to state, Mr. Errebo, to clarify, as far as --

MR. BUELL: Do you recall the question?

A Yes. -- as far as my opinion is concerned, over a period of a month, I do not believe that you could vary the gas-oil ratio. If you had a man out there that was ready to turn the valve off and on every five minutes, if you take the average of a five month period, I don't think the ratio would vary.

Q (By Mr. Errebo) Are you talking about the apparent producing rate as determined from the total amount of oil and gas produced at the end of the month?

A Either that or a twenty-four hour test.

Q Actually, the information that you have on it is based on production information rather than test information?

A I don't believe so. A ratio, 15,000 ratio, which I reported, was a gas-oil ratio filed with the Commission dated March 28, 1959, which was, I believe, a twenty-four hour test. The ratio that I had available, it wasn't exactly a ratio. I believe the report filed with the Commission stated that the well potentialed for 5800 MCF of gas per day and reported no liquid.

Q Well, how about the ratio that you show on your Exhibit 1 for that well? Is that a test ratio also?

A Yes, sir. I believe that is the formal gas-oil ratio filed with the Commission.

Q Now, with further regard to movement of this oil rim or the gas-oil contact, was it your testimony earlier today here, Mr. Marshall, that that movement occurred during a time when there

were no rules in effect other than statewide rules?

A The majority of it, yes, sir.

Q Is it your testimony that no movement has occurred since then?

A I think some movement has occurred since then.

Q Now, since then, since that time, we've had rules in effect which provide for 2,000 to 1 ratio, haven't we?

A For a short period.

Q Is it your testimony that movement occurred during that period of time?

A There was some minor amount of movement. I would say it was negligible during that time.

Q Then, we've had a period of time that the limiting ratio was 4,000 to 1, haven't we?

A Yes.

Q And movement occurred then?

A Yes, sir, I think some of the movement occurred during that period.

Q Now, do you think movement causes waste?

A Yes, sir.

Q Have you made an estimate of how much gas was drawn out of the gas cap during that period of time?

A During the period of time --

Q That the 4,000 to 1 rule was --

A 4,000 to 1?

Q Say, per day.

A Yes, sir. Just a second.

Q Perhaps rather than delaying the hearing, your finding a definite figure on that, Mr. Marshall, let me ask you this question. You have determined what the total amount has been, is that right?

A I have a tabulation showing --

Q Per day?

A The monthly withdrawal.

Q The monthly withdrawal?

A The monthly withdrawal.

Q Is it your opinion that there would be more or less monthly withdrawals under the rules you propose from the gas cap under present conditions?

A Under present development conditions more or less than which now, or than the present withdrawals?

Q Under the rules which you propose, would there be less total gas withdrawn from the gas cap than under the rules that are now in effect?

A No, sir, but there would be less voidage of the oil. The waste caused by decreasing the oil withdrawal is the same as the waste caused by the increase in the gas withdrawal, and the reason it would be less oil withdrawal is that in 4,000 limit an oil well that is not capable of producing 4,000 can't withdraw 4,000, so that you are cutting the -- you are, in effect, reducing the withdrawal from the oil area.

Q Can you tell me whether the total amount of gas withdrawn from a gas cap would be smaller or larger than is now being withdrawn on a daily basis --

A On a 640-acre unit.

Q -- under which you are proposing, as compared to now?

A I am proposing that the allowable for 160-acre gas well be set at 600. The result of my proposal, 600 MCF per day under the present rule, I believe, is also 600 MCF per 160 developed acres. The withdrawal of the gas cap, from the gas cap would be identical.

Q I would like to repeat my question, Mr. Marshall. Will you please tell me, Mr. Marshall, under the rules you propose --

A There will be neither more nor less on a per well based --

Q That wasn't my question, Mr. Marshall. My question was this, whether or not the total amount of gas withdrawn from this field through the wells as they now exist, would be more or less under your rules as compared to the present situation?

A It would neither be more nor less, it would be the same.

Q The total amount?

A The total amount, yes, sir. With the existing wells we have the same resulting allowables, providing no wells are drilled on less than 160 acres or no additional wells are drilled.

Q You have qualified that, Mr. Marshall, haven't you? You say "providing." I want to know on the basis --

MR. PORTER: Mr. Errebo, does your question assume that there will be no more wells drilled? You said "through the present wells drilled."

MR. [illegible]: Yes, sir. [illegible]

it.

MR. PORTER: And the question was -- will you repeat it again, please?

MR. ERREBO: Yes, sir, on the basis --

MR. PORTER: On the basis of the present rule, what you propose?

MR. ERREBO: Yes, sir. Will the total amount of gas be more or less withdrawn from the gas cap under the rules which you propose with the present wells as compared to now?

MR. BUELL: Let's be sure, now, that we've got everything in this question, Mr. Errebo. Do you mean on a surface volume basis, on an acreage basis, on a per well basis, on a total MCF basis, or what?

MR. PAYNE: He means total.

MR. ERREBO: I was making it just as clear as I possibly could, Mr. Buell, and that is the total amount of MCF.

MR. BUELL: Not on any comparative basis?

MR. ERREBO: On any total amount of gas withdrawn under that gas cap, under the rules he proposes, if it was to be put into effect, with the wells we have now, would it be more or less.

A If I am wrong, stop me. You want me to assume that there will be no further production, that we are going to go under what is there now?

Q (By Mr. Errebo) I didn't ask about further development.

MR. [illegible]: The question requires an answer. He is talking about right now.

A The voidage would be the same. It would be not more, not less, it would be the same under the present rules and under my recommendation.

Q Your testimony is there will be no more gas withdrawn from the present wells under your rules as you propose than there is right now under the present rule, is that your testimony?

A That was my testimony. No, sir, excuse me. There will be more gas withdrawn from the gas cap under my recommendation than is being withdrawn at the present time.

Q What will that cause, Mr. Marshall? Will that cause more migration of the oil rim? Will it cause it to migrate further into the gas cap;if it is migrated at all, will it aggrevate the situation which you say is now occurring?

A To answer that question we will take the number of gas wells and the number of oil wells. I have based my recommendation on full development of the field. Now, I've said that under the full development of the field, which we can't tell whether it will be next week or two years from now, the voidage would be equal, and there would be no waste. Right now, as we have one,two,three, four,five,six gas wells, and one,two, three, four, five, six oil wells, two of those wells are drilling. When these wells are producing, since the number of wells will be equal, I can't see that there will be any waste occurring.

Q Do you think there is any waste occurring now?

A Definitely, right now, because Pan American's wells are shut-in, and I believe the only wells producing are the gas wells.

Q Well, let's assume that the wells were being produced, then do you think that waste would occur under producing conditions that would result from the rules which are now in effect?

A Yes, sir.

Q Other than the shut-in?

A Yes, sir, because the wells -- there are several wells, two that I know of, and possibly there will be more that can't produce a ratio of 4,000.

Q You say that they can't produce a ratio of 4,000?

A Yes, sir.

Q How many of those wells are there?

A Right now, well, there is two right now. Well, actually, the Frost is not producing at the present time either.

Q Well, actually, how many wells are there on your Exhibit No. 1 that show a gas-oil ratio in excess of -- let me strike that, if you will, please. How many are there, wells that show a gas-oil ratio less than 4,000 to 1 as appear on your Exhibit No. 1?

A Two.

Q And which are those two?

A The Frost, when it was producing, and the Huerfano unit No. 107.

Q Actually, the Frost shows TSTM, doesn't it, doesn't show any ratio?

A Yes, sir.

Q How many wells are there as compared to these one or two, however you want to look at it, that produce in excess of 4,000 to 1?

A You mean of the wells I am calling oil wells?

Q The wells shown on your map?

A Well, all the rest of them.

Q How many are there, do you know?

A Six gas wells, and one, two, three, four oil wells.

MR. ERREBO: That will be all.

MR. PORTER: Take a ten-minute recess.

(Short recess)

MR. PORTER: The hearing will come to order. Mr. Payne.

QUESTIONS BY MR. PAYNE:

Q Mr. Marshall, I believe you testified that in order to have an economic gas well in this pool, you have to be able to dedicate 320 acres to it, is that right?

A I testified that to have a reasonable return on investment you would have to, yes, sir, dedicate 320 acres to it.

Q Is there a distinction or is it distinction without a difference?

A It depends on your definition of economical. If you say can we make any profit down to a dollar, I believe we could

make some profit on a hundred and sixty acres. However, I don't think the return would be realistic.

Q I see. You think it would have to be 320 to have a reasonable return on your money?

A Yes, sir.

Q Now, what you are worried about here in wanting to change the ratio from 4,000 to 1 to 2,000 to 1 is actually total gas produced out of the gas cap, is it not? You want to hold withdrawals down in the gas cap so that the oil doesn't migrate up structure?

A Yes, sir. I want to provide essentially equal withdrawal so that the contact won't move either way.

Q And you are not so concerned about the gas withdrawal rates at present, are you?

A No, sir.

Q What you are worried about is additional wells being drilled in the gas cap?

A Yes, sir, I'm assuming the development of the field.

Q All right, sir. If you can't get a reasonable return on your money unless you drill on 320, then how can you assume that this pool will be drilled up on either 80 or 160?

A Well, sir, we don't operate -- I'm giving that as Pan American's opinion. We don't operate all the wells. In fact, Mr. Weaver has already drilled to a hundred sixty acre density. Evidently he believes that he can show a return on 160 acres. We are

of the opinion that we cannot.

Q Let me ask you this, Mr. Marshall. Does the United States Geological Survey require an offset well if you can establish it is uneconomical to drill a well?

A I don't -- I'm not sure of the regulation. I don't believe so.

Q So that --

MR. BUELL: Excuse me, Mr. Marshall. Unless he knows of his own knowledge, Mr. Porter, he shouldn't answer that question because he is not an expert on their policies. I couldn't answer it myself.

MR. PAYNE: The Commission will take administrative notice of that fact.

MR. HOWELL: If the Commission please, we expect to put on a little testimony about what the United States Geological Survey requested, and they have a representative here, and I suggest that --

MR. PAYNE: Are you controverting the point, Mr. Howell, that they do not require an offset well, and if you establish it, it would be uncommercial?

MR. HOWELL: I am prepared to put on testimony that the United States Geological Survey has required the drilling of three offset wells in this section.

MR. PAYNE: That does not conflict with the point that I am asking the Commission to take administrative notice of.

MR. HOWELL: We certainly would not stipulate that that is a fact; that we have a representative of the Survey here that I suspect can meet with the Commission, if necessary, that could establish the surveys position.

MR. PAYNE: Do you intend to call him as a witness?

MR. HOWELL: No, I do not, because he is here, available; we expect to put on testimony as to what the survey has requested of us as a unit operator.

MR. PAYNE: Pending such time until we find definitely what the U.S.G.S.'s position is, we withdraw the request that the Commission take administrative notice of it with the proviso, if I am correct in my understanding, that the Commission takes administrative notice of it at such time as it is determined.

MR. PORTER: Perhaps it may be developed through a later witness -- subsequent witness.

MR. HOWELL: If the Commission please, if we could employ Mr. Payne to get the Survey, to keep the Survey from drilling those wells, we will be delighted to have him.

MR. PAYNE: I am talking about when they require an offset well and when they do not only.

MR. HOWELL: I am talking about something specific.

MR. PAYNE: So am I.

Q (By Mr. Payne) Mr. Marshall, are you aware that the pool rules for this pool went into effect on June the 1st?

A Yes, sir.

Q Are you also aware that the no-flare provision didn't go into effect until July the 15th?

A Yes, sir.

Q Did your company make any bonafide effort to get a market for this gas or to make plans to reinject this gas during the forty-five day period?

MR. BUELL: May it please the Commission, I might be able to answer that better than Mr. Marshall. We have entered into preliminary negotiations with El Paso, who is the most logical purchaser; a very preliminary negotiation.

MR. PORTER: Anyone else have a question of Mr. Marshall? Mr. Utz.

QUESTIONS BY MR. UTZ:

Q Mr. Marshall, do gas wells in this pool produce a certain amount of liquids?

A Yes, sir.

Q Referring to your Exhibits 8-A through 14-A, where you purport to show interference, how were these bottom hole pressures taken?

A I believe I can go by this tabulation here. The pressures were calculated from surface pressures except on Exhibit 6-A. There are three initial bottom hole pressures by which there is an astorisk. These pressures were bombed measured pressures.

Q Is that on the 107 and the 103?

A The 103, 107, and Pan American's McAdams "B" 2, yes, sir.

Q Well, a number of these exhibits, then, were calculated, those wells shown on the exhibit?

A The bottom hole pressure was calculated, yes, sir.

Q Do you know whether or not there is any liquid in the well bore?

A It is my opinion that based on the places that we did have measured bottom hole pressures, except for the McAdams "B" 2, of course, which had liquid in the hole, but the Huerfano 103 did not have any liquid in the hole at thetime that bottom hole pressure was measured, and in fact, the Huerfano unit 107, which produces quite a bit of oil, it did not have any liquid in the bore when the bottom hole pressure was measured, and in line with the values and examination of the values that resulted, together with those two facts, it is my opinion that there was no liquid in the bore of these gas wells which I calculated the bottom hole pressure for.

Q You base that on the ones that you did take bottom hole pressure on?

A Yes, sir.

Q And how many of those were oil wells?

A Two.

MR. UTZ: That's all.

MR. PORTER: Anyone else have a question of Mr. Marshall?

MR. BUELL: May I formally offer at this time, may it please the Commission, Pan American's Exhibits 1-A through 14-A?

MR. PORTER: Without objection, Pan American's Exhibits 1-A through 14-A will be admitted into the record.

REDIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Marshall, I want you to assume for me that under the present rules of 80-acre units for both oil and gas wells, a 4,000 to 1 limiting ratio, which we now have. Assume further, that the field is completely developed under these rules. I want you to compare that with your recommended rule and assume complete development. Under those two assumptions, which would result in the greater gas withdrawal?

A The rules which are now in effect governing production.

Q And your recommendations would result in less total gas withdrawals?

A Yes, sir.

Q All right, sir. You earlier answered a question that conservation would be served by reinjecting the produced casinghead gas into the gas cap, is that right?

A Yes, sir.

Q Were you answering that question as a true scientist, looking only at the ultimate end and increased oil recovery?

A Yes, sir.

Q Let's go, as a scientist, a little further, Mr. Marshall, and I want you to tell me from a scientific viewpoint alone which would be the more efficient way, ignoring correlative rights,

which would be the most efficient way to produce this field to get the maximum amount of oil?

A To shut-in the gas wells, possibly, in addition, reinject casinghead gas into the gas cap. Of course, that would be a form of secondary recovery. As far as primary recovery is concerned, the greatest primary recovery would result from shutting in the gas wells and producing the entire reservoir through the oil wells, if you are not going to worry about correlative rights.

Q But as you say, when you do that, you close your eyes to correlative rights?

A Yes, sir.

Q And production in that manner would result in damage to correlative rights?

A Yes.

Q Pan American is an interest owner in the Huerfano unit, is that right?

A Yes, sir.

Q Are there other owners?

A Yes, sir.

Q Also there are some developed tracts in the unit area in the gas cap which are not even committed to the unit, is that right?

A Yes, sir.

Q Mr. Marshall, I thought we were going to let the Jack Frost thaw out a while, but apparently we are not, so let me direct

your attention to what will be marked as Pan American's Exhibit 15-A. What is on that Exhibit, Mr. Marshall?

A This Exhibit shows the electrical log sections on Pan American's Jack Frost "B" No. 1, and El Paso's Huerfano 107.

Q All right, sir, what kind of a well is the Huerfano 107?

A It is a flowing oil well. On the latest gas-oil ratio test measured, taken the 29th of March, the well flowed 290 barrels of oil per day with a gas-oil ratio of 2573. On the latest production test only the well flowed 154 barrels of oil per day through a 20/64 inch choke.

Q Is the Huerfano unit 107 an offset to the Jack Frost "B" 1?

A Yes, sir, it is a diagonal offset.

Q And it is an excellent oil well in this pool?

A The 107.

Q One of the better ones?

A Yes, sir.

Q All right. Would you compare the log on the Huerfano unit 107 with the log on Pan American's Frost "B" 1?

A In my opinion, the electrical log is indicating that the pay section in these wells is for all practical purposes identical.

Q All right, sir. What other information do you have on this Exhibit with reference to the Frost "B" 1?

A We have a core analysis -- results of a core analysis taken on the pay zone.

Q What does it reflect?

A It shows that over the approximate 8 feet of pay, main pay, that the porosity is around 8 or 9 percent, and that the permeability varies between a very small amount to up to 6, 7 milladarcies.

Q What is your opinion of the potentialities of the Frost "B" 1 from the standpoint of an oil producing well?

A From the information here, it is my opinion that it should be a comparable well to the Huerfano unit 107.

Q You have enough confidence in it to recommend an expensive work-over job, do you not, --

A Yes, sir.

Q -- which Pan American is in the process of executing at this time?

A Yes, sir.

Q And you feel the chances are good that the Frost "B" 1 will make a commercial oil well in this pool?

A Yes, sir.

MR. BUELL: May I formally offer Pan American's Exhibit 15-A?

MR. PORTER: Is there objection to the admission of this Exhibit?

MR. BUELL: That's all I have at this time.

MR. PORTER: It will be admitted.

(Thereupon, Pan American's Exhibit No. 15-A was received in evidence.)

MR. ERREBO: I have some questions.

MR. PORTER: Mr. Errebo.

QUESTIONS BY MR. ERREBO:

Q Mr. Marshall, is the Huerfano unit No. 107 producing oil through the perforations above the line that you have identified as top main sand?

A The well is producing from all the perforations. It is my opinion that a minor amount of oil is coming from above that line that you referred to.

Q You intend to perforate the Jack Frost "B" 1 to a comparable depth?

A No, sir.

Q You don't? Why not?

A Because we have perforated our McAdams "B" No. 1, which is not shown on this section at comparable depths and tested it, and it is our opinion that the intervals above the top of the main sand are producing essentially gas with very little oil.

Q Mr. Marshall, you don't mean to tell this Commission that you expect the Jack Frost "B" 1 to be as good a well as the Huerfano unit 107, do you?

A Well, sir, I would expect it to be a comparable well, yes, sir.

Q You mean as good a well?

A Yes, sir.

Q Now, do you feel that these sands get poorer in porosity and permeability as you go toward the edge of the field, northeast?

A I don't -- evidently -- yes, yes, I do feel that there is a decrease in thickness, certainly. And evidently there is also a decrease in the pay quality.

Q Then, you wouldn't expect the Jack Frost "B" 1 to be as good a well, would you?

A Well, we have a log on both wells. The information that we can take from the electric log indicates that the development is essentially the same.

Q Even though it's lower on structure, is that right, and further toward the -- what you defined as commercial limit of production?

A It is in the same trend, but it is a little bit down structure, 25 feet, 24 feet.

Q Did you drill the Huerfano unit No. 107, Pan American?

A No, sir.

Q Was that information available to them when they drilled the Jack Frost "B" 1?

A The information -- let's see, --

Q The logs?

A Let's see, if the well was completed, I am sure. --

Q I was just wondering, Mr. Marshall, if you expect a

comparable well, why you didn't get that comparable well the first time around on this then?

A Well, we wish we could have, but we feel that through certain things that happened in drilling this well -- for instance, while coring the well, it was unavoidable, but we lost 300 barrels of mud to the formation. We believe that the damage which resulted to the pay section was not repaired by the first stimulation, and we feel that by restimulating the well, we have a good chance to repair that damage.

MR. ERREBO: Thank you. That's all I have.

MR. PORTER: Anyone else have a question of Mr. Marshall? The witness may be excused.

(Witness excused)

MR. PORTER: Does this conclude your testimony, Mr. Buell?

MR. BUELL: Yes, sir, that's all at this time.

MR. PORTER: Mr. Howell, do you desire to present testimony?

MR. HOWELL: We have two witnesses we would like to call, Mr. Rainey and Mr. Lemon.

MR. PORTER: Will the witnesses stand and be sworn, please?

(Witnesses sworn)

MR. HOWELL: If it please the Commission, at this time we would like to introduce the record of the testimony offered by

El Paso at the Examiner Hearing, the hearing, beginning at the middle of Page 165 and continuing through Page 201 of the record of the Examiner Hearing, and the two Exhibits which were introduced by El Paso in that hearing. I think in the interest of time that it might save quite a little bit of testimony here.

MR. PORTER: Is there objection to Mr. Howell's motion? That portion of the record will be made part of the record in this case.

DAVE H. RAINEY,

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HOWELL:

Q Will you state your name, please, to the Reporter?

A Dave H. Rainey.

Q Are you the same David H. Rainey who testified in the Examiner Hearing.--

A Yes, sir.

Q -- in this case?

A Yes, sir.

Q Now, have you prepared, Mr. Rainey, a plat graphically showing the relationship between Section 34 and the surrounding portions of the Huerfano unit?

A This was prepared by our Land Department based on the information available to them, and they furnished it to me.

Q Will you please mark this as El Paso's Exhibit 1-A?

A Yes, sir.

(Thereupon, El Paso's Exhibit No. 1-A was marked for identification.)

Q Now referring to El Paso's Exhibit 1-A, is the north line, boundary line of the Huerfano unit shown running just to the north of Section 34 in Township 26 North, Range 10 West?

A Yes, sir, it is, by the heavy dashed line in the north edge of that section.

Q And is the acreage which has been committed to the Huerfano unit immediately surrounding Section 34 shown in red?

A Yes, sir.

Q And is Section 34, which is the Weaver Brown section, committed to the Huerfano unit?

A No, sir.

Q Now, do you know of the request made by the United States Geological Survey for the drilling of offset wells to protect the boundaries of the Huerfano unit?

A Yes, sir. The United States Geological Survey has advised us that they intend to ask -- I don't know whether the formal request has actually been made or not, but they intend to ask for an offset in the SW/4 of Section 35, the NE/4 of Section 3, and the NE/4 of Section 33, all surrounding the so-called Weaver and Brown lease in Section 34.

Q By another witness we will expect to introduce testi-

mony regarding the company's attitude toward the drilling of those additional offset wells. Now, passing to another phase of the testimony, Mr. Rainey, have you had occasion to examine pool rules issued by this Commission covering all that you were able to find in the State?

A Yes, sir.

Q I'll ask you to state whether or not you have found any pools in which the rules permit different spacing for oil wells and for gas wells?

A Yes, sir. There are ten gas pools in the State of New Mexico that I can find in the currently existing rules which provide for different spacing for gas wells and oil wells.

Q And I believe that at the Examiner Hearing you testified with reference to the Blinebry Pool, that although there are two pools designated, one is the Blinebry Oil Pool and one is the Blinebry Gas Pool; the vertical and horizontal limits are identical for the two pools?

A Yes, sir, that is correct.

Q And in that Blinebry situation is there different spacing for oil wells and gas wells?

A Yes, sir. There is 160-acre spacing on gas wells and 40-acre spacing on oil wells. I might --

Q Go ahead.

A I might point out that there are a number of these rules. One, two, about four of these rules have been written in

the last two years which provide for different spacing for gas wells and for oil wells in the same pool.

Q I believe that at the Examiner Hearing you submitted as El Paso's Exhibit 2, proposed rules for the Angels Peak oil pool?

A Yes, sir.

Q Are there any changes or suggestions that subsequent study has led you to offer at this hearing?

A Yes, sir. We had a provision in the proposed rules that we submitted at that time, that no gas either dry or casing-head gas produced in the Angels Peak oil pool shall be flared or vented. And at this time, in the light of testimony of Pan American's witness, I think we would like to amend that one rule which was Rule 9 to provide that no dry gas produced from the Angels Peak-Gallup Pool shall be flared or vented.

Q Do you have any further testimony, any other matters that you wish to testify to before the Commission?

A I might point out one thing. With respect to our Exhibit 1-A, there was considerable testimony a moment ago, and I do not pretend to be an expert on U.S.G.S. rules and regulations, but I do know that the U.S.G.S. has advised us that as far as they are concerned, the question of economics does not enter into this particular case. Where there is drainage offsetting the unit and under the provisions of unit agreement, they are going to request we drill those three offset.

MR. ROMERO: I think that's all.

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Rainey, how would you define dry gas here?

A In our previously submitted suggested pool rules, we made the definition of a gas well as a well that produces with a gas-oil ratio of 30,000 to 1 or more; 30,000 cubic feet of gas per barrel of oil or more, and I think in that case the definition of dry gas would be gas produced from a gas well under that definition of a gas well.

MR. PORTER: Anyone have any questions of Mr. Rainey? Mr. Nutter.

QUESTIONS BY MR. NUTTER:

Q Mr. Rainey, --

A Yes, sir.

Q -- what are you proposing today, that there be an increase in the amount of acreage that be dedicated to a gas well?

A We are proposing exactly the same thing as we proposed in the Examiner Hearing, which is 320 acres, up to 320 acres to a gas well, as defined by the definition I just mentioned.

Q Well, now, we have heard mention of three wells that the U.S.G.S. has indicated to you that they would request?

A Yes, sir.

Q Now, one of those wells is in Section 3, correct?

A Yes, sir.

Q Now, how would you avoid having to drill that well if you had this 320-acre spacing?

A We would dedicate the S/2 of Section 33 to the well that is in the SE/4 at the present time.

Q Now, another requested well is going to be in the NE/4 of Section 3?

A Yes, sir.

Q How would you avoid having to drill that one?

A Dedicate the N/2 of Section 3 to the existing well in the NW/4.

Q Now, the other well is in the SW/4 of Section 35?

A Yes, sir.

Q How would you avoid having to drill that well?

A That well we would probably have to drill because of the fact that our Huerfano 107, which is in the NE/4 of that section, is classified, or would be classified under the terms of our definition as an oil well.

Q So actually, --

A Consequently, we would not have a gas well offsetting the Weaver McAdams No. 2.

Q We are talking about two wells --

A We are saving two wells at a cost of between two hundred and -- two hundred fifty thousand dollars.

Q We are talking about two wells rather than three?

A Yes, sir.

MR. NUTTER: Thank you.

QUESTIONS BY MR. PORTER:

Q Mr. Rainey, considering the pool as a whole, gas, oil and everything, do you think more or less waste would occur under your proposed pool rules than would under the rules established by the recent order?

A It is my opinion that there would be less waste in that there would be considerably fewer wells drilled in the so-called gas cap area, and there would consequently be total less gas production over the life of the field from the gas cap area than under the existing rules.

MR. PORTER: Anyone else have a question? The witness may be excused.

(Witness excused)

MR.HOWELL: Mr. Lemon, will you take the stand, please?

RICHARD F. LEMON,

called as a witness, having been previously duly sworn, testified as follows:

MR. HOWELL: We would like to offer El Paso's Exhibit 1-A in evidence at this time.

MR. PORTER: Was this prepared by the witness?

MR. HOWELL: It was prepared and delivered to the witness. It was not prepared by the witness, it came out of the Land Department. It is a correct representation of the location of the area.

MR. PORTER: Without objection, the Exhibit will be admitted.

DIRECT EXAMINATION

BY MR. HOWELL:

Q Will you state your name for the record, please?

A Richard F. Lemon.

Q Are you the same Richard F. Lemon who testified in the Examiner Hearing of this same case?

A Yes, sir.

Q Now, without going over again the testimony which you gave in the previous case, will you please tell the Commission what additional information has come to you since that testimony, what additional data you have, what additional study you have done, and what conclusions you have reached as a result of any additional data and study?

A Well, I restudied the information with the emphasis placed on spacing, drainage, and since the previous hearing Pan American has completed their Forst 2 "B" or McAdams 2 "B", and from that measured pressure, it confirms what I had previously concluded prior, that one oil or gas well would drain in excess of 320 acres. The fact that the McAdams Well 2 "B" registered a pressure of approximately 300 pounds less than the initial pressure is sufficient evidence that that area has been drained by offsetting wells, and that, therefore, one oil well in that case will drain in excess of 320 acres.

Q Now, also during the period of time under study, was one of the Huerfano unit wells shut-in over a period of time -- was not produced over a period of time? I believe Mr. Marshall --

A Mr. Marshall mentioned that, yes, sir.

Q Are you familiar with that situation?

A Yes, sir.

Q And was there a loss in pressure from the time this well was not producing for a period of time?

A That is correct. There was a lapse of time there of forty-two days during which time there was approximately a 20 to 30 pound drop in pressure.

Q And what is the closest well to that particular well that was producing?

A The closest well is the Weaver and Brown McAdams 4, and that is located approximately, about 2,000 feet from the 103.

Q And over the period of forty-two days when the Huerfano unit well was not produced, there was a substantial drop in pressure?

A There was a noticeable amount of pressure which would be caused by offset production from McAdams No. 4.

Q Have you prepared any exhibits or schedules which you desire to introduce to summarize what your studies have been since the other testimony?

A Yes, sir.

Q Will you please state to the Commission what they are?

Will you please mark one as El Paso's Exhibit 2-A?

(Thereupon, El Paso's Exhibit 2-A was marked for identification.)

Q Now, will you state to the Commission what El Paso's Exhibit 2-A represents?

A El Paso's Exhibit 2-A is a diagram, a theoretical diagram showing the reservoir pressure profile under existing conditions that would exist in the Huerfano unit area, summarizing what one would find here. We arbitrarily selected the area and wells shown there, which are the Huerfano No. 107, Weaver and Brown McAdams 2, Weaver and Brown McAdams No. 4, Huerfano unit No. 6, and Huerfano No. 105. Line A indicates the original conditions that existed before any production occurred. The area, curve B, shows the type profile that one would find after a small amount of production from the Weaver-Brown 2 and 4 wells. The curve C would show the pressure profile at a later time with more production withdrawn from the area.

Q To be sure, there is no misunderstanding of this Exhibit, El Paso's Exhibit 2-A, am I correct in understanding that this is a theoretical condition which will exist in any reservoir in which there is communication between wells?

A That is correct.

Q And represents the experience that has occurred in a good many reservoirs?

A That is true.

Q Now then, in examining this particular area and particular reservoir, did you find the pressures to correspond with the theoretical communication?

A That is right. For instance, in the Huerfano unit 107, although this diagram is not to scale, it does show that assuming a drop had occurred there, had it occurred, the pressure front caused by production from the Weaver-Brown acreage would have moved past that location. That is, any time you find a drop in pressure at a location before that particular well is produced, there must be communication which is caused by the offsetting well's production, and likewise, on the unit No. 106, Huerfano, you have a similar type drop. The main purpose of this Exhibit is simply to show visually what would occur in a reservoir; the idea being that we are mainly concerned here with whether a well will drain 320 acres or whether it won't.

Q Well, I'll ask you as to whether you have prepared an exhibit which we have marked El Paso's Exhibit 3-A?

A Yes. Exhibit 3.

(Thereupon, El Paso's Exhibit 3-A was marked for identification.)

Q And state to the Commission what that exhibit represents.

A Exhibit 3-A is a plat of a portion of the Angels Peak Field showing the various well distances. The distances represented here are surface distances; that the bottom hole distances

would not vary appreciably from these numbers; these are approximate figures. I might point out that, assuming 320-acre spacing, the diagonal distance between wells would be something in the order of 3750 feet. The mid-distance between the wells would be 1875 feet. Therefore, the distances shown between wells here are all in excess of 1875 feet, so that if one can show that a drop of pressure occurred due to the offsetting well's production, then communication must exist to that point. Hence, 320 acres or in excess would be established.

Q Now, would you state to the Commission what your Exhibit No. 4-A represents?

(Thereupon, El Paso's Exhibit 4-A was marked for identification.)

A Exhibit 4-A is a plat showing the initial pressures on the surrounding wells to the Weaver acreage versus time, in addition to cumulative gas production plotted versus time, the idea here being simply to show graphically if any drop in pressure has occurred from the -- in the surrounding wells. They were drilled at a later date from the Weaver acreage, and assuming communication existed, a drop in pressure should be obtained upon initial completion of the offsetting wells. The first well I have marked on the diagram, the upper portion there, is the E. P. and G. Huerfano No. 99. In that particular well I used the well head surface pressure, and computed the bottom hole pressure from that; an estimated value, assuming that you wouldn't have any oil column

in the well. The drop in pressure obtained in that well is approximately 115 pounds. The numbers at the top there apply to the plat here, as far as the well's location, the footage underneath that indicates the footage between the nearest producing well, so that the McAdams 2 production and probably the well, other wells on the lease, cause approximately a 115 pound drop in that well.

Moving across the diagram, the next well that I have noted on that is E. P. and G. Huerfano unit No. 105. At the time that well was completed, the nearest producing well to that well was the McAdams No. 1, and the distance across there is 8250, so that getting back to the idea of the half distance between wells of 1875, you would have way in excess of 320-acre drainage.

The Column marked 3 is the Huerfano unit No. 103. It's nearest offset well is the McAdams No. 4, and in that particular well there we did have a measured bottom hole pressure, and the value obtained at the datum I selected, which was plus 420, was 1270 pounds. So in that particular well there is a 370 pound drop from the initial conditions, so indicating a substantial amount of drop there. The distance between wells is 2,000, which is very near 320-acre spacing.

Column 4 applies to the Huerfano unit No. 6. The nearest producing well is the McAdams No. 4, at a distance of 3500 feet there, with the bottom hole pressure from the surface pressure with an indicated drop of 290 pounds.

The Column marked 5 applies to Huerfano unit No. 107, the

nearest producing well being the McAdams No. 2, at a distance of 2,000 feet. In that particular well we had a measured bottom hole pressure corrected to datum of 4428, which was 272 pounds below the initial pressure.

Column 6 applies to Pan American's McAdams 2 "B" which is an oil well, according to Mr. Marshall's testimony, and the nearest producing well to that well, or the -- let's see, I have several wells indicated there. The Huerfano unit 105 was the nearest producing well. And in addition to that, there is also the Huerfano unit 106 at a distance of 7800 feet, and also the McAdams No. 1 at a distance of 8400 feet; also shown on there is the distance between the McAdams No. "B" 1. When the pressure was measured on the McAdams No. 2, very little production had been taken from "B" 1, so that the main drawdown in that particular well would be attributed to the Weaver-Brown area, plus the Huerfano unit No. 105. The measured bottom hole pressure correct to the datum was 1310 pounds, indicating a drop of 320 pounds; a very substantial drop.

Q And what does the graph at the bottom reflect?

A That reflects the cumulative production at the various times the wells were completed, that is, the initial pressures were measured.

Q Now, Mr. Lemon, from your studies, have you changed the conclusions to which you testified before, that a well, whether it be a gas well or oil well in this area, is capable of draining

at least 320 acres?

A That is correct. There is evidence by the McAdams "B" No. 2 and also the Huerfano unit 107, which are oil wells, that is supported by similar data on wells that would be designated as gas wells under our rules.

Q Now, referring to El Paso's Exhibit No. 1-A, which is on the board behind you, I would ask what would be your recommendations, or your conclusions and recommendations to management about the economic feasibility of drilling additional wells on those three locations surrounding Section 34, that have been mentioned, as requested by the U.S.G.S.?

A I believe that I testified previously that on a 160-acre spacing for a gas well, you would just reach a more or less break even proposition. Therefore, there wouldn't be any additional economic advantage to drilling wells on 160-acre spacing.

Q Well, with the wells that are located there along the unit boundary, do you regard the drilling of wells on 160 as necessary to prevent draining, if the rules which we have requested were adopted?

A No, sir. Any additional wells, those wells that are presently completed would be more than adequate to drain that area.

Q And would you regard the drilling of wells on those three locations as being the drilling of unnecessary wells?

A Yes, sir.

MR. HOWELL: I think that's all.

We would like to offer the Exhibits in evidence. I'll ask a qualifying question.

Q (By Mr. Howell) Mr. Lemon, were these Exhibits prepared by you or under your supervision?

A Yes, sir.

Q Do they correctly reflect the matters to which they refer?

A Yes, sir.

MR. HOWELL: We offer them.

MR. PORTER: Without objection, the Exhibits will be admitted.

(Whereupon, El Paso's Exhibits 1-A through 4-A were received in evidence.)

CROSS EXAMINATION

BY MR. ERREBO:

Q Mr. Lemon, you were carrying me a little fast as you went over your Exhibit here showing a bar graph on the initial --

A That's A.

Q Yes, that's not numbered.

A Yes, that's 4-A.

Q Now, with regard to Well no. 1, that shows that the initial pressure was estimated at 1525?

A That is correct.

Q And that was based on a bottom hole pressure?

A No, sir. That was based on surface pressure converted

to bottom hole conditions.

Q Did you know how much fluid was in the well when that calculation was made?

A Based on my experience with other wells there, I assumed that there was no liquid in there.

Q Assumed that there wasn't?

A That's right.

Q Were you here when Mr. Marshall testified here yesterday -- this afternoon?

A Yes, sir.

Q Mr. Marshall, for Pan American?

A Yes, sir.

Q I believe he testified, did he not, that some wells did have fluid in the bore?

A I think that is correct.

Q Now, then, how about the subsequent pressure, the 1265, was that also estimated?

A No, sir, the 1265 was the well head pressure.

Q That was well head pressure?

A And also I would like to point out that that well is located in an area which would be in the gas cap area, and the conclusion reached because of its location would be such that you would expect the fluid in that well.

Q Were you able to take bottom hole pressures of any of these other wells? I believe you did testify on some of them,

didn't you?

A Yes, sir. We had one on the Huerfano unit 107, and also the Huerfano unit 103.

Q Now, were those both of the pressures which you are comparing, the initial and the later pressure?

A Yes, sir. Also I would like to point out that Pan American ran a bottom hole pressure on their McAdams 2 "B"; that is also a measured bottom hole pressure.

Q But you have no information on those wells as to whether the fluid was in the --

A I have no information on the Pan American well except that there was fluid in the hole.

Q Do you know how many pounds per square inch difference would be made by one foot of fluid in the bottom of the well?

A Well, it depends on the composition of the liquid. If it happened to be oil, I would say maybe three-tenths pound per foot.

MR. ERREBO: That's all I have.

MR. PORTER: Anyone else have a question of Mr. Lemon?

QUESTIONS BY MR. PAYNE:

Q Mr. Lemon, in your opinion, is drainage from the Huerfano unit taking place now?

A Drain --

Q Drainage from --

A In what way?

Q Well, are Mr. Weaver's wells draining acreage in the Huerfano unit?

A Under the current rules, I would say that the three gas wells are producing their limit compared with low ratio oil wells which 107 is actually below 4,000 based on my latest information. The fact that you have an unequaled balance like that, it is possible that some movement of the oil into the gas could occur.

Q But you are not certain whether it is occurring or not, is that right?

A Well, I would presume so.

MR. PAYNE: Thank you. That's all.

MR. PORTER: Anyone else have a question of Mr. Lemon? The witness may be excused.

(Witness excused)

MR. HOWELL: That's all our testimony.

MR. PORTER: Does anyone desire to present testimony in this case?

MR. ERREBO: If the Commission please, at this point we would like to ask for a five-minute recess to fully determine the extent of the testimony that we should put on.

MR. PORTER: Take a five-minute recess.

(Short recess)

MR. PORTER: The hearing will come to order, please. We will recognize Mr. Errebo.

MR. ERREBO: If the Commission please, W. R. Weaver has no further testimony to offer in this hearing at this time. At the previous Examiner Hearing, Mr. J. Harris testified, gave geological testimony. Mr. Thomas M. Dugan gave the engineering testimony. We would like to ask that that testimony by both witnesses be incorporated by reference into this hearing record, and that the Exhibits offered at that time also be incorporated into the record of this hearing.

MR. PAYNE: With your permission, Mr. Errebo, I would like to amend your motion, and move that the entire record in that case be incorporated in this case.

MR. ERREBO: That will be satisfactory with us.

MR. PORTER: Is there objection to Mr. Payne's motion?

MR. BUELL: May it please the Commission, may I speak briefly, and only briefly, on this. I ask that Pan American's silence in not objecting to these motions not be construed to indicate complete concurrence in Pan American's legal thinking with the interpretation of De Novo hearing that has been handled here today.

MR. PORTER: The record of the previous hearing will be made a part of the record in this case. Anyone have any statements to make in this case?

MR. HOWELL: If it please the Commission, I would like about three minutes; as an argument to summarize, three to five minutes, and then I will be through.

MR. PORTER: Mr. Thomasson.

MR. THOMASON: My name is Edwin Thomasson. I am deputy supervisor of the U.S.G.S. in Roswell. I would like to make two brief statements which were asked by your counsel. First of all, it is not the policy of the U.S.G.S. to call on any operator to drill an offset obligation when it can be shown to our satisfaction and to the satisfaction of our engineers and geologists that such location is not economical. Secondly, I would like to point out that in our opinion, under the present rules as they exist in the Angels Peak Field, there is drainage from the Huerfano unit to the Weaver and Brown tracts, and it is for this reason that we have called on the unit operator informally to offset these wells and probably will in the near future call on them formally to do so in the absence of some other arrangement whereby the withdrawals would be equal. Thank you.

MR. PORTER: Anyone else have a statement to make? Mr. Howell, will you proceed?

MR. HOWELL: I would just like to have about three minutes, and look at this Exhibit, El Paso's Exhibit 1-A, and summarize the problem in this respect. That you've got here a question of four wells on 640 acres, that under the Commission's rule, are being permitted to produce the same volumes of gas as four wells on 1280 acres, and that obviously is drainage from the 1280 to the 640 acres, and if the Commission will allocate the acreage as requested, so that the four wells will withdraw ratably

from the 1280 acres with the 640 acres, there is no need for drilling offset wells. The U.S.G.S. would not require them under those circumstances, and there wouldn't be additional unnecessary and expensive drilling into this gas cap. Now, that is the meat in the cocoanut.

MR. BUELL: May it please the Commission, on behalf of Pan American, may I again respectively urge that the Commission give serious consideration to our request to return our oil wells to production.

MR. ERREBO: May it please the Commission, on behalf of W. R. Weaver, we have no objection to the rules as they are now in effect, which were ordered by this Commission as a result of the Examiner Hearing. Certainly, there may be drainage to the Weaver tracts, but if El Paso does not desire to drill their wells to 160-acre density, to protect themselves from it, well, then, that is nobody's fault but their own. We think that the rules in effect now are satisfactory, and in the event the Commission should desire to reexamine them in a year's time, to have time to obtain more data and to more carefully evaluate the situation which we have here, we would certainly be agreeable to that.

MR. PORTER: Anyone else have a statement? Nothing further, we will take the case under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, J. A. Trujillo, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in Stenotype and reduced to typewritten transcript by me, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 30th day of July, 1959, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Joseph A. Trujillo
NOTARY PUBLIC

My Commission Expires:

October 5, 1960

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GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
3-6691 5-9546

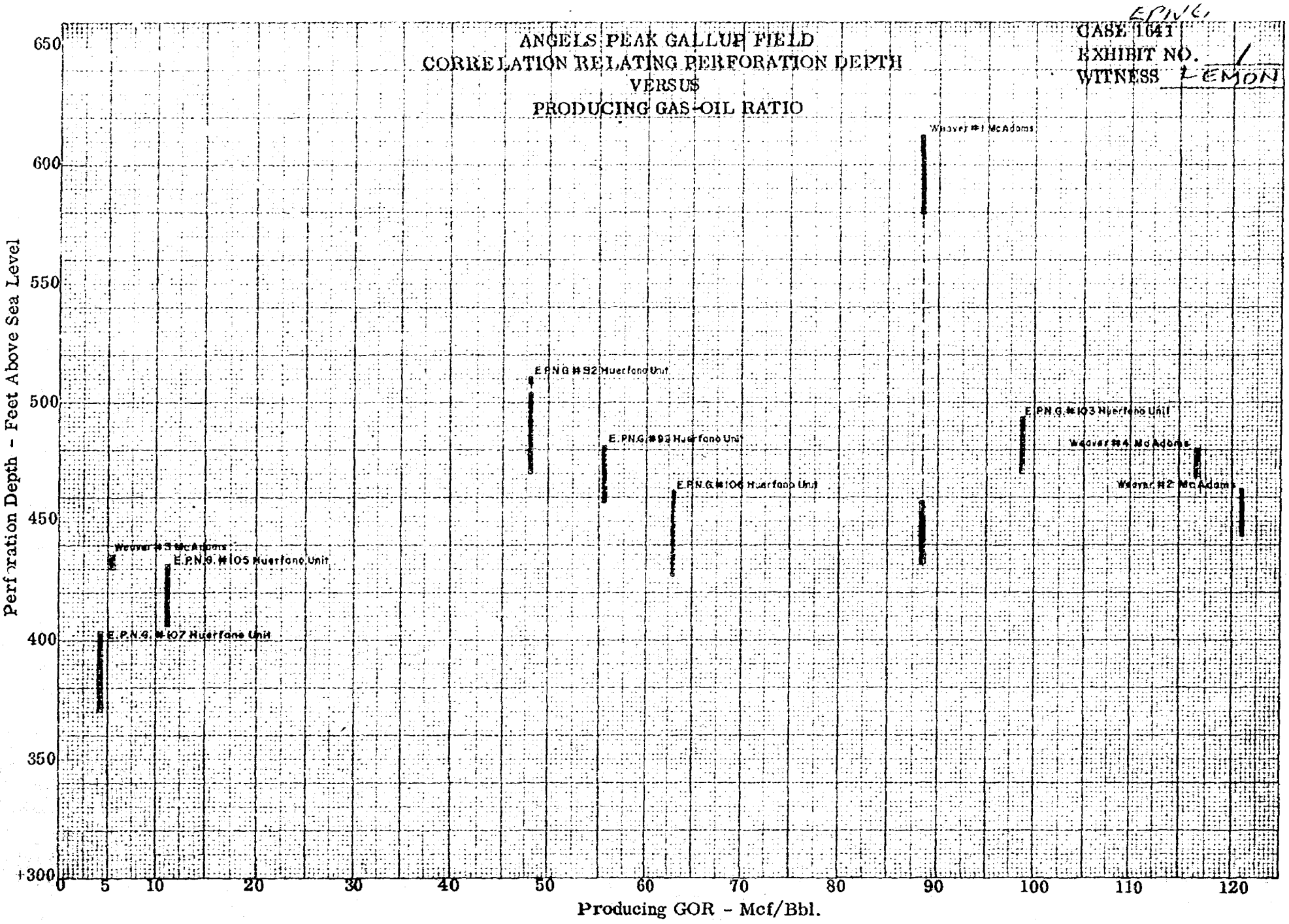
Ex 5

359-14G
10 X 10 TO THE CM.
KEUFFEL & ESSER CO.

EPNG

CASE 1641
EXHIBIT NO. 1
WITNESS LEMON

ANGELS PEAK GALLUP FIELD
CORRELATION RELATING PERFORATION DEPTH VERSUS PRODUCING GAS-OIL RATIO



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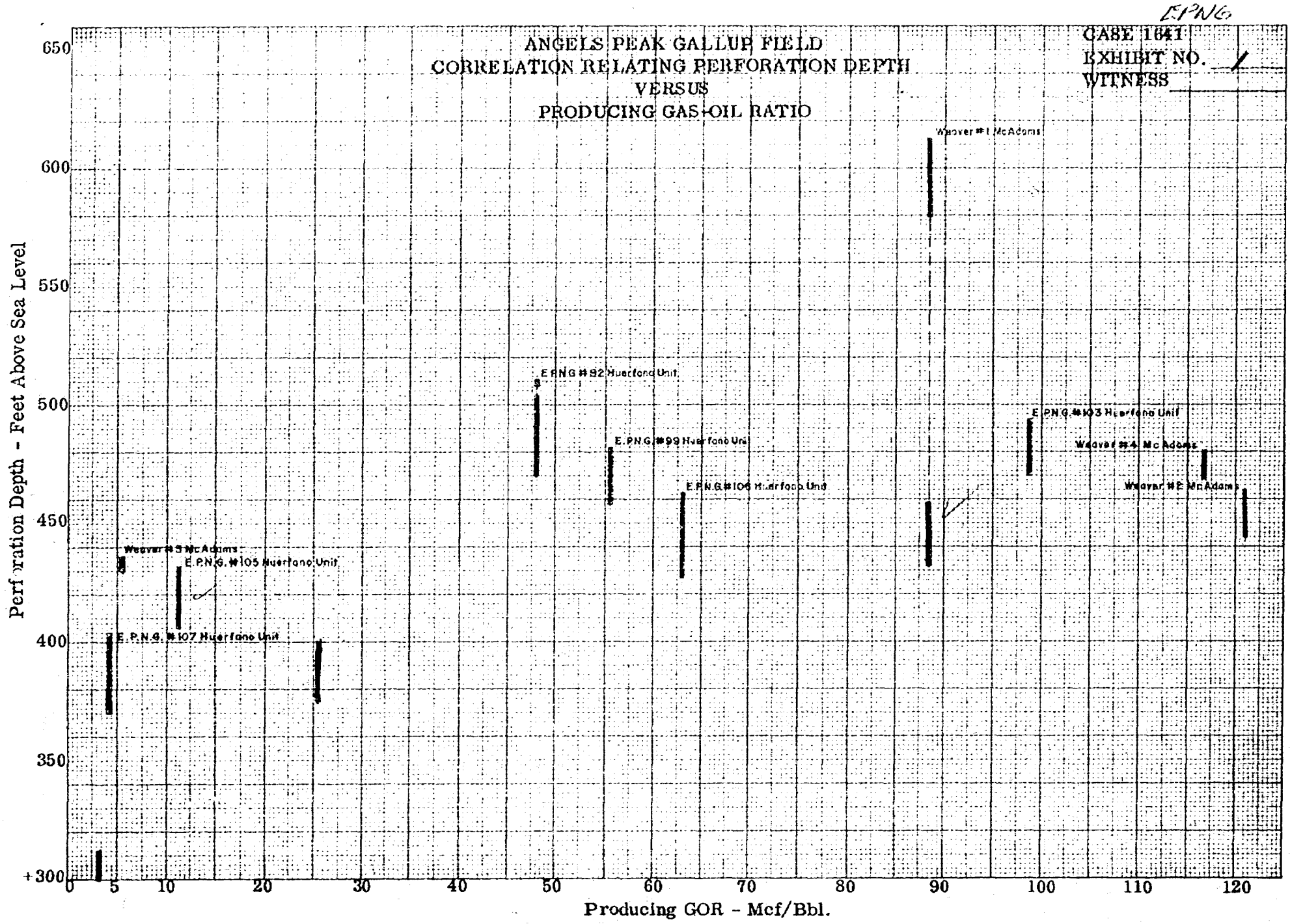
KEUFFEL & ESSER CO

E P N G

CASE 1641
EXHIBIT NO. 1
WITNESS

ANGELS PEAK GALLUP FIELD
CORRELATION RELATING PERFORATION DEPTH VERSUS PRODUCING GAS-OIL RATIO



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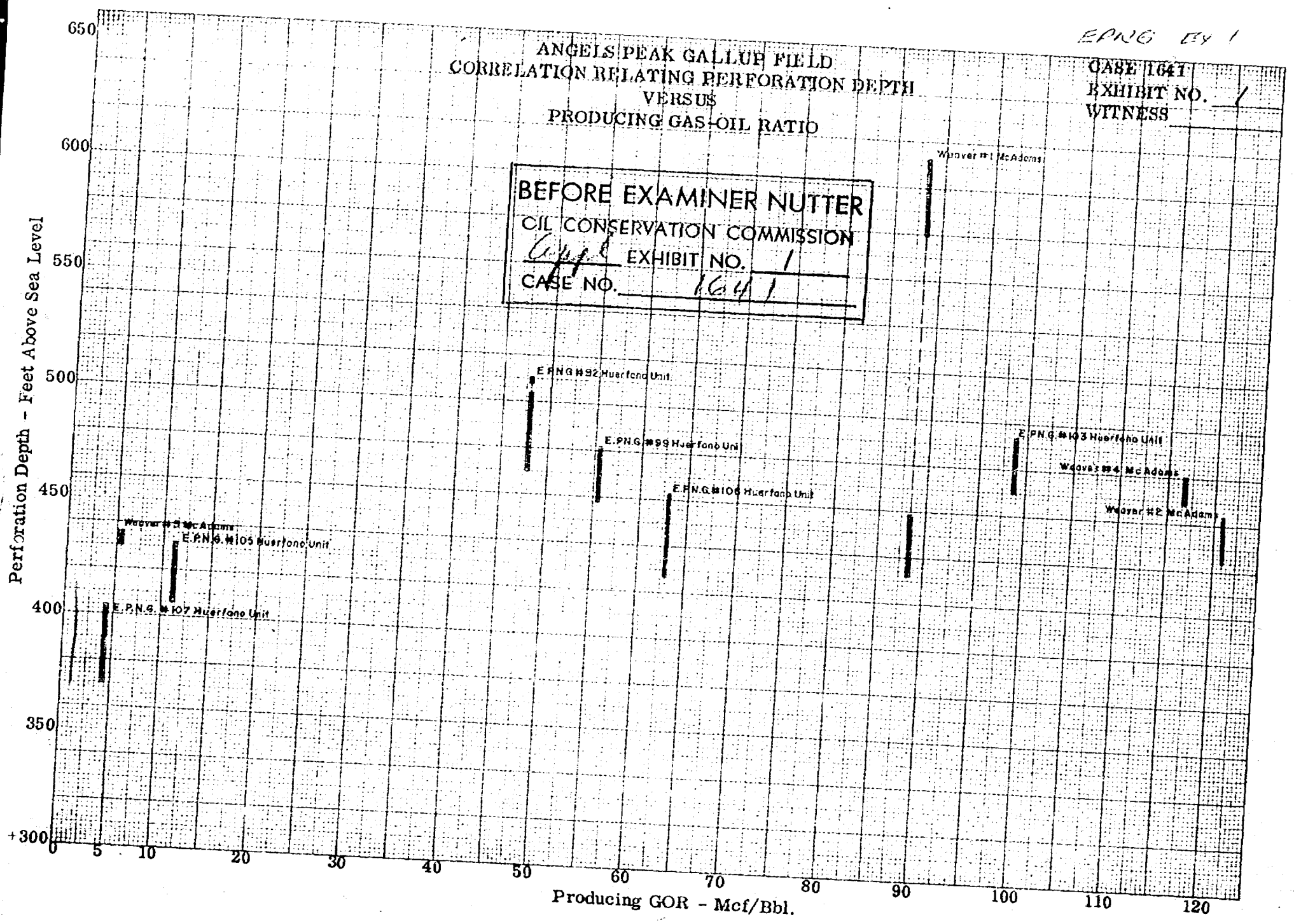
359-146

EPNG Ex 1

ANGELS PEAK GALLUP FIELD
CORRELATION RELATING PERFORATION DEPTH
VERSUS
PRODUCING GAS-OIL RATIO

CASE 1641
EXHIBIT NO. 1
WITNESS

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
EXHIBIT NO. 1
CASE NO. 1641



CASE 1641
EPNG EXHIBIT NO. 2
WITNESS

ANGELS PEAK GALLUP FIELD
RELATIVE RESERVOIR VOIDAGE VERSUS PRODUCING GOR FOR VARIOUS LIMITING GAS-OIL RATIOS

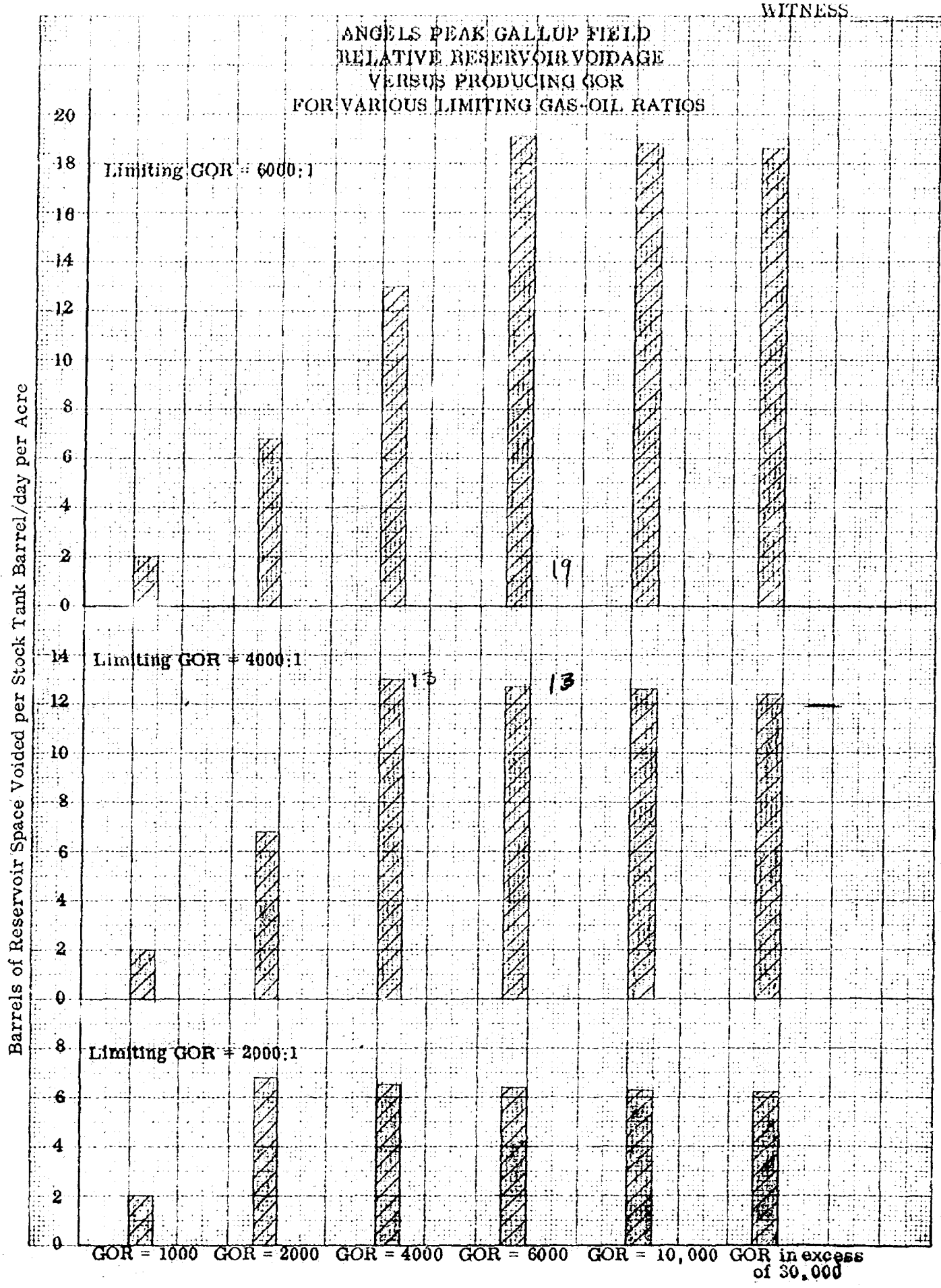


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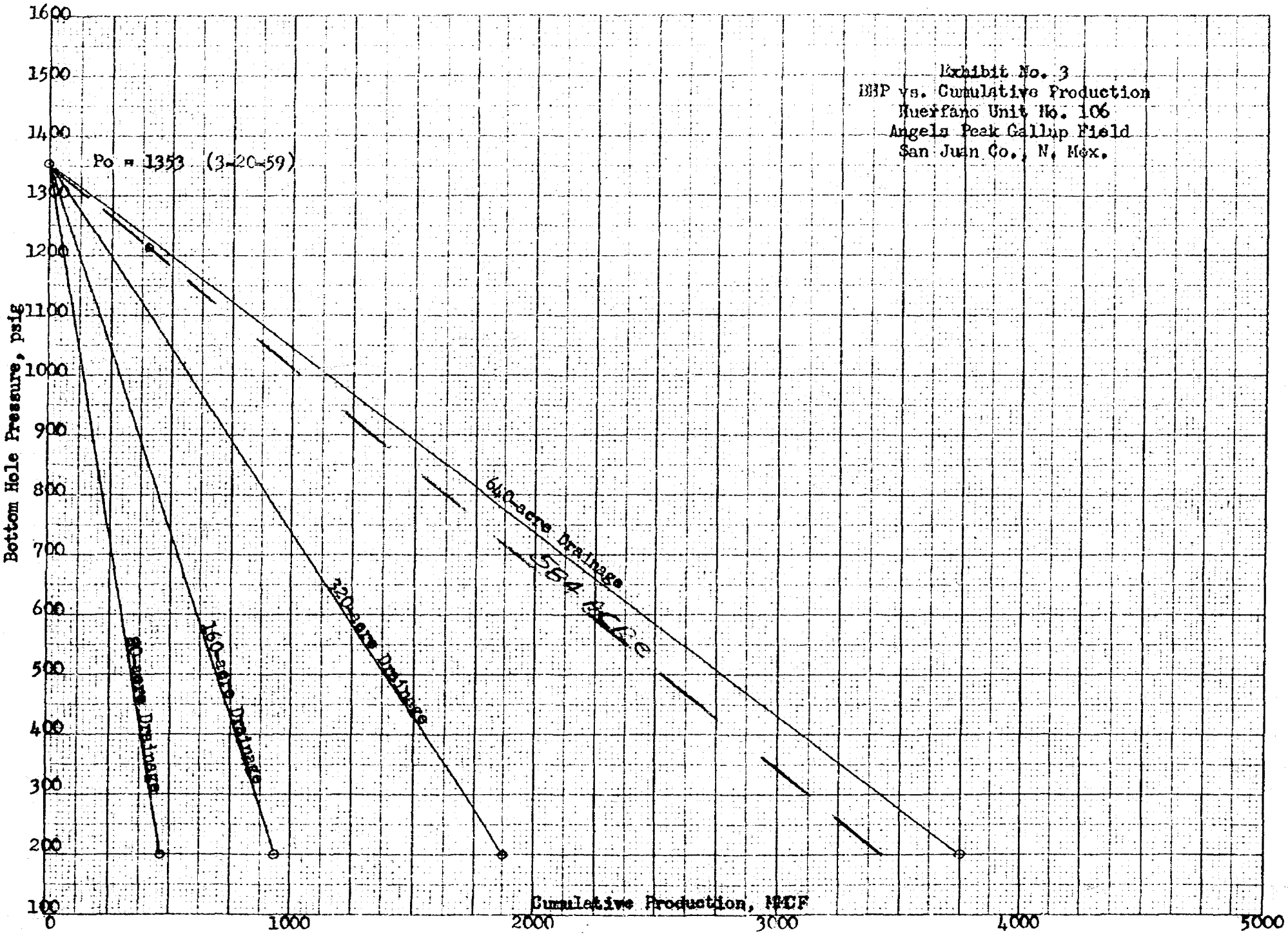
Exhibit No. 3
BHP vs. Cumulative Production
Huerfano Unit No. 106
Angels Peak Gallup Field
San Juan Co., N. Mex.



BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE 1641

TRANSCRIPT OF HEARING

May 7, 1959

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GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
Phone CHapel 3-6691

NEW MEXICO OIL CONSERVATION COMMISSION

Daniel S. Nutter (Examiner)

Santa Fe, NEW MEXICO

REGISTER

HEARING DATE May 7, 1959 TIME: 9 o'clock

NAME:	REPRESENTING:	LOCATION:
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
A. J. Dugenhoffer	El Paso	Farmington
L. D. Galloway	" "	"
G. W. King	Pan American Pet. Corp.	Ft. Worth
Guy Buell	" " " "	" "
O. K. Marshall	" " " "	Farmington
Kirk Newman	Atwood & Malone	Roswell
Fred Hammond	El Paso Nat. Gas Co.	Santa Fe
Frank Andrews	" " "	Santa Fe
R. F. Lemon	El Paso Nat. Gas Co.	El Paso
Ben F. Howell	" " "	"
D. H. Rainey	" " "	"
A. H. Brown	Weaver & Brown	Farmington
Burnett Marchbanks	— —	Albuquerque
[illegible]	[illegible]	[illegible]

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
MAY 7, 1959

IN THE MATTER OF:

CASE 1641 Application of W. R. Weaver for the promulgation of special rules and regulations governing the Angels Peak-Gallup Oil Pool. Applicant, in the above-styled cause, seeks an order promulgating special rules and regulations governing the drilling, spacing, and production of oil and gas wells in the Angels Peak-Gallup Oil Pool in San Juan County, New Mexico.

BEFORE:

Daniel S. Nutter, Examiner.

T R A N S C R I P T O F P R O C E E D I N G S

MR. NUTTER: The hearing will come to order, please. The first case on the docket this morning will be Case 1641.

MR. PAYNE: Case 1641. Application of W. R. Weaver for the promulgation of special rules and regulations governing the Angels Peak-Gallup Oil Pool.

MR. SPERLING: Appearances for the applicant, W. R. Weaver, Burns Errebo and J. E. Sperling, Modrall, Seymour, Sperling, Roehl & Harris.

MR. NUTTER: Are there any other appearances to be

made in this case this morning?

MR. NEWMAN: Kirk Newman of Roswell, New Mexico and Guy Buell of Fort Worth, Texas, appearing on behalf of Pan American Oil Corporation.

MR. ANDREWS : Seth Montgomery, Federici & Andrews, by Frank Andrews, appearing with Mr. Ben R. Howell of El Paso for El Paso Natural Gas Company.

MR. NUTTER: Any further appearances?

Would you proceed, Mr. Sperling?

MR. SPERLING: Yes. Mr. Harris, stand and be sworn.

(Witness sworn)

J. J. HARRIS,

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. SPERLING:

Q Would you please state your name?

A J. J. Harris.

Q Where do you live, Mr. Harris?

A Albuquerque.

Q And what business or profession are you engaged in?

A Consulting geologist.

Q How long have you been practicing your profession in the San Juan Basin?

A Since, including my company experience, since January of 1947.

Q Give us a very brief resume of your education and experience background.

A Well, I went to school at the University of Texas. Did most of my geological work there, got my degree from Texas Christian University, and did some graduate work there, and was employed by Stanolin Oil & Gas Company at that time, from 1947 to -- I was employed by them earlier, before the war, but in the geological end of it, from 1947 to '53. The last year I was area geologist in Albuquerque for them. I have been consultant since then.

Q Have you appeared previously before this Commission?

A Yes.

MR. SPERLING: Are his qualifications acceptable, Mr. Examiner?

MR. NUTTER: Yes, sir, they are. Please proceed,

Mr. Sperling.

(Whereupon, Exhibit No. 1 was marked for identification.)

Q Mr. Harris, I will ask you to refer first to the Exhibit which has been marked Exhibit No. 1, which appears on the board there, and ask you to explain what that shows and the purpose of its preparation?

A Well, it is a structural map of the Angels Peak-Gallup field contoured on the lower Gallup member of the Gallup formation. The original Angels Peak outline went through here; the field has since then been extended to include this area as shown by this outside line here. And on this map, we will attempt to show.--

Q Mr. Harris, would you stand over on this side, if you please, so that the Commission staff can see the Exhibit.

A We will attempt to show the limits of the oil rim on the north and the gas on the south.

Q Will you explain what the red area represents?

A The red area represents the proved oil productive rim in this Angels Peak field, according to my figures and estimates on it, and actually it is probably a little bit wider than it is from later information.

Q What does the green area represent?

A It represents the proved gas area. I didn't take into consideration everything, but I limited it by the production

of the wells that are on there. It shows the proved productive gas area in that field.

Q Now, in the preparation of that Exhibit, and the indication of the red and green areas, what information did you consider as a basis for that estimate?

A Used the electric logs on all the wells considered, plus the gas-oil ratios in the wells, and the amount of productive sand looked like it would produce oil or gas in those wells.

Q And what about the structure contour information?

A It's contoured on the lower Gallup member of the formation which is, all of these wells in this area are producing from. I believe the 107 may be perforated other than the lower member, but some of the wells up here are perforated above the lower Gallup also, but --

Q Is there a substantial variation in gas-oil ratios between the wells which appear to be located in the red area and those wells located in the green area?

A There is a substantial difference in gas-oil ratios in those wells. However, the gas-oil ratios in these wells are going up since the original gas-oil ratios were taken.

MR. NUTTER: You mean in the red area?

A Yes. This one has increased to a certain extent. This one I don't know whether it has increased or not. The McAdams No. 3 has increased slightly; we don't have a gas-oil ratio on this Pan American Frost "B" 1, since that well is still recovering

load oil.

MR. NUTTER: Mr. Harris, you stated two wells and pointed them on the map had increased their ratios. Would you identify those wells for the record, please?

A The El Paso Natural Gas Company's Huerfano No. 105 I believe that was turned in originally at 6,000; I have forgotten. It is now 11,000 to 1. You have the original gas-oil ratios. The last report we had on this well was 9300 to 1. Pan American's McAdams "B" 1. The W. R. Weaver McAdams No. 3 has increased from 5200 to 5700 to 1. As I said, this well, we don't have any information, the Pan American's Frost "B" 1 because it is still recovering load oil.

Q (By Mr. Sterling) Now, you have indicated that the red and the green areas are the proved areas of gas or oil production?

A Yes.

Q Can you give us an opinion as to the possibility of the extension of either of those two areas?

A I believe, in my opinion, the oil area is limited by the Pan American McAdams "B", which was completed. The latest potential we had on it was 41 barrels per day. The Frost "B" 1 still had, at last report, which was two or three days ago, 1613 barrels of load oil still left in the hole, and was producing from 20 to 40 barrels a day on the pump, which looks like it is doubtful whether it is commercial or non-commercial -- doubtful

that it is commercial, I should say.

Q From your test, then, it's your opinion that the northern rim or edge of the oil producing area has been defined by the Frost Well and the McAdams "B" 1 Pan American, is that right?

A I believe it has been limited there, to the logs and those two wells.

Q How long has it been since the Frost Well was fraced?

A That's been about the time of the last hearing. I don't remember the date it was fraced. It has been just close to thirty days that they have been trying to recover load oil out of the hole.

Q What about the McAdams "B" 1?

A As I understand, they didn't recover all of their load oil until they opened both zones together in the Gallup, all of the different zones, and they finally recovered all their load oil and had to pull -- they have had trouble -- they had to pull their pump once.

Q Now, you have stated that the northernmost edge of the oil area has been defined, in your opinion. What about the southernmost area -- or the gas area, which you have shown as proven on that Exhibit?

A I called it proven due to the fact that this is one of the good gas wells which is the El Paso Huerfano No. 103, and

it is a high gas-oil ratio well, and I extended the limits to include the 160 acres on that well on the line very close to the contour. I didn't follow the strikes of the contour exactly because those sands don't always follow the strike of contours, and that's as far as proved gas production. And on the southeast end, I think this definitely limits there because it had a potential of about 352,000 cubic feet from the Gallup.

Q Is that the Huerfano No. 92?

A That is the Huerfano No. 92, which would limit it, I think, east and south, as far as proved production. Now, straight south of the Huerfano, El Paso's Huerfano 103, that is not limited as to possible production because -- as to the north edge of it -- because we still have a good well there, and the sand still looks good on the log. So it could possibly extend on one location or three or four locations. We do know in our own minds that we have a permeability barrier somewhere between the 103 and the El Paso Natural Gas Huerfano 104, because we are producing oil structurally higher from the 104, from the same zone that we are producing from the 103. So we almost have to have a permeability barrier somewhere between these two wells, otherwise, you would be producing oil higher than your gas, which would foul everybody's theory as far as the gas cap is concerned.

Q Now, Mr. Harris, in your opinion, with the drilling of the Pan American's Jack Frost No. 1, since this matter was last considered by the Commission, do you feel that the drilling of that

well has provided additional information with reference to the northern extent of the oil producing area?

A I certainly do, yes.

Q I take it, from your previous testimony, that you feel that there is an excellent possibility of the extension of the gas producing area a substantial distance from the south of what you show as the proven area?

A I feel sure it will extend to the south. Nobody can tell how fast it is going to pinch out. Apparently, the sands are thickening to the south a little bit, so there will be some extension to it because we still have a good well here where we are limited by a well of doubtful commercial value on the north.

Q Now, in connection with sand thickness, Mr. Harris, I will refer you now to Exhibit marked 2 and ask you to explain what that is, Mr. Harris.

A Exhibit 2 is a cross section from north to south made from electric logs showing the Gallup formation through the Angels Peak-Gallup Pool. I have an index map on the cross section showing from A which is this well here, which is the old, on the logs it is called the old Stanolin Oil Company's Angels Peak 1. I believe you now call it Pan American's J. C. Gordon No. 1, but I labeled them as they were labeled on the logs. And Angels Peak 2 is this, which is this well here, and on this map it goes straight down across here. This is the Pan American Jack Frost "B" 1, which is this well here, down to the McAdams W. R. Weaver,

Weaver McAdams No. 3, this well to the Weaver McAdams No. 4 to the El Paso Natural Gas Company's 103, which is the southernmost well in the cross section. As you can see, you can't see very much on the Angels Peak No. 1 to the north, but there is practically no sand development in the lower Gallup. There is no development as far as being a clean sand. You can see it plainer on this one, which is the Angels Peak unit No. 2 located here. There is no commercial Gallup production in the lower Gallup. You do have a little resistivity there which is common through all these sandy sections of the Mancos. Somewhere between the Angels Peak 2 and the Pan American Jack Frost 1, this sand pinches out entirely as far as the productive sand, which is indicated on here. This cross section shows a little more sand than is actually in the productive sand, just a gradual pinchout of the sand on this. It is a very shaley sand as indicated by your SP curve on the log there. This is your shale line. You draw a line straight across there, leaving you very little clean -- there is -- I doubt if there is over two feet of clean sand on this well. I don't have any core analysis on it. I've calculated the capacity from the sonic log that was run on the hole, and which was, porosity was very low on that well all the way through it. We come to the McAdams 3. Your sand is thickening considerably. It is, the Weaver McAdams No. 3 has cleaned up. You have a very clean sand there as indicated by the log. The McAdams No. 4, which is the next well on your cross section, also

has very clean sand, which is our best well on the lease as far as a gas well is concerned. And going on down through, you've got a further thickening of sand here. It is a little bit shalyer than either of these two, according to logs. However, this SP log has drifted. We don't know if that is caused by being sandy or mechanical on the log; they will do that sometimes. But it shows that the sand section is still good and increasing and getting better to the south, so we know that our gas production is not actually limited here, even though that is all I can prove. You might get a dry hole 330 feet from the line there, but it is not probable, let's put it that way, that we will probably have at least two more locations south we could extend this gas area.

Q Well now, that cross section that you have been referring to, taken as it has been, generally from north to south, does that substantiate the conclusions that you have drawn with reference to establishing the northernmost boundary of the oil producing area?

A Yes, it definitely establishes the northernmost boundary because, as I say, this well is of doubtful commercial value, and that's the only way we can determine the limits of the field. When you cease to be commercial, then you stop drilling there. If it has been a month recovering load oil and recovering at the rate of 20 to 40 barrels a day, when that load oil is entirely recovered, it will be pretty low, I imagine, the potential.

Q Now, as sand thickness does increase to the south

there, is it reasonable to conclude that your reserves increase substantially?

A Our reserves would increase substantially as your sand thickens and as your sand cleans up, which gives you higher porosity, more void space for oil or gas to be stored.

Q Now, Mr. Harris, if you will refer to Exhibit No. 3 and explain what that is?

A Exhibit No. 3 is an isopach map of the Angels Peak-Gallup field contoured also on the thickness of the lower Gallup. Shows a rapid thickening of the pay section to the north and the probable limits of the productive sand area in there, actually.

Q Was that Exhibit prepared from information obtained from logs?

A It was prepared from information obtained from logs, and I tried to pick out the net pay from the logs as well as I could to show the thickness. It is contoured on five-foot intervals from zero to twenty-five feet.

Q Now, what do you mean by net pay?

A The productive sand area, or the part of the sand. This area, we have shown about 35 feet of sand there. Actually, that is not all net pay, it is sand, but it is not productive sand.

Q Now, going back to Exhibit No. 2 again, what is your structural reference line?

A It's the top of the sandy zone in the Mancos, which is usually, most of us call it top of the Gallup, some call it top of the Gallup as far down as here, but it doesn't make too much difference. These zones correlate across, it is just a datum to hang the logs on and show this section.

This is all Gallup in here, this is lower Gallup here that we're concerned with in the hearing, I think mainly lower Gallup.

Q I see. And you do have excellent correlation reference points throughout the cross section?

A We have excellent, you can correlate on this, at this point to this point, and this one, this one, straight across you can pick any number of five section beds in there that will correlate exactly across there.

MR. SPERLING: I believe that's all right now. If you would like to take your seat, Mr. Harris.

One other question, Mr. Harris.

Q (By Mr. Sperling) From the study that you have made of this particular field, as indicated by these Exhibits that you have referred to, what conclusions have you reached, or what opinion have you formed with reference to the character of this field?

A My own opinion, I think it's a fairly small field, not a small field, it has an extremely large potential as a gas producing area with a very small oil rim on the north, as indicated on here, on Exhibit No. 1. I think our sand limits, thickness,

are definitely limited as far as -- I don't think it is a long drawn out trend like the Bisti field. I think we've got a small area in here of real good sand with the oil area, oil rim definitely going to the north to a very small area. We have zero sand in this Hancock Douthit well, which is now the British American Douthit. It is British American operating these properties. We are limited as far as--zero is the productive sand in those wells. The Frost "B" 1 has approximately 11 feet of sand, which has thinned there 22 feet. Here in one location it is half as thick, and this one down here, of course, limits the -- this one has 17 feet of sand, but it only potentials at 372 000, which is of doubtful commercial value at that depth. This well had zero sand, this Magnolia Crandell Well, also the old Huerfano No. 4, this Magnolia Crandell Well, if the production was following the strike of the contours, which it does in a lot of cases, it doesn't necessarily mean so in this case, because that well there is on, practically on strike with your McAdams Weaver, McAdams No. 3, which is a very good well, but this well had no productive sand apparently in the Gallup. So I think we are just limited on this end and on this end, but I feel that we have a large area which is gas productive and minor part oil productive.

Q Did you prepare these Exhibits?

A Prepard them myself.

MR. SPERLING: I think that's all at this time, Mr. Harris.

MR. NUTTER: Any questions of Mr. Harris?

MR. PAYNE: Yes, sir.

MR. NUTTER: Mr. Payne.

CROSS EXAMINATION

BY MR. PAYNE:

Q Mr. Harris, how many operators are there in the Angels Peak-Gallup Oil Pool?

A W. R. Weaver, El Paso Natural Gas Company and Pan American Oil Company, I believe, the operators that I am familiar with.

Q Has any attempt been made by W. R. Weaver to accomplish a pool-wide unitization with El Paso and Pan American?

A Not that I know of.

Q Don't you feel that this is one of the better ways, perhaps the best, to handle the situation where you have an oil pool with a gas cap?

A I'm not sure that that is an oil pool.

Q Well, even assuming that it's, just has an oil rim?

A With the lower permeability and porosity on the northern part of that unit, I don't think you could unitize and do any good. It would be, in my opinion, years getting your oil out at 20 to 40 barrels a day and even though you shut the gas well in to repressure them, just shut them in and forgot about them, which actually Weaver owns that gas under that section

that he is in, his correlative rights would be damaged, I think, by doing that.

Q If it were unitized, how would his correlative rights be --

A By taking so many years to get his investment back probably about twenty-five years getting it back, by producing it that way, in my opinion.

MR. PAYNE: Thank you. That's all.

MR. NUTTER: Any other questions of Mr. Harris?

QUESTIONS BY MR. HOWELL:

Q Mr. Harris, Ben Howell, representing El Paso Natural Gas Company. From your Exhibit 3, it appears that you had not closed the pool to the northwest, you are not prepared to say that the area to the northwest will pinch out at any particular point, is that correct?

A That's correct. The zone in the El Paso Natural Gas Products Company's "B" 1 had 12 feet of sand that correlated with the lower Gallup here, but, in my opinion, this well is zero sand, which is more or less on strike with the contour on the structural map. However this may be another trend, I don't know. That's so far away that, it's about six, seven miles away. I wouldn't close these contours because we don't, I feel like we do have more gas production for sure in this area to the northwest, yes, sir. Somewhere between here and the Douthit Well, it stops, in my opinion.

Q As a matter of fact, the sand thickness, which the effective pay, which you give to the well, that is, the last one that has been drilled to the northwest is 22 feet isn't it?

A That's right.

Q And you wouldn't purport to tell the Commission where the northwest limits of this particular pool would be or what would be found up there?

A No, sir, other than, I believe, in my opinion, it is somewhere between this Hancock Douthit Well and the Weaver area down across there.

Q But it is possible that it might run all the way up to the El Paso Natural Gas Products Company's Well, some seven or eight miles away?

A It is possible, I say not probable, but possible, in my opinion.

Q At the present time, however, we cannot define the northwestern limit?

A No, sir. I think we can, southeastern limits and the north limits; we cannot northwestern or the south limits, or the southeastern limits.

MR. HOWELL: Thank you, Mr. Harris.

MR. NUTTER: Any other questions of Mr. Harris?

RECROSS EXAMINATION

BY MR. PAYNE:

Mr. Harris, how long does it take to pay out a well on

this pool?

A Under present --

Q Well, let's take an oil well first, under present conditions?

A Now, you are speaking of one of your El Paso wells in the oil rim or --

Q Yes, we will take those first.

A Mr. Dugan will answer those questions on the engineering end. I haven't calculated; I could very easily.

Q Have you calculated them as to the gas wells?

A Roughly, but Mr. Dugan has calculated those out too. He is going to do the engineering testimony for us.

MR. PAYNE: All right, sir. Thank you.

QUESTIONS BY MR. NUTTER:

Q Mr. Harris, this connecting section of your Exhibit No. 2, all the wells are hung on a common datum, being the top of the Gallup zone, is that right?

A That's right.

Q You haven't attempted to show any structure or dips of structure on the north?

A No, sir. The structural contour map will show the dip of the formation, which is generally from southwest to northeast. It is almost north in this particular area of San Juan Basin, slightly northeast, which is very gentle.

Q What is the actual degree of dip in here?

A I didn't calculate by degree.

Q I mean in feet per mile.

A You've got from, say, from a 500 to 425 right here. That's about 75 feet to a hundred feet per mile, which would be approximately 1 degrees, about 90 feet per mile, I believe, which is just apparently regional dip. Thereis a little bit of nosing shown in here as some structure begins to pick up in the Angels Peak area where the Angels Peak Well was drilled -- and there is a little nosing over here on your Magnolia Well, which is very similar to the nosing here, but this well is non-productive in the Gallup zone.

Q Well now, if you had shown this Exhibit No. 2 hung from sea level rather than just hung on a common datum, the top of the Gallup, you would have a dip to the right, would you not?

A You would have a dip to the right, you would be coming up to the right.

Q I mean, you would be coming up to the right,--

A To the south.

Q -- and then would the green line be crossed by a line that would be a gas-oil contact?

A Possibly could be a very slight gas-oil contact. It is not going to be very long, as indicated by your McAdams, Weaver McAdams No. 3, which I have placed almost on the -- I have placed it in the oil area, but it is above 5,000 to 1, it is almost 6,000 to 1 gas-oil ratio, and this No. 2, I think, is 116,000 to 1, which

is -- we definitely have a much cleaner sand through this very small area. We didn't recover many cores on the McAdams wells, but part of the cores had permeability and porosity up to 200 milladarcies, above 200 milladarcies, which I don't think any of the wells in the oil rim will show much over 1 milladarcy.

Q Mr. Harris, when you were discussing that green band on Exhibit 2 and talking about it thickening as it goes to the right, I believe I heard the word "reserves" creep into your testimony. Did you make any actual reserves for this area?

A Very roughly.

Q Do you have an approximate of what the reserves of gas and reserves for oil --

A Mr. Dugan has calculated those figures.

Q I see. Now, do you feel, Mr. Harris, that there is a possibility that the strike of this structure may pass a little bit more northerly than you have shown and that the Hancock Douthit No. 1 may be south of the strike or south of the structure?

A It is possible, but not indicated by the datum, the correlation on it. El Paso Products Company drilled a well, I believe, the Frontier 1 "C", I believe, in Section 17. It is not shown on here. I didn't get the log until after I prepared these Exhibits. I do have the log in my brief case, and I believe it is in Section 17, 27, 11. And I think that that log will show they didn't even attempt a Gallup completion in it. They completed in the Dakota. I have the large scale logs, but I want to be sure

of the location of it before I -- this 1 "B," 1 "C", Section 16 -- I was off a Section -- it is in the northwest northwest of 16, and if my information is correct, they didn't even attempt completion in the Gallup.

Q Now, what -- would the top of the Gallup figure be the same figure you used for contouring your Exhibit No. 1? What would that figure be in Section 16?

A Let me correlate and see. I'll correlate it with this McAdams No. 3. There is your Tolcito zone there, it would be this zone at the top of it. I would pick at 58, about 5878.

Q Now, all these tops that you have given on Exhibit 1 are above sea level?

A Yes.

Q Do you have the elevation of that well?

A The elevation is on the log. Elevation derrick floor, which is all calculated 5226. Does that bear out the structural contous?

Q Yes, sir, that would help you to draw your contour line, just about fall right on it.

Q It is to the south, see, so that indicates that your strike of the formation, your field, is sometimes limited.

MR. UTZ: What was the elevation?

MR. NUTTER: 5226 elevation.

Q (By Mr. Nutter) What about the El Paso Natural Gas Huerfano 105, what is the potential on that well, Mr. Harris?

A The 105 in Section 29, the well was originally, I believe, potentialed at 571 barrels per day. I have it right here. The 105 was potentialed at 571 barrels per day. I think that the potential has been probably lower. I know at the end of six days' production it was down to 139 barrels per day, I understand, and the gas-oil ratio has increased considerably, from up to 11,000 to 1, and I believe when that 571 was taken, this -- I am not sure of the figure, that the gas-oil ratio was reported as 1538 to 1.

Q That's one of the two wells that at the beginning of your testimony you stated that the G O R 's were going up?

A Going up, that one and the Pan American McAdams "B" 1, and even the Weaver McAdams 3.

MR. NUTTER: Any further questions of Mr. Harris?

QUESTIONS BY MR. ARNOLD:

Q Mr. Harris, do you think that the present structure of the San Juan Basin, as such, was a controlling factor in the accumulation of oil in this reservoir?

A That the structure of the Basin was as the way the sands were laid down or what?

Q No, I mean the present structure, the present configuration of the Basin. Do you think that had anything to do with the accumulation of oil, do you think the oil accumulated before that time?

A Highly theoretically, the oil was accumulated, of

course, after the sand was deposited, and migrated, I think, to the up-dip with the gas migrating a little ahead of it, and there was a very small amount of oil trapped in this Angels Peak area, and a large amount of gas was trapped there, apparently, as indicated by your El Paso Huerfano 104, which is oil, and this might be a major oil field here whereas the deep waters were probably along in here, and your sand, you had a permeability barrier created somewhere in here.

Q Would you consider this a stratigraphic rather than a structural trap?

A I sure would.

Q That being the case, there isn't any particular reason why the good sand in the reservoir should necessarily follow structural contours?

A No. This has a slight nosing here on the formation. As seen on the structural contours, your sand sometimes is a little cleaner where you have some type of structure, and that might have been just a little nosing where your sand happened to clean out a little better on top of the structure, which is normally found -- I know the Mesaverde production, which is apparently stratigraphic and blanket we don't -- we do find some better wells where there is some structure indicating that the sand in the Mesaverde cleaned up, and the sands in the Gallup are comparable to Mesaverde in the type of deposition, permeability, and it is primarily a gas producing sand. We have a lot of Mesaverde

wells producing more oil. I know the Nordhaus Well on the Canyon several years ago was producing two million cubic feet of gas per day for three months, making 163 barrels of oil a day.

Q To go further on my question, if you should project this pool further northwest, then there is no particular reason why it shouldn't cut across structure?

A That's correct. It generally follows structural contours, but not, it doesn't have to follow the configuration exactly. You can see the field itself, that's a good well, and this is a good well; across that area right there are the better wells in the field, and they are not on the same structural contour, but they are within the general configuration of the structural contour. In fact, all of the oil production in the San Juan Basin and oil production, Pictured Cliffs and Mesaverde, is all northwest, southeast.

MR. ARNOLD: That's all, I believe.

MR. UTZ: Any other questions?

QUESTIONS BY MR. BUELL:

Q Mr. Harris, my name is Guy Buell, with Pan American Petroleum Corporation. Would it be a fair summary of your testimony to say that the purpose of your testimony was to show a small oil area and a large gas area?

A I think that's right.

Q All right, sir, I wonder what the change would be in the appearance of your Exhibit No. 1 if we transpose your zero

isopach from your Exhibit 1, would that not show a much larger red or oil area than you have reflected on Exhibit 1?

A I don't think it would show a great deal larger oil area but I limited, by these wells, I limited by what I thought was commercial wells, I didn't limit it by actual sand thickness.

Q Mr. Harris, let's get back to my question. Let's transpose your zero isopach contours to Exhibit No. 1.

A All right.

Q Would that not greatly increase the size of the red or the oil area?

A When you get down to zero, you don't have production.

Q Mr. Harris, you want to answer my question?

A If I can.

Q When we transpose your zero isopach contour to Exhibit No. 1, would that not greatly increase the red or oil area?

A You want to put your zero contour up here?

Q Where your contour would fall.

A Let's see, I would put it at the north part of this section; the zero contour would fall right here, but that is nonproductive.

Q Yes,sir, we realize that. Would you have any objection, Mr. Harris, or would you ask counsel if they have any objection; they may say so, but would you have any personal objection

to transposing your zero isopach contour on your Exhibit No. 1?

A No, I wouldn't have any objection.

Q We certainly realize --

A It will be very rough.

Q It will be rough, yes.

A Section 27, put it right across there?

Q Let the record show that Mr. Harris has penciled in, roughly, approximating it, the zero isopach contours, as reflected on Exhibit No. 3 on Exhibit No. 1.

A You want it all around or just the north limits?

Q Let's go a little further to the west there, Mr. Harris. Let's go on out to where it is opened; you can't close your contour anyway.

A All right. I believe it is going to be through about there, I am not sure of that. I believe that's fairly close, I am not sure.

Q Now, when we look at that, if that were colored in red, gas-oil contact to your zero isopach line, we'd have a lot bigger oil area, wouldn't we?

A If that was all productive, yes, but I was trying to limit the limits of commercial production, not limits of --

Q Yes, sir, I realize what you are trying to do. I also ask you if we colored the area between your gas-oil contact and your zero isopach line, we'd have a much larger red area, would we not?

A It would indicate that, yes, it would be a much larger red area which, then it wouldn't be true as to commercial production.

Q Yes, sir, I know it wouldn't, but we would have a tremendous increase on the area?

A I could paint the red area here, but it wouldn't mean anything.

Q Doesn't your isopach mean anything?

A Yes, my isopach is sand thickness.

Q And that's what we are using on your Exhibit 1, isn't it?

A We are using these wells right here as limits on Exhibit 1, that are non-commercial producers, in my opinion, in the limits of the oil area.

Q Let's clear up the record. One thing, when you were discussing your Exhibit No. 3, and talking about Pan American's Frost "B" 1, --

A Yes.

Q -- you said, in your opinion, that well only had two feet of pay?

A No, two feet possibly above one milladarcy permeability and the porosity above ten percent.

Q Well, --

A Eleven feet of pay. Eleven feet of sand.

Q It has eleven feet of net pay?

A Of sand.

Q And not two feet of net pay?

A Oh, no, no. I didn't say two feet.

Q But if I understand you correctly and the record reflects that you said two feet of net pay when we were discussing Exhibit No. 3, you want to change the record?

A If I said two feet of net pay, I want to change the record on that because I have indicated here approximately, that's a little over the net pay thickness, but --

Q Mr. Harris, I notice on all of your Exhibits you show that the reservoir that we are discussing is in complete communication, one part with another part?

A I don't say that the complete reservoir is in communication. Certainly it is in communication over a period of many, many hundreds of years, yes.

Q Do your Exhibits show any faults, any structural impediments?

A No, other than permeability barriers, which I don't show structurally.

Q Let's look at Exhibit No. 3.

A It shows the sand is thickening, and this one here shows that these sands are not as clean as these sands, --

Q Yes, sir.

A -- which would indicate that you are not, your communication is much slower.

Q Yes, sir. Exhibit 3 is an isopach, is it not?

A Yes.

Q Does your Exhibit 3 show any kind or type of separation within what you consider the productive limits of the reservoir?

A It doesn't show any barriers at all.

Q So we have communication?

A You have communication on any field where the wells are offsetting each other, I am sure of that.

Q All right, let's go back to Exhibit 1. Mr. Harris, looking at your Exhibit 1, the green gas and the red oil, what would occur in this reservoir--according to your testimony we have communication; if you produced a well in the gas area or the green area at a rate disproportionately higher than a well in an oil area, what happens in this reservoir?

A You lower the pressure on the reservoir here.

Q What occurs in a reservoir when you lower pressure in one portion of it?

A You lower the pressure on any reservoir when you produce oil or gas, either one.

Q Under the assumption of this, we are producing the gas or green area at disproportionately higher rate than we are the oil or red area?

A You are going to lower this more.

Q The green area. What happens to the red area?

A If your communication is sufficient, you lower it here, but where you have a real low permeability, I don't believe that you've got permeability and porosity to lower the pressure drastically in this area by producing these wells.

Q In other words, is it your testimony, Mr. Harris, that you could produce a gas well in this reservoir --

A No.

Q -- and it would have no effect on the oil area, is that your testimony?

A No. If you produce them wide open any time, you produce any reservoir wide open, you are going to have some waste and lower the pressure, but we are asking for a limiting, a fair limiting oil ratio where we can produce these wells commercially.

Q What are you asking for? You have made no recommendation.

A We are asking for 6,000 to 1.

MR. SPERLING: I think we ought to be permitted to put a case on before we ask what you are asking for.

MR. NUTTER: Yes, sir. I don't think Mr. Harris has made any reference to what he is asking for in this case. He is giving geological testimony only.

Q All right, what would happen, Mr. Harris, -- let's go back to the question, assume that we produce the gas wells in the gas area at a disproportionately higher rate than we produce the oil rate?

A If you produce them at a disproportionately higher rate, I don't know what a disproportionately -- what the rate is. I know at the present rate of production, 2,000 to 1, it will take probably twenty years to pay out our well.

Q You don't understand the word "disproportionately higher?"

A I understand what disproportionately means, but I would have to have figures to know how much. In other words, you can produce these wells at a rate of ten million a day each, as against what up here?

Q All right, sir. Let's look at the actual facts in this reservoir. What occurred in this reservoir when the gas wells were producing as they were prior to the recent Commission Order?

A What happened to the gas wells?

Q Yes, sir. What happened in the reservoir, did we have oil migrating into the gas area?

A When the wells were producing before?

Q Yes, sir.

A That, I couldn't answer for sure, that we have oil migrating into it, because of these permeabilities, and that is something you would have to know,whether it was migrating in there or not but we drilled the first well in here, we had no knowledge of any oil in there. We produced them as gas wells, and what we want is a reasonable pay out of our wells. We don't want to produce gas that belongs to us under here to produce marginal

oil wells for somebody else.

Q Maybe we can get at it, Mr. Harris. Will you assume, for the purpose of this question, that due to the rates at which gas wells in this reservoir were produced, that we had oil migrating from the oil area into the gas cap area. For the purpose of this question, will you assume that in the event that occurred, did that result in physical waste?

A Well, you produce your oil through your gas wells if it does.

Q It is your testimony, then, that if oil from an oil area migrates into a difficult gas cap area, that you'll have no waste?

A That, I couldn't answer. If it migrates, I don't know how much it has migrated. We haven't had any evidence of any oil migrating into this well.

Q We are assuming, for the purpose of this question, that it does.

A If it does, --

Q Waste will result?

A I don't know if you will have waste or not. You might produce it with your gas.

MR. BUELL: That's all.

MR. NUTTER: Any further questions of Mr. Harris?

MR. SPERLING: I have a couple.

REDIRECT EXAMINATION

BY MR. SPERLING:

Q Mr. Harris, with reference to some of Mr. Buell's questions, has there been any evidence of any migration of oil, so far as production, from the No. 3 Weaver McAdams is concerned, in view of the fact that your oil and gas ratios are increasing?

A I wouldn't -- due to the fact that the oil and gas ratios are increasing, it looks like the oil hasn't migrated because we are producing less oil and more gas.

Q Now, with reference again to Exhibit No. 3, which is your isopach map, you stated in answer to Mr. Howell's question, it could not be closed on the northwestern end. Is there any indication from studies that you have made, that you might anticipate any thickening of the oil producing section in the northwest?

A I have no indication of it, no, from my studies.

Q Well then, is your conclusion that if --

A This well only made 30 barrels, I believe.

Q If it is extended to the northwest, would it, in your opinion, increase the gas producing area, or the oil producing area?

A I think your gas will go further northwest than the oil area due to one fact, that you can produce gas from a zone with lower permeabilities and porosities than you can an oil well. We could extend this gas area, I think, considerably out in here whereas your oil area, I believe; that's my opinion. I can't back it up with facts because I don't have the control --

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Q Before you turn away from Exhibit 3 there would you indicate on there, on the isopach, what you consider to be the limits of commercial oil production?

A It will be the same limits that I had on the other map because I am going by --

Q Mr. Buell asked you to extend zero --

A He asked me to put my zero line there. Well, the oil limits, I think, come inside of the Pan American's Frost "B" 1, of the limits of commercial production, is that what you want?

Q That's right.

A It will follow right along with the red on this map, which would be inside the Frost Well, and just barely, this McAdams would be in the edge of it. That's it.

Q As I understand, on your Exhibit No. 1, you attempted to show in red only the commercial producing area?

A That's right.

MR. SPERLING: That's all.

QUESTIONS BY MR. NUTTER:

Q Mr. Harris, is there any reason to believe that there on Exhibit 1 the red could not be extended along the north side of the green, on the right side of the green?

A On this side, there is no reason to believe that it couldn't be extended, but I couldn't prove it. I extended it out to the edge of the 160-acre location, as proved. That's all I was attempting to show there, not, we might extend this gas area clear

down to within one contour here, but we can't prove it.

Q Would you expect that a well would be productive of oil if drilled within a half of a mile of the north side of the green line there?

A In here?

Q Yes, sir.

A It possibly would. It looks like there is a small oil rim on the north side of the gas, but very small. Actually, we have, under present producing methods, I don't think there is but one well in the whole oil area that will make its allowable under 2,000 to 1 ratio, and it is 2500, 2600 to 1; the 107, it wouldn't make its allowable, so that wouldn't leave any of the wells that would make their allowables under present conditions.

MR. PORTER: By that, do you mean top allowable for the pool?

A By that, I mean top allowable for the pool.

Q (By Mr. Nutter) Is that the lowest ratio in the pool?

A As far as I know, the lowest ratio. I don't have one on that, but I am sure it wouldn't because it is only making 40 barrels of oil while pumping load oil.

Q Do the Weaver McAdams 1, 2 3, and 4 Wells make any liquids?

A Yes, sir.

Q What is the ratio on those four wells, Mr. Harris?

A The oil and gas ratios on the McAdams No. 1 is, on the No. 1 is 88,550 to 1. The McAdams No. 2 is 120,930 to 1. The No. 3 is, this says 5221. We took a recent one just the other day, it was 57 -- wasn't it 5690? I will correct it here. The McAdams No. 4 is 116,636 to 1.

Q Do you know the ratios on the El Paso Huerfano 103 and 99?

A On the Huerfano 99, we have 55,000 to 1; 55,506; on the 103, 98,947.

Q 98,--

A thousand,947.

Q 947. How about the Huerfano 106?

A The Huerfano 106, 62,983.

Q While we are at it, we might as well have the ratio that you have for the rest of the wells.

A I have,Huerfano 107 is 2, 2573. The Huerfano 92, I don't have a gas-oil ratio in 92. Is there any others that you don't have?

Q Yes, sir, the Huerfano 105, I think you testified?

A The 105 is 11,210.

Q Pan American's McAdams "B" 1?

A Pan American's McAdams "B" 1 on here shows a 9235 estimate, that is what shows is estimated.

Q And we don't have any ratio yet on the Frost.

A On the Frost, that's right.

MR. NUTTER: Thank you. Any further questions of Mr. Harris?

QUESTIONS BY MR. ARNOLD:

Q Mr. Harris, if it were found from additional development that Section 19 were productive, that thissand was continuously present --

A 19? What Township and Range?

Q 27 North, 10 West --

A 19 --

Q --it would be just to the northwest end of the pool, one more over. No, to the west.

A Oh, in --

Q 27, 10.

A 27, 10, that would be right there.

Q Would you expect that that well would be a higher or lower gas-oil ratio well than the Huerfano unit 105?

A If it were a continuation of this field, I think you would have it lower, but you might have another trend coming through here, the same as we have down here on the Gallegos trend. I don't know for sure. We don't have control there, but I think we've limited the sand by this Angels Peak 2, through here. I wouldn't look for any production at all from the Gallup oil in there.

Q Actually, though, do you think that any sand to the northwest, which is continuous with the present producing

reservoir, would be oil productive because of the fact that it is lower structurally?

A An oil rim, you d find it lower structurally, yes. The gas area would be higher structurally, yes, that's right.

Q So that it wouldn t be possible that the oil area in relation to the gas area might, it might be that there is a lot larger oil area in relation to the gas area as you go northwest?

A I don t believe that there is; it is possible. I wouldn t recommend drilling a well out there, let s put it that way.

MR. ARNOLD: That s all.

QUESTIONS BY MR. UTZ:

Q Mr. Harris, you spoke of permeability and porosity in the oil zones. Do you have any figures on those?

A The only figures I have on the two wells to the north, is that what you are speaking of, in the oil zone?

Q Yes, sir.

A Our calculated porosity from the sonic logs, which were calculated by me and one of the schlumberger engineers, shows the McAdams "B" 1 in the lower Gallup, shows a -- I've got it if I can find it. Here it is. It was just a penciled notation from the schlumberger engineer; the McAdams "B" 1 shows a porosity range of five to ten percent with an average of eight per cent. The Pan American Jack Frost Well had an average of 9 percent with a range of 5 to 11 percent, which normally would be comparable to your Mesaverde

figures which are not gas productive, but normally you find, in oil fields you will find a little better porosity than that.

MR. NUTTER: Mr. Harris, you were testifying a while ago that you thought that the permeability was such as to impede the migration of oil from that area. Do you have anything on the permeability in there?

A I have nothing that -- you can't calculate permability from those logs, and core analyses on those wells were not available to us. I imagine Pan American will have that test.

Q (By Mr. Utz) You didn't core any wells?

A We attempted to core with gas two of the Weaver wells, and I think Dugan has the core analyses, two of them, and as I stated, part of one core that we recovered we had a very small interval in there that the permeability was up to 222 millacarcies, in the, one of the Weaver Wells, I believe it was the McAdams No. 2, I am not sure of that one.

Q Do you have a core of that, Mr. Harris?

A Mr. Dugan has the core analysis of the well from Core Laboratories, but as I say, we recovered about, what is it, 10 percent, 20 percent recovered on our cores? Our sands were, apparently the softer sands just blew away and we cored the tighter sand.

Q Do you know whether or not Pan American cored their wells or not, Mr. Harris?

A I understand they did core their McAdams "N" 1, and

some cores were taken on the Frost 1. I am not -- that I couldn't -- that's hearsay.

MR. UTZ: That's all.

QUESTIONS BY MR. HOWELL:

Q Ben Howell, representing El Paso Natural Gas. Mr. Harris, has there been more than one gas-oil ratio test taken on the McAdams No. 3?

A Yes, sir. There was two taken, one was 50.

Q What was the initial gas-oil ratio on that one well?

A The first test that I have any record of was 5 -- I believe 5220. The second one that I have any record of, which was taken just a few days ago, was 5690.

MR. NUTTER: Any further questions of Mr. Harris? He may be excused.

(Witness excused)

MR. NUTTER: We will take a ten-minute recess.

MR. NUTTER: The hearing will come to order, please. Mr. Sperling, do you have any other witnesses?

MR. SPERLING: If the Commission please, Mr. Errebo will conduct the examination of Mr. Dugan.

MR. ERREBO: We would like to call as our next witness Mr. Dugan. Would you stand and be sworn, please?

(Witness sworn.)

THOMAS A. DUGAN

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. ERREBO:

Q Would you state your name, please?

A Thomas A. Dugan.

Q Where do you live, Mr. Dugan?

A Farmington, New Mexico.

Q What is your profession?

A Petroleum engineer.

Q How long have you been a petroleum engineer?

A I graduated from Oklahoma University in 1950.

Q How much experience or practice have you had, timewise, in the San Juan Basin?

A Six and a half years.

MR. ERREBO: Are his qualifications acceptable?

MR. NUTTER: Yes, sir. Please proceed.

Q Have you made a study of the Angel's Peak-Gallup Pool, Mr. Dugan?

A Yes.

Q Based on this Pool, have you prepared certain exhibits which you now have this morning to present to the Commission?

A Yes, I have.

(Applicant's Exhibit No. 4 marked for identification.)

Q I'll refer you to Applicant's Exhibit No. 4, Mr. Dugan, and ask you to identify it.

A It is a data sheet.

Q That data sheet shows the drilling and production data on the wells presently completed in this Pool?

A Yes, that's correct.

Q How many wells are there completed to date as producing wells, or wells capable of producing?

A There's twelve wells that have been drilled. One of the twelve is still recovering load oil.

Q That is the Pan American Well which was discussed by the last witness?

A Yes, the Jack Frost B-1.

Q That's the well he stated he didn't think would be a commercial well, is that correct?

A That's correct.

Q Now how many of these wells are now flowing?

A There's ten that's flowing.

Q Are those all gas wells?

A No, there's two of those wells, three of them are oil wells in the oil rim..

Q By that you mean they are wells having ~~more~~ lower gas-oil ratios than the wells in the gas area, is that correct?

A Yes, that's correct.

Q Are any of these wells now pumping?

A There's two wells pumping, the two Pan American wells.

Q Will you point out on Applicant's Exhibit No. 1 on the board those two wells?

A It's this Jack Frost B-1 and the Pan American McAdams B-1.

Q Now with regard to the gas-oil ratios -- you may take your seat again, Mr. Dugan -- on these wells, how many wells have gas-oil ratios, according to the latest tests which you have been furnished, less than 2,000 to 1?

A There aren't any wells with a GOR of less than 2,000 to 1.

Q Do you know what the Commission rules now in effect are with regard to GOR's?

A Yes.

Q What is that GOR?

A You are restricted on your oil production, if your gas-oil ratio is above 2,000 to 1.

Q With regard to the data shown on Exhibit 4, that shows all the wells in the field without regard as to whether they are owned by Weaver or somebody else?

A Yes.

Q Have you made inquiry of the other operators and asked them to furnish you all information that they might have so you might present a complete picture to the Commission?

A Yes.

Q And this is based on the information you were furnished?

A Which I obtained from the other operators or obtained from the Commission office in Aztec.

Q Now with regard to the Pan American McAdams B Well, Mr. Harris testified that that well is presently recovering the load oil, is that correct?

A No. The McAdams B has -- Pan American McAdams --

Q Excuse me, I refer to Frost B well.

A The Jack Frost is still recovering load oil Monday when I checked with the Pan American people in Farmington.

Q When was that well fracked, do you know?

A No, I'm not sure of the date.

Q Do you have any estimate of when it was fracked?

A Three or four weeks ago.

MR. ERREBO: Is that approximately correct, anybody with Pan American know?

MR. MARSHALL: Yes, it's approximately correct.

Q Do you know how many barrels of frack oil were put in that well, do you have that information?

A I think I do some place.

Q Do you have any estimate of it?

A Fifteen to eighteen hundred barrels.

Q Fifteen to eighteen hundred barrels?

A I would say.

Q Do you know how much, according to what has been reported to you, how much oil is still left to be recovered?

A Monday they said they had 614 barrels left to recover.

Q At what rate is that oil being recovered?

A Well, at that time they had just pulled the pump and I believe he gave me a figure that it had produced ten barrels, no, twelve barrels in ten hours.

Q On the pump?

A On the pump, yes.

Q Do you have any other information that you would like to give the Commission at this time with regard to that well--

A No.

Q -- that's significant to you?

A On the Jack Frost?

Q Yes.

A No, except that twenty barrels in ten hours was apparently right after the pump job. It was possible that there

might have been some accumulation of oil in the well bore that would make that gauge slightly high. I believe before the pump job it was down to twenty barrels, something like that.

Q Now based upon your knowledge of this Jack Frost well, would you say, Mr. Dugan, that this will be a commercial well for Pan American?

A Well, it doesn't look like it will be.

Q Would you say it is likely to fall short of ever paying out?

A I believe that there's very little prospect that it will pay out.

Q Now on that basis are you in agreement with Mr. Harris that the Frost B-1 is a well which may be regarded as defining the northern limits of the oil accumulation in this area in this field?

A Well, since it is undoubtedly a non-commercial well it would define the commercial limits of the field, I'm sure.

Q When you referred to Pan American McAdams B well, will you state what the current gas-oil ratio is on that well?

A Well, this well, they've done an awful lot of testing on the McAdams B-1; they perforated and fracked the lower Gallup zone and recovered their load oil from that zone, and then set a bridge plug and perforated and fracked an upper zone, recovered their load oil and got tests on each zone separate. Then they killed the well and completed it, made, and they have just

recovered their load oil after this, after they had put the entire Gallup together, all zones, and this I. P. that is shown on the data sheet was the first day after they recovered the load oil with all zones together.

Q First day after recovery of all the load oil, then the I. P. was taken?

A With both zones together. The zones were tested separately, though.

Q Will you repeat again what was the test on the lower zone?

A Well, I haven't got that on the data sheet.

Q Do you have any knowledge of how that zone performed?

A Yes, it was reported, I believe, to the scouts at forty barrels per day with a gas-oil ratio of twenty-five to twenty-six hundred.

Q Now refer to the El Paso Natural Gas Company Huerfano No. 105, that is another oil rim well, is that correct?

A Yes, it's located in the oil rim, as Mr. Harris has it on his Exhibit 1.

Q What gas-oil ratio is shown for that well on your Exhibit No. 4?

A The most gas-oil ratio was 11,210 to 1.

Q Do you have any information as to what the initial test was on that well?

A Well, the I. P. which was a three-hour test calculated

571 barrels of oil per day with a gas-oil ratio of 3300 to 1.

Q So the initial test was 3300 to 1, and is currently 11,000 to 1, is that correct?

A Yes, sir, that's correct.

Q Is that startling to you, or do you feel it is unusual that a well should perform in that way, located as it is?

A Well, of course, that initial test was a test of short duration which possibly you could get an erroneous answer as to a gas-oil ratio.

Q You think it might have been a little higher than that?

A Yes, it's possible. In fact, on another exhibit I show some other gas-oil ratios after the well was producing.

Q Do you have any idea what the current potential of that well is, what the well is presently capable of making?

A I haven't any idea. I know it makes its allowable very easily.

Q It is producing, but you don't know what it will make?

A No, but it will make its allowable.

Q By that the well is penalized, isn't it?

A Oh, sure.

Q Then it really didn't make its allowable, you mean it makes its penalized allowable?

A Yes.

Q That would be considerably less than the 54 barrels per day?

A I haven't figured out what the exact allowable should be, although it would be relatively easy to do, if you would like to have it.

Q Do you know what the method of production of this well is?

A They have got it flowing to 500 pound line and they have a free piston in the well.

Q What is the purpose that you think the El Paso has that free piston in this well?

A They probably put it in there for a dual purpose; one, to try to eliminate a paraffine problem; and the other, to try to lower the gas-oil ratio.

Q You think that the use of the piston would be effective in keeping the gas-oil ratio under what it would be under different methods of operation, is that correct?

A Yes, I do.

Q Now with regard to the El Paso Huerfano No. 107, what information do you have on that well with regard to gas-oil ratio?

A The gas-oil ratio I have listed here was filed with the Commission and taken in, I believe March 29th, which was 2,573 to 1. They have taken a subsequent test that was slightly lower than this, but the second test was on a shorter duration.

This test was a twenty-four hour test, whereas the second test was a ten hour test, which could possibly make the difference, the small amount of difference in the calculated gas-oil ratio.

Q Actually, according to your tabulation this well is the lowest ratio well in the field, is it not?

A Yes, it is, that I have information on. Of course, the only one that we don't have information on is the Jack Frost B-1.

Q Is this well currently producing, to your knowledge?

A Yes, it's flowing to atmosphere.

MR. NUTTER: Just what do you mean by "flowing to atmosphere?"

A Well, the other wells, with the exception of the Weaver McAdams 3, are all producing into a line and selling the gas at 500 pounds system, whereas this well and the No. 3 are producing to a low pressure separator and venting, flaring the gas. In other words, they're holding a smaller back pressure on the well head.

MR. NUTTER: Now I note that your Weaver-Brown No. 3 is also flowing to atmosphere. Is this well incapable of flowing into a five hundred pound line?

A Yes, it's uncapable of producing, it's not capable of producing its allowable against five hundred pound system.

MR. NUTTER: Is that the same situation here with the Huerfano 107?

A I assume so.

MR. NUTTER: Excuse me, go ahead, Mr. Errebo.

Q (By Mr. Errebo) How long has the Huerfano No. 107 been producing, do you know?

A No, I'm not sure of that, although I believe, I had a hard time finding the date of first delivery, but I believe it was turned on about the last of March, on steady production.

Q Now how many of the wells as shown on this tabulation have ratios in excess of 6,000 to 1?

A Well, all of the wells have, with the exception of the Weaver McAdams 3 and the Huerfano Unit No. 107, have ratios in excess of 6,000 to 1.

Q Then based on the information which is shown here, would you say that this well, or that this Pool is primarily a gas pool?

A Well, it would be pretty hard to say that from the gas-oil ratios; however, from the cumulative production I would say that the majority of the wells produced are gas wells, yes.

Q Would you say that on the basis of the ratio of gas completions to oil completions?

A Yes.

Q Now I refer you, Mr. Dugan, to Applicant's Exhibit No. 5. Before we leave No. 4, however, is there anything further you care to point out before I move on to the next exhibit?

A No, not that I can think of right now.

(Applicant's Exhibit No. 5 marked for identification.)

Q Then referring to Applicant's Exhibit No. 5, state what that exhibit shows.

A Well, I've plotted the gas-oil ratio versus time on two wells that are in the oil rim.

Q Now would you say that, number one, that exhibit shows that the ratios are already high as compared to wells which you might find not only in this field but other fields?

A Yes.

Q In other words, they're well above 2,000 to 1?

A Yes.

Q What else does that exhibit show?

A Well, on these two particular wells that the gas-oil ratios are increasing, although the data here is limited because of the small amount of production from the wells.

Q On the basis of what you see here and what you have shown here, Mr. Dugan, would you state that these wells might give some indication as to what we might expect from the other wells in the field?

A Yes, I would.

Q Which of the two wells would you say, as shown on No. 5, would be more likely to be more typical?

A Of the wells --

Q On the gas-oil ratio performance of the other wells

in the oil rim?

A Well, I would have to answer that by saying probably the Weaver McAdams No. 3, because it has had more production, more length of production than the information as shown here on the 105.

Q Now then the Weaver McAdams No. 3 is increasing, though, isn't it?

A Yes, it's pretty high but it continues to go up.

Q Do you expect that soon it will be above 6,000 to 1, based upon what you have shown here?

A Yes, it might level out close to 6,000 to 1.

Q But you really don't know, do you?

A No, I don't.

Q On the other hand, Mr. Dugan, Huerfano No. 105 has had a tremendous increase in a short time?

A Yes.

(Applicant's Exhibit No. 6 marked for identification.)

Q Refer to Exhibit No. 6, if you will, Mr. Dugan. Will you explain what that exhibit represents?

A It's a summary or it's the core analysis from Core Laboratories Incorporated on two wells that have been cored in this Angel Peak-Gallup Pool.

Q Are both of these wells located in the gas area of this pool?

A Yes, they are.

Q You have not shown the average permeability for those wells on this exhibit?

A No, I haven't.

Q Do you have that average which could be added to the exhibit?

A Yes. On the McAdams No. 2, twenty-one feet, the average permeability is 26.2 millidarcies. The average porosity is 11.7 percent; oil saturation is 19.9 percent; average water saturation, 18.1 percent.

On the El Paso Huerfano No. 106, the average permeability is 31.5 millidarcies. This is on an average of twenty-two feet section, and the average oil saturation is 21.4; average water saturation, 28.1, average porosity, 12.9.

Q With regard to the oil saturation, what do you mean by that?

A That's the residual oil saturation.

Q You mean then that on the core analysis which was made on these wells that they actually showed that there was oil saturation in the cores, is that correct?

A Yes.

Q So on that basis would you call this a dry gas cap?

A No, you sure couldn't.

Q It's saturated, is that correct?

A Yes.

Q Do you know whether that is a dark oil or light oil?

A No, I don't. The oil being produced from the wells that are in the gas cap is a light oil with a gravity of 58 to 60, and it's clear.

Q That is more of a distillate or a condensate, is it not?

A It appears to be.

Q It's clear, you say?

A Yes.

Q It's white?

A No, it's amber in color. It's translucent, you can see through it.

Q You say the gravity is what?

A 58 to 60.

Q With regard to the oil which is being produced in the oil rim, what color is that?

A Well, it's a dark green.

Q Dark green?

A Yes.

Q And what gravity is it?

A 42 to 44.

Q Some fifteen percent lower, then, in gravity?

A Degrees, yes.

Q Or degrees lower, than the distillate?

A Yes.

Q Before we go on, I would like to refer you back to

the gas-oil ratios again, the wells in the oil rim. You say that the ratio for the Huerfano No. 105 is 11,000 to 1, approximately, is that correct?

A Yes.

Q That the McAdams B is approximately 9700 to 1?

A That is, I stated that a gas-oil ratio, I don't have a gas-oil ratio that was taken after both zones in the Gallup were combined and the well finally completed. This I believe was taken before the final completion, this gas-oil ratio.

Q Then the Huerfano No. 107 is 2575?

A Yes.

Q And the McAdams No. 3 is some 5700 to 1?

A Yes.

Q You stated with regard to Exhibit No. 5 that you thought that the McAdams No. 3 might be more typical. I wonder if you would say that perhaps the ratio which might be expected of the other well, namely, the Huerfano No. 107, might be likely to be more in the range between the two curves shown on No. 5, as well as any other wells which might be drilled in the oil rim?

A Of course, that would be pure speculation. However, I feel if allowed to have a longer producing period, that gas-oil ratio would continue to increase.

Q Actually you do have two quite high ratio wells in the western part of this oil rim, don't you? That's the 9300 to 1 and the 11,000 to 1?

A Yes.

Q Based on your study of this reservoir and the drilling production data that you have offered here this morning, do you have any recommendations as to what oil unit this Commission should adopt?

A On wells drilled in the oil rim?

Q Yes.

A I tried to approach that from a reservoir standpoint and lacking any core analysis in the oil rim, I was pretty well at a loss to do so; if the field was developed on eighty acres, there would undoubtedly be sufficient reserves to justify this development.

Q In other words, do you feel that if we went to forty acres at this time, there might be grave danger of drilling unnecessary wells, and that danger would be fully reflected by additional information that you do not have at this time?

A Yes, particularly bearing in mind that the sands seem to be emptying out right in the oil rim and the fact that the permeability and porosities are decreasing in that direction, I would be inclined to be cautious as to the amount of drilling to be done.

Q Do you have any recommendation as to the amount of acreage which a gas well, we'll say a well in the gas area as shown on Exhibit 1 would efficiently and economically drain?

A I feel that there's no doubt that these wells are

very definitely gas wells, but what they could drain 160 acres.

Q What would be your recommendation as to the amount of acreage which the Commission should permit to be assigned to a gas well?

A Since in my opinion they can drain 160 acres, I would recommend that they assign 160 acres.

Q Actually, Mr. Dugan, have you had benefit of any interference test information?

A No. We attempted to get permission to test, to take an interference test; however, doing so would have exceeded our allowable and the test was not taken.

Q Do you think that it's likely, on the basis of additional testing information, that it's possible that 320 acre spacing might be more desirable for this area?

A Well, I haven't done any lengthy study as to the desirability of 320 acre spacing.

Q Actually you just don't have the information at hand at this time, is that correct?

A No, I don't. I would hate to recommend it without doing a lot of lengthy calculations and tests, studies.

(Applicant's Exhibit No. 7 marked for identification.)

Q Now then, referring to Applicant's Exhibit 7, in connection with this exhibit, Mr. Dugan, will you state again what the limiting gas-oil ratio now is as applicable to all wells

in the field?

A 2,000 to 1.

Q What is the allowable assigned to those wells?

A Well, I calculated and I added the forty-acre allowable over the past year and got an average allowable and came up with a gas allowable of 118 MCF a day.

Q That is based on the depth factor times the unit allowable times 2,000 to 1?

A Yes, times the average unit allowable over the past year.

Q Now then, on that basis have you drawn and compared information shown on Exhibit No. 7?

A Yes.

Q Will you proceed to explain what that shows?

A First of all, I made a cost estimate of what I estimated to be the minimum cost of a well drilled in that area. This would be an average minimum cost, as there is quite a difference in elevation, some of the wells are considerably deeper than others. I used an average depth figure and took and calculated or made a cost estimate trying to determine the amount, the original cost or the minimum original cost, and then plotted that against the revenue from allowable of a well producing in the gas cap area.

Q What was this minimum cost as shown on this exhibit?

A Well, I figured a Gallup single completion would be

about $78,000.00.

Q $78,000.00?

A Yes.

Q Then using that cost average factor, did you plot the uppermost curve as shown on this exhibit?

A That is the $78,000.00 plus five percent interest on the unpaid balance.

Q Then what does the curve immediately below that show, Mr. Dugan?

A Well, I made a similar cost estimate study of a Gallup Dakota, a dual, and for lack of any better basis, I divided the cost in half between the two zones.

Q You feel that's a reasonable basis?

A I feel it would be a conservative basis.

Q Conservative basis. What does the straight line represent, Mr. Dugan?

A That's the cumulative reserve from a typical well drilled in the gas cap area.

Q You mean accumulated revenue, do you not?

A Yes, revenue, excuse me.

Q Then what does this exhibit show, Mr. Dugan, with regard to payout?

A Well, the payout on a single Gallup well would be approximately thirteen years.

Q You feel that is a reasonable payout period?

A I feel it's pretty long.

Q You mean it's unreasonable?

A Sure do.

(Applicant's Exhibit No. 8 marked for identification.)

Q Now with regard to Exhibit No. 8, we'll next refer to it. Will you now proceed to describe to the Commission the manner in which you prepared this exhibit, Mr. Dugan, and also what it shows?

A This is the actual cost of the development of the Weaver McAdams Lease, plus five percent interest on the unpaid balance, is the upper line. The other lines are the cumulative revenue to date with the expected payout after the wells were completed and with the probable payout under the present conditions.

Q In other words, before the Commission reclassified this field, Mr. Weaver expected a payout of approximately three years and five months from his investment in developing the lease?

A That's from the date that he started the development work.

Q As a result of the reclassification and under the present restrictions, he can now look forward to payout of nine years and seven months, is that correct?

A Yes.

Q What do you think about that type of payout, is that

a reasonable payout?

A It's sure not reasonable when you consider the ability of the wells to produce.

Q In that regard will you give to the Commission the information that you have with regard to the present potential as you know it of the Weaver wells which are completed in the gas area?

A Well, the No. 1 will deliver about 1900 MCF a day to the line; No. 2 about 2500; the No. 4 about 6,000 MCF per day.

Q Six million cubic feet per day?

A Yes, six million cubic feet, and the No. 3 on the gas-oil ratio test that I took the day before yesterday was producing about 130 barrels of oil per day.

Q Would you say those are good gas wells?

A Sure would.

Q Excellent, aren't they?

A Yes.

Q Yet under the present rules they'll be required to take nine years and seven months to pay out, is that correct?

A That's an estimate, yes.

Q On that basis would you say that Mr. Weaver needed relief from the rules which are now in effect?

A I certainly would think I would need it if they were mine.

Q Now you have proposed some rules with regard to

spacing. Do you think that those rules would help to give relief to Mr. Weaver?

A Yes, they would.

Q Do you think that they would protect correlative rights and prevent waste while doing this?

A I feel that they would protect correlative rights and would not cause any waste, that will not probably occur unless the field is taken over and communitized.

Q Now, Mr. Dugan, we're not asking this morning for 160 acre gas units, insofar as the term is presently recognized by the rules and by the laws of the State of New Mexico. We're asking for eighty acre oil units with permission to assign up to 160 acres to gas wells, isn't that correct?

A That's the way I understand it.

Q Now if the wells in the oil rim are drilled on a density of eighty acres and the wells in the gas cap are drilled on a density of 160 acres and the rules are kept in effect as they are, do you know whether or not Mr. Weaver's correlative rights will be violated?

A If production continues with a restriction of 2,000 to 1 gas-oil ratio, I'm sure that his correlative rights will be violated.

Q On the basis of surface acres, would the gas wells in the gas cap have the same voidage as the eighty acre oil wells in the oil rim?

A Well, no, a well in the oil rim would be producing the same amount of gas plus whatever its oil allowable would be while the wells in the gas rim would be producing.

Q In the oil rim --

A The gas wells would be producing a given amount of gas while the oil wells would be producing the same amount of gas plus whatever oil their allowable is.

Q Would you say that there would be disproportionate withdrawals between the gas area and the oil area under the type of development which you could expect in the future under the present rules?

A Well, there will be more voidage in the oil rim, and therefore gas from the gas cap area will be moving into the oil rim.

Q Now then, do you think that if Mr. Weaver is allowed to assign up to 160 acres to his gas wells as given allowable, based on the assigned acreage, that this will help to retard the movement of the gas toward the oil rim?

A Yes, I do.

Q Actually, under the rules as they now exist, the only way that Mr. Weaver can prevent this is to drill additional wells?

A That's correct.

Q Do you think it's economical to drill additional wells in the gas area?

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A I don't believe the reserves in the gas area would justify drilling additional wells.

Q So then it's your opinion that the gas is presently moving toward the oil rim, or would move under a full development of the field under the present rules?

A Yes.

Q And that his correlative rights are being and will be violated?

A Will be, yes.

Q Actually that movement would be more pronounced upon a full development of the oil rim under a close spacing?

A Yes, it would be.

Q And it might or might not be moving in that direction now?

A I would say it's pretty stable right now, there's not much being produced out of the field.

Q All right. Do you have any limiting gas-oil ratio which you would recommend that the Commission adopt for this field?

A Oh, I feel a 6,000 to 1 gas-oil ratio would be justified, bearing in mind the gas-oil ratios that have been taken on wells producing in the oil rim.

Q Do you know whether or not any waste would occur under a 6,000 to 1 ratio as compared to a 2,000 to 1 ratio as it now exists?

A Let me answer that question with a comparison. You

take, say, take a typical oil pool where the average gas-oil ratio is, say, in the neighborhood of 1200 to 1, and you had a well that had a gas-oil ratio of 6,000 to 1, and you restricted the production from that well because of its excessive gas-oil ratio, well, it's true that the reservoir energy that is contained in this gas would probably help produce oil from another well. However, take a field such as the Angel Peaks-Gallup Pool where all the gas-oil ratios are high, the energy is not being used to any better advantage in any particular well than it is in the other particular well, so about all that you are accomplishing is extending the payout period.

Q Extending the payout period increases the cost, doesn't it?

A It sure does.

Q And possibly can result in early abandonment, is that correct?

A Possibly, not necessarily.

Q Now, you are saying then that the effect of 6,000 to 1 ratio would simply enable the wells to produce the oil and gas that are in this reservoir faster than they would produce under a 2,000 to 1 limiting ratio?

A Yes.

Q Actually there would be no substantial savings or benefit insofar as use of reservoir energy is concerned, is that correct?

A I can't see how you could get better use of your reservoir energy, seeing as how the oil wells have high gas-oil ratios and restricting the gas-oil ratios to less than they actually are is just lengthening the payout period.

Q You feel that there are any rules now in effect by the Commission which would have to be modified by special order as a result of the rules which you now propose, insofar as the amount of production which may be taken from a well per day?

A Yes, I would like to recommend that the Commission waive the daily tolerance rule 502, paragraph 1, because of the ability of Mr. Weaver's wells to produce is quite high and restricting their daily production as they are right now to roughly 185 MCF a day, it causes considerably more expense, producing expense because you either have to switch the wells daily, or would have to install additional equipment to take a high pressure drop from, actually the wells would probably be producing close to a wellhead pressure of a thousand pounds, and you are cutting that pressure to, well, actually you are cutting it to 250 pounds.

Q In other words, when you have a six million well producing into a line, and it's permitted to produce only a fraction of what it is capable of producing, then it will cause freezing up of the regulator, is that right?

A You are taking an excessive pressure drop between your wellhead and your line pressure, and you either have to dehydrate your gas and install additional heating equipment to

take the pressure cut.

Q Or else go out and switch the well each day to make its allowable?

A Switch the well each day.

Q How about the location of the wells, Mr. Dugan, what is your recommendation to the Commission in that regard?

A Well, I can't see any reason for changing the location from the State-wide location of wells that is now in effect in that area.

Q In other words, you would recommend that the minimum distance from a lease line of 790 feet for gas wells and 330 feet for oil wells would be workable under these conditions?

A I can see no reason why it wouldn't be.

Q How about testing of these wells, what do you recommend insofar as that is concerned?

A The only, I can't recommend any change in taking an annual gas-oil ratio test or deliverability test in the case of a gas, however, it might be a good idea to allow the Commission or the offset operator to request a gas-oil ratio test or deliverability test at any time from any particular other operator.

Q Now as to the disposition of the gas produced from any of the wells in this field, you recommend that the Commission require that be sold and not flared to the air?

A If the Commission adopts a higher gas-oil ratio, I would recommend that there be a no flare order written.

MR. ERREBO: If it please the Commission, this concludes the Applicant's testimony in this hearing. We would like to offer our Exhibits Nos. 1 through 8 in evidence at this time.

MR. NUTTER: Exhibits 1 through 8 will be entered in evidence. Does anyone have any questions of Mr. Dugan?

MR. PORTER: I would like to ask him one.

MR. NUTTER: Mr. Porter.

CROSS EXAMINATION

BY MR. PORTER:

Q We talk about oil wells and we talk about gas wells here. Do you have a recommendation for a definition of a gas well?

A It's relatively easy to determine whether, on completion, whether your gas well is an oil well or gas well in that particular area, although I realize there has to be a dividing line. If, a 30,000 to 1 gas-oil ratio was adopted, I believe it would not result in any problem.

Q You wouldn't give any consideration to the characteristics of the liquids produced?

A You certainly could do that and you certainly could determine whether your well was in a gas cap or oil rim, because of the characteristics of the liquids produced.

Q In other words, you might go to gravity factor, something like that.

A Yes, it would be very applicable.

Q You would recommend a 30,000 to 1 as the dividing line on gas-oil ratio?

A I think that would be a good point.

Q Now, another question here, as you know we don't have gas proration in this particular area at this time.

A Yes.

Q However, the oil wells would be prorated, even the gas which is produced from them. I was wondering that, if, in the event that the Commission followed your recommendations, would you recommend gas prorationing in this area, too?

A The proration of the gas could be calculated from the oil proration formula. In other words, with the limiting gas-oil ratio of 6,000 to 1.

Q Well, that would apply to oil wells.

A Well, you could convert that to a gas well, too, and prorate your gas wells in the same manner that you prorate your oil wells with a maximum gas allowable.

Q I have another question here, I believe you said you would recommend a no flare order in the event that the Commission adopted a 6,000 to 1 limiting ratio. You testified, I believe, on Exhibit No. 8, which concerns payout predictions, and that's on a lease basis showing cumulative revenue to date on the lease, among other things. Now, do you know whether any of the individual wells in this pool, Weaver 1, 2, 3, or 4, paid out up to now?

A No, I'm sure they aren't.

MR. PORTER: That's all I have, Mr. Examiner.

MR. NUTTER: Any further questions of Mr. Dugan?

MR. PAYNE: Yes.

MR. NUTTER: Mr. Payne.

BY MR. PAYNE:

Q Mr. Dugan, what's the difference in assigning 160 acres to a so-called gas well in this pool and establishing 160 acre proration units?

A The difference between assigning the allowable and establishing a proration unit?

Q Yes, I understood --

A The only difference I could see would be forced pooling.

Q I understood Mr. Errebo to say that the Applicants are not asking for 160 acre spacing or prorationing. What I'm getting at, if you assign 160 acres to a gas well, how does that differ from having 160 acre proration units?

A The only difference would be, that I can see, is forced pooling.

Q All right, do you agree with the testimony of Mr. Harris that Pool-wide unitization would impair correlative rights?

A That would entirely depend on the way it was handled, of course. I believe what he was referring to is that possibly lengthens the payout time.

Q How would it do that, Mr. Dugan, wouldn't all the operators be sharing in the oil production?

A Yes, theoretically.

Q So that being the case, I don't follow how it would lengthen the payout period.

A I'm sure that it would lengthen it to what they were expecting the payout to be. However, it might not lengthen it to what it's going to be under present conditions.

Q Do you consider that the most efficient way to produce a pool of this nature is when it's completely unitized, from the standpoint of waste, now, rather than correlative rights?

A From waste?

Q Yes.

A I sure do.

Q Now assuming that assigning 160 acres to a so-called gas well is the same thing as having 160 acre proration units, do you feel that having two different spacings in a pool, 80 acre for oil wells and 160 acre for gas wells, is contemplated under the rules and regulations and the statutes governing the Oil Conservation Commission? Perhaps I should address this to Mr. Errebo.

A I think it would be a good idea.

MR. ERREBO: Mr. Payne, it's hard to tell sometimes what the statutes contemplate in some instances, but I do know this, that it does seem to me under the rules as they're now written

and the statutes that are now written, any reasonable means -- let's put it this way, any reasonable yardstick for assigning allowables to wells is permitted under the rules and under the statutes; and to the extent that it will cause waste or not protect correlative rights, it's prohibited, and the converse is also true. As I see this, what we are proposing here today is a reasonable yardstick which will protect correlative rights and certainly will not cause waste.

MR. PAYNE: As a general rule, you are saying that the Commission can do anything reasonable to prevent waste and protect correlative rights?

MR. ERREBO: Well, generally speaking.

MR. PAYNE: What if that conflicts with an expressed statutory thing?

MR. ERREBO: Well, I would have to see it.

MR. PAYNE: Let me read a portion of the statute, 65-3-14 (b), which says: "The Commission may establish a proration unit for each pool, such being the area that can be efficiently and economically drained and developed by one well." Do you feel that that statute contemplates having two different spacings in the same pool?

MR. ERREBO: Well, it contemplates one, and as to two, I don't know, it quite possibly could. I don't think under what we've prepared here today we are faced with that problem. We asked only for the establishment of one proration unit; namely, the 80 acre unit, with the permission to assign to wells classified

as gas wells up to 160 acres for proration purposes, and I believe that is the difference.

MR. PAYNE: Since it's for pro --

MR. ERREBO: That would be permissible under the statute.

MR. PAYNE: This statute is dealing with proration units, you are going to assign this for proration purposes, so therefore is there any actual distinction or a distinction without a difference, this assigning 160 acres and yet saying it's not a 160 acre proration unit?

MR. ERREBO: I think there is very definitely a difference between a 160 acre proration unit and assigning 160 acres for proration purposes. I think that distinction is what clearly brings us within the statute. I'm not prepared to say that we couldn't even establish 160 acre proration units in the same pool with other units. We are actually, I think, avoiding that question by the proposal we are offering here this morning.

MR. PAYNE: Mr. Examiner, in view of the testimony brought out here today, I would like to move that the record in Case No. 1616 be incorporated into the record of this case.

MR. NUTTER: What is Case 1616?

MR. PAYNE: That was the case that dealt with the reclassification of this pool from a gas pool to oil pool.

MR. NUTTER: Is there objection to the consolidation of the record of Case 1616 in the record of this case here today,

1641? If not, the records will be consolidated.

MR. BUELL: Is it already consolidated?

MR. NUTTER: No, sir.

MR. BUELL: I just wondered, I haven't any objections, I'm worried, I'm not familiar with that case and I wonder about the pertinency of the consolidation.

MR. NUTTER: I believe, if you recall, that is the case that Pan American testified in as to advisability of the reclassification of the pool from an oil pool to a gas pool.

MR. PAYNE: That's correct. There has been a lot of testimony this is a gas pool.

MR. BUELL: I misunderstood the case. I was going to make that motion myself.

MR. NUTTER: Is there objection to the consolidation of the records in the two cases?

MR. PORTER: Mr. Nutter, I had another question.

MR. NUTTER: Yes, sir, we are not through with Mr. Dugan yet.

MR. SPERLING: Could I inquire from Mr. Payne as to his statement for the reason?

MR. PAYNE: The previous case, in the previous case, Mr. Sperling, the Commission witness, Mr. Arnold, testified in effect that he felt that this was an oil pool. Now the testimony here today has been generally that it's a gas pool, a large gas pool with a small oil rim. Therefore, to have the record complete

before the Commission, I think we ought to have the previous record incorporated into this one.

MR. ERREBO: Certainly the Applicant at this time is not requesting any reclassification, and to that extent we are not challenging the findings of the Commission in the case whose record you propose to incorporate.

MR. PAYNE: I understand, Mr. Errebo.

MR. NUTTER: If there is no objection, the record in Case 1616 will be incorporated in the case of 1641. Does anyone have any further questions of Mr. Dugan?

MR. PORTER: I have one that I want to clarify.

BY MR. PORTER:

Q I believe you recommended 6,000 to 1 gas-oil ratio, and you recommended the normal unit allowable plus the depth factor. Now you have also recommended eighty acre units, did you mean to include in there the eighty acre depth factor?

A Yes, that would be 2.77.

Q Yes.

A Yes.

MR. PORTER: That's all.

BY MR. NUTTER:

Q What is the top unit allowable in the San Juan Basin at the present time, the normal unit allowable?

A I think this month it is 54, average is about 51.

Q What is the depth factor for this top allowable?

A 1.77.

Q What is the top allowable for this pool for the month of May?

A It would be about 94, I believe, barrels a day.

Q The wells presently are receiving an allowable of 2,000 times this 94?

A Yes.

Q Or 188 MCF per day?

A Yes.

Q In effect, what have you requested here, that this gas allowable be tripled?

A By increasing the gas-oil ratio it would be tripled to 6,000.

Q Now this 94 barrels is the amount of allowable that is assigned to forty acres, correct?

A Yes.

Q You have requested the oil pools be assigned allowable on the basis of eighty acres?

A Eighty.

Q So we would take 94 barrels and add another 54, is that correct?

A That's correct.

Q Giving a total allowable of 148 to the oil wells. For proration purposes you would assign 160 to gas wells?

A Yes.

Q And increase the gas-oil ratio to 6,000?

A Yes.

Q So the oil wells would receive 6,000 times 148, is that correct?

A You lost me.

Q The oil wells --

A Would receive an allowable of 148 barrels a day.

Q Yes, sir, and the amount of gas that they would receive would be 6,000 times 148?

A Yes.

Q On 80 acres?

A Yes.

Q Now the gas well that's located on 160 acres would receive twice that?

A Yes.

Q What amount of gas would be available then to a well classified as a gas well and located on 160 acres?

A About 1.8 million.

Q How does this compare with the allowables that are assigned to gas wells in the San Juan Basin at the present time?

A Well, the allowable, since these wells haven't been prorated I don't know what the allowable would be, but the contractual obligation, minimum contractual obligation that El Paso has been taking from them would be about half of their deliverability. In other words, prior to the time that these wells were

reclassified they were, well, the No. 1 for instance was producing about a million a day.

Q These wells are roughly comparable to the Mesa Verde wells in depth, are they not?

A A little deeper.

Q How much deeper?

A The No. 1, which was the discovery well, was 6250, I believe.

Q What's the average depth of Mesa Verde wells in the Basin?

A Fifty-two, fifty-three hundred.

Q What's the average a Mesa Verde well in the Blanco-Mesa Verde Pool is receiving?

A Well, I believe this month it is relatively low, about thirty percent of its deliverability.

Q Would this allowable that would be assigned to these Gallup gas wells then be --

A Well--

Q How would it compare with the Mesa Verde wells?

A Well, on the No. 4, it would be just about the same on the others, since it has an ideal of approximately six million, thirty percent would be about -- on the others it would be considerably less -- of 30.1 million.

MR. NUTTER: I think we're going to recess the hearing at this time. The hearing will be recess until 1:30.

AFTERNOON SESSION
May 7, 1959

MR. NUTTER: The hearing will come to order, please. Does anyone have any questions of Mr. Dugan?

MR. HOWELL: Yes.

BY MR. HOWELL:

Q Mr. Dugan, you testified with reference to the McAdams No. 2 Well, the El Paso Natural Gas Huerfano 106, which formed a basis of your Exhibit No. 6, I believe the permeability of these wells is excellent, is it not, in comparison with other wells in the San Juan Basin?

A Yes.

Q Most of the wells that are completed in this Angel Peak-Gallup Pool are completed in formations that have very good permeability, are they not?

A It's pretty hard to say whether the most of the wells are or not, because we are limited in the core information we have got. However, from the log information, a portion of them are completed in relatively good permeability areas. However, the two Pan American wells are probably poor permeability areas.

Q They are wells that you would put up to the edge or just over the edge of the commercial production in the oil zone?

A Well, Mr. Harris spotted that McAdams B-1 right on the edge of what he considered the commercial limits of the field.

Q The wells which are completed down in the gas area

are generally completed in an area of good permeability, are they not?

A Yes, with the exception of the El Paso Huerfano 92.

Q And that is borne out by the performance of the wells in delivering gas into the pipe line?

A Yes.

Q They have good deliverability?

A Yes.

Q Now your testimony was, I believe that you recommended 80 acres for spacing for oil wells. It is your opinion, is it not, that one well will adequately drain the oil and the gas that would be associated with the oil in an area of 80 acres, is it not?

A I'm sure it will in these good permeability belts.

Q And in the gas zone one well would drain 160 acres or more, would it not?

A In these good permeability areas, I'm sure it will.

Q Would you think it would drain efficiently as much as 320 acres?

A It's possible, but as I stated this morning, I haven't made any calculations or taken any tests to try to establish 320 acre spacing; therefore I would hesitate to recommend it.

Q You wouldn't recommend against it, though, would you?

A Not if there was sufficient evidence for it.

Q Now, your Exhibits 7 and 8 refer to the payout period, and I believe the line that you have drawn there is based upon one well to forty acres in each instance, is it not?

A It was based upon the present allowable, which is forty acres, yes, sir.

Q That's right. That is allowing a well to have forty acres attributable to it?

A Yes.

Q If eighty acres is allowed, why then of course the payout would be quite a bit shorter, would it not?

A Yes.

Q And the economics would be better for the operator in that event?

A Yes.

Q Now actually the period of payout for most gas wells drilled in the San Juan Basin is relatively long, is it not?

A I presume if you took a weighted average of the entire Basin, you might make that statement, although I have not made a study to that effect.

Q You know that the middle wells were completed in the San Juan Basin with deliverabilities which were ridiculously low in comparison with other gas producers?

A Maybe not ridiculously low.

Q They are low with what you find around the Gulf Coast?

A I've never worked the Gulf Coast, but with my under-

standing, that is correct.

Q That's right. You recommended a waiver, I believe it was Rule 502 which requires --

A The daily tolerance.

Q -- the daily production of a well to be more or less on a level, is that not the purpose of the rule?

A Yes, it was. Yes, I'm sure it was.

Q As a matter of fact, practically, with gas wells it's almost impossible to produce exactly the same amount of gas each day because the well has to put gas into the line and then there's the demand for it, isn't that correct?

A That's correct.

Q Isn't that the practical way to produce a gas well?

A Yes, and the line pressure varies considerably, which varies your production rate.

Q Your recommendation would be that the pool rule permit the well to be produced when the market is there available for it, and then shut in until the market is again available?

A That is correct, although it would probably be preferable on the part of the operator if he could produce his monthly allowable in that given month, although that isn't always the case.

Q It isn't always the case in gas wells, and to attempt to take it to a daily, to attempt to produce the allowable for each day is practically impossible where you have gas wells,

isn't it?

A Yes.

MR. HOWELL: That's all.

MR. NUTTER: Any further questions?

MR. PAYNE: Yes.

MR. NUTTER: Mr. Payne.

BY MR. PAYNE:

Q You are not recommending that the monthly tolerance be waived for this pool, are you?

A I didn't recommend that, no.

MR. NUTTER: Mr. Buell.

BY MR. BUELL:

Q Mr. Dugan, let me ask you one preliminary question so that it will help me in my other questioning. Have you had a reservoir study of this pool, or have you simply made a statistical analysis of this pool?

A My main study has been statistical; however, I have done a little bit of reservoir work.

Q What have you done in the way of a reservoir study in this pool?

A Well, I have attempted to make a volumetric calculation of the gas reservoirs in the gas cap area, for one thing.

Q You say "attempted?"

A Yes, with the information I had at hand, I presume.

Q Would that indicate that you were not successful?

A No, I think I'm very successful, with the information that is available.

Q What else have you done?

A That's practically all.

Q How many gas wells does your client have in this pool?

A Three.

Q Three gas wells?

A Yes.

Q Are any of them dually completed gas wells?

A Well, of the two, of the three gas wells, two of those are duals and then there's one oil well which is a dual also.

Q I'm referring now to simply just gas wells.

A Yes.

Q Your client has three gas wells, two of which are dually completed?

A Yes.

Q As I recall your cost breakdown, a dually completed well in this pool, you said $65,000.00?

A That was one-half of the minimum cost of a dual, was my estimate.

Q But that figure is on one of your exhibits?

A Yes. For lack of a better reason, I took one-half of the cost, of the total cost of a dual assigned to one zone.

Q Yes, sir. I believe your exhibit also reflected that

a singly completed well in the Gallup cost $78,000.00?

A That was my estimate, that would be a minimum cost.

Q We have got a sixty-five, a sixty-five, and seventy-eight. What does that total?

A Well, now, as you realize --

Q Just what does that total?

A Well, sixty-five, sixty-five, seventy-eight -- two oh eight.

Q Two oh eight. I also recall one of your exhibits, I think it was Exhibit 8, showed to whatever period of time you ended that calculation, that you had cumulative revenue of $200,000.00, is that correct?

A Well, that was from all zones, Dakota and Gallup.

Q That's from both --

A The Dakota and Gallup. Total lease revenue versus total lease cost.

Q Would you give me the revenue on the Gallup, I believe it's going to be pretty close to the total. Do you have that available?

A No, I don't.

Q I believe you see the point I am driving at. Your client's gas wells are practically paid out, aren't they?

A No, that's not correct. You have to consider the entire lease costs, not the theoretical costs, as you well know.

Q Then why did you submit them?

A Because as you well know, initial wells drilled in an area, the costs run higher. This No. 1 was a discovery well, this is a minimum cost that a well could be drilled for at the present time. Not two years ago, or one year ago, or not in an unknown area.

Q All right, sir. Assuming that your client's three gas wells, we'll assume that they were drilled for the cost as you reflect on your exhibit.

A For the $616,000.00 initial lease cost?

Q No, sir, we are assuming --

A Development?

Q We are assuming that those wells cost exactly what you have shown on your Exhibit,sixty-five.

A What I have shown on my exhibit is $616,000.00 as the total cost of the lease development.

Q Would you assume for the purpose of this question, Mr. Dugan, that those wells were drilled and completed; that the cost reflected on your exhibit of sixty-five thousand for a dual Gallup and seventy-eight thousand for the one single Gallup; with that assumption, aren't these gas wells almost paid out, based on that assumption?

A Well, the wells weren't drilled for that originally and they would -- well, would be approaching maybe sixty percent of being paid out, if you assigned half of the cost of the well to the Gallup only. However, we're pretty fortunate, if you

wanted to prorate the original cost of this $130,000.00 that I estimated as the minimum cost of a well to its initial by prorating it by the initial deliverability or the initial I. P. of the two zones, why, the burden of payout would be upon the Gallup, correct. In other words, our Gallup zone is as much more prolific than the Dakota zones, there are several ways of looking at it, but taking an unknown location, it's pretty hard to say, well, we want to prorate sixty percent or seventy-five percent to the Gallup zone or vice-versa.

Q But the figures I have been using are your figures that were on your exhibit. I don't know how you arrived at them and I am not challenging them, I want to use them. They are on your exhibit, aren't they?

A They're the minimum cost of a potential well to be drilled tomorrow without any trouble.

Q Mr. Dugan, in making your reservoir analysis of this pool, did you see any indication of the occurrence of oil migrating into the gas cap area?

A There's no physical indication of that, and it would be assuming, you would have to assume a pressure gradient across the lease boundary to have a movement of the oil. There is no physical indication of the gas-oil contact moving that I know of.

Q Would you say that due to the way the field has been produced, conditions.are,would you say, excellent for such to occur? What I mean, maybe I had better explain that.

A It would depend on your permeability, and since the discovery well happened to be in the gas cap, why you are lowering the pressure in that immediate area; if the permeability towards the oil area was such that there would be theoretically a possibility of migration.

Q Substantially all the voidage has been out of the gas cap area?

A To date.

Q Yes.

A Yes.

Q You haven't had a log of your McAdams B No. 3 or is it on your cross section?

A Yes, this is it right here.

Q What were the original perforations in that well? What was the location, the footage of the original perforations?

A I think I have that some place, although right, not at my fingertips.

Q I'll wait.

A According to this information here, it was 2670 to 80.

Q 2670 to 80?

A To 80.

Q Is the log of that well on that cross section, is the McAdams B-3 on the cross section?

A Yes, that's it right there.

Q Would you approximate or locate the perforations on that log on the exhibit, so we will have it in the record?

MR. NUTTER: Would you label those the original perforations, Mr. Dugan?

A (Witness complies.)

Q (By Mr. Buell) What did that well potential for in that interval?

A Nine million.

Q Nine million what?

A Cubic feet of gas.

Q What was its gas-liquid ratio on that test?

A That was completed as a gas well.

Q Yes, sir.

A And there wasn't a gas-oil ratio taken to my knowledge. However, the well was subsequently produced with these perforations open.

Q You don't know what the gas-liquid ratio was on that initial potential?

A No, there wasn't any taken.

Q Did it produce nine million a day, or is that some kind of a theoretical calculation?

A That's a three hour --

MR. HARRIS: Peto tube calculation.

Q Where is that well located now?

A It looks like about 6257 to 67.

Q Would you mark that on your Exhibit 3?

A Yes.

MR. NUTTER: Mr. Dugan, your Exhibit No. 4 indicates the perforation at 6250 to 72.

A 50 to 72?

MR. NUTTER: Yes, sir.

A Well, that would be a little up. I was taking this log run when the second set of perforations were made. Just reading them off the log. If you are comparing these actual depths or the depths off this log would be 57 to 67.

MR. BUELL: For my purpose we don't need to resolve the small amount of difference in the two.

MR. NUTTER: I see.

Q (By Mr. Buell) That well is now completed higher in the section than the original completion?

A Yes.

Q What was the potential of the well at its present completion interval?

A The gas-oil ratio test filed shortly after recovering the load oil was 103.42 barrels of oil; 540 MCF of gas, with gas-oil ratio of 5221.

Q That well in the original interval was a nine million a day gas well?

A Yes.

Q You came up the hole higher in the section and

completed it as a fairly low ratio oil well, is that right?

A Yes.

Q Would that not indicate to you, Mr. Dugan, that oil has migrated into the gas cap area?

A Not necessarily. This other zone that we perforated is the zone of high permeability, and the original perforations were, as I understand it, were low because of a mechanical error. The ability of gas to be produced from a low permeability area is greater than the oil to be produced from the same area, and we have come up to more prolific area.

Q Are you telling me, Mr. Dugan, that in this common reservoir in this interval of this well bore that we have got a nine million a day gas reservoir below a low ratio oil well? Are you telling me that?

A The initial I.P. was nine million is what was reported. I don't know the amount of oil;they might have had a good gas-oil ratio at the time.

Q But you don't know that?

A No, I wasn't on the lease.

MR. BUELL: That's all.

MR. NUTTER: Any other questions of Mr. Dugan?

MR. PORTER: I have one question.

By MR. PORTER:

Q Mr. Dugan, would you consider three years a good payout, reasonable?

A It depends a lot on the initial investment, and the prospect in mind when the investment was made and the reserves behind that.

Q Let's say in this particular instance, would you consider three years reasonable payout?

A Yes, I think so.

MR. PORTER: That's all I have.

BY MR. NUTTER:

Q Mr. Dugan, Mr. Weaver has four Gallup wells.here,, correct?

A Yes.

Q Does he also have four Dakota wells in this same section?

A Three.

Q He only has three Dakota wells?

A Yes.

Q You said you hadn't taken any test to establish that 320 acre spacing would be proper for this gas area?

A No.

Q Have you taken any tests to establish that 160 acres would be proper?

A As I mentioned before, we proposed an interference test; however, by taking it at any sensible rate of withdrawals from the wells, we would have exceeded our allowable, so it hasn't been done.

Q Have you taken any test to establish that eighty acre spacing is proper in the oil area?

A The only, as I stated this morning, that recommendation was made because of, on an economical point of view, the reserves in the oil rim is not -- to my knowledge are unknown, and there is no core analysis that I have available to try to determine the total reserves which would in turn determine whether you could justify the expense of drilling on forties.

Q So you really haven't determined whether a well could drain eighty acres or not?

A No, I haven't.

Q Do you have any idea of the value of the gas that's in place per acre foot in this gas area?

A Per acre foot?

Q Yes.

A Well, per acre, I figured it about 10,000 MCF per acre.

Q Well, now, is the thickness of the sand uniform enough that you could compare the various areas that way, or would it have to be on an acre foot basis, compare tracts?

A Well, yes, it would have to be.

Q How about the oil reserves, do you have any idea of the value of those?

A No, I don't. As I said, I haven't got any core analysis in the oil rim; therefore I didn't feel it was justified

projecting the core analysis that was available in the gas cap area to the oil rim.

Q This proposal of yours, Mr. Dugan, to dedicate twice as much acreage to a gas area well as is dedicated to an oil area well, and to raise the GOR limit for the pool, this isn't any attempt to establish ratable take among the gas wells and the oil wells, is it, or a volumetric withdrawal of the reserves?

A Assuming the wells producing in the oil rim were producing at the average gas-oil ratio, which is allowed, the ratable take would be very close to being equal.

Q What do you base that on?

A Voidage figures.

Q Do you have those voidage figures? I think those would be pertinent to this hearing if you could introduce those.

A I calculated that an oil well producing in the oil rim that was making 150 barrels of oil per day with a gas-oil ratio of 6,000 to 1 would be voiding approximately half of the area that a gas well would be that was producing 1.8 million per day and 24 barrels of oil, which was double, of course, there's twice the surface acreage assigned to the wells in the gas cap area, plus the fact that the pay thicknesses are greater, which would actually make your acreage draw down or your acreage voidage factor in favor, or the oil well voiding more of its total percentage of oil than a gas well would be.

Q If you could give us those actual figures, Mr. Dugan,

I would appreciate it.

A Well, I calculated, let's go back to the information that is available on these wells in the oil rim.

Q Yes.

A To my knowledge there's been no sample, reservoir sample taken to try to determine the solution gas or the shrinkage factor, so those factors have to be assumed or calculated, which I tried to calculate, so the accuracy of this type of calculation with the information at hand might be, leave something to be desired. However, I got on this potential, this oil well in the oil rim, voidage factor of 21 and a half thousand cubic feet versus 44 thousand cubic feet for the gas well producing 18 thousand or 1.8 million per day, plus 24 barrels of oil.

Q Now let me see if I have this correct. The oil well would void 21,000 cubic feet?

A Twenty-one and a half.

Q Twenty-one and a half?

A Yes.

Q The gas well would void 44,000 cubic feet?

A Yes.

Q That's considering 160 acres would be dedicated to the gas well?

A Assuming that twice the acreage was dedicated to the gas well; therefore, the gas well would have twice the surface acreage to void, plus the fact that it is relatively obvious that

the sand thickness is greater in the gas cap area, so the percent of total reserves that was being voided at any one time would be, it would appear to me, although I haven't made the calculations, because of the difference in the sand thickness you would be voiding a greater percentage of your reserves in the oil area.

Q Now, Mr. Dugan, in an ordinary oil pool where you don't have one of these gas cap situations, if one well is producing with a gas-oil ratio of 1,000 and the other well is producing with a gas-oil ratio of 2,000, does the one with the higher gas-oil ratio actually void a higher space in the reservoir?

A Yes.

Q Is any attempt made to equalize the takes and protect the correlative rights of one operator with the low gas-oil ratio against the operator with the high gas-oil ratio?

A There's no attempt made that I know of below 2,000 to 1. Actually, I assume that's what the gas-oil ratio limit was probably originally designed for, besides conserving the energy; the fact that the oil wells in the oil rim all have relatively high gas-oil ratios that seem to be increasing is the only fact, the only basis I have for trying to establish a gas-oil ratio, a limiting gas-oil ratio.

Q Is the Dakota in this area considered a commercial venture as a single completion?

A Probably not as a single completion.

Q What is the actual cost of dually completing a well

that has penetrated the Gallup formation?

A Do you mean --

Q Without apportioning the drilling costs to the Gallup, but just the actual cost of physically making a dual completion there.

A Just assuming that up to the point --

Q Assuming that you have got a well through the Gallup formation completed in the Dakota, and then you decide that you want to complete it?

A Up to that point, you had made no -- or we'll assume that you hadn't spent any money, that you got that hole in the ground for nothing.

Q The Dakota paid for?

A Cased, yes, I would estimate eighteen to twenty-two thousand, possibly more.

Q These four Weaver McAdams wells that we're considering here today have produced varying amounts of gas, have they not?

A Yes. Do you mean monthly?

Q No, I mean the total production from the four wells varies considerably, does it not? Is this the total number of gas that No. 4 has produced, 726,000 MCF?

A Yes.

Q What has been the cumulative production from the No. 3 well?

A On gas? Isn't it on there?

Q Well, it's 8620, but this well was originally completed as a nine million cubic foot gas well?

A Yes.

Q It only produced 8,000 MCF after that?

A Yes. 8620. That nine million gauge was never substantiated with the production. See, the well was completed in August, and November it only produced only four million, that was the first production from the well, November.

Q Oh, I see. Although it was completed May 23rd, it didn't deliver any gas until November?

A That's correct, November.

Q Now I note on your I.P. data for that well you give an I.P. of 5800 MCF, Mr. Dugan, yet you stated it was originally nine million?

A I made a mistake. I was thinking of the 2, this is correct, the 5800.

Q This is the initial completion data then, the 5800?

A Yes.

Q Then when it was recompleted, it was completed for 305 barrels and 340 MCF?

A That was the initial gas-oil ratio.

Q Was that a twenty-four hour test there?

A Yes, it was. I made an error, I glanced at the McAdams No. 2 instead of the 3 when I stated that initial I.P.

MR. NUTTER: Does anyone have any questions of Mr. Dugan? Mr. Porter.

MR. PORTER: I hate to keep beating a witness to death, but I would like to, just for my own information on this computation of the space voided, see if I understood it right.

BY MR. PORTER:

Q Did you have a figure there of 21.5 for an oil well on an eighty as compared with 44 for a gas well on 160?

A Yes, that's correct.

MR. PORTER: That's all I have.

MR. HOWELL: I would like to ask another question.

BY MR. HOWELL:

Q Mr. Dugan, as I understand your calculations as to the cubic footage that is voided, if there were two oil wells, each drilled on an eighty acres, the space which those two would void would be 43,000 feet or twice 21.5 thousand, would it not?

A Assuming that both wells were producing the same amount of oil with the same gas-oil ratio. Well, I am assuming, I figured 150 barrels per day and 6,000 gas-oil ratio.

Q Well, that would be true if a limiting gas-oil ratio be placed upon the weight?

A Of 6,000 to 1.

Q And that gas-oil ratio be below the actual gas-oil ratio of the well, so that it acts as a limiting factor?

A Well, it would have to be exactly 6,000 to 1,

assuming that the State-wide allowable is maintained, which would be roughly 150 barrels a day for the well.

Q That's right, but now then, if instead of having two gas wells on 320 acres, and assuming that one well has the capacity to drain 320 acres efficiently, one gas well on 320 would in the same manner void twice 44,000 or 88,000 cubic feet, would it not?

A Yes, if the well was producing 3.6 million, yes.

Q Under the same limiting ratio?

A Yes. If the well had the capacity to produce 3.6 million, why theoretically that's what you would be voiding.

Q That's right, and that one well then on 320, if it's a gas well, and is limited by that ratio, would produce at approximately the same rate as two wells would on 160?

A That's correct, yes, if it has the capacity to produce.

Q And that would be comparable to four oil wells each on eighty, insofar as the volumetric withdrawals are concerned?

A That's correct.

MR. NUTTER: Mr. Errebo.

REDIRECT EXAMINATION

BY MR. ERREBO:

Q In your voidage calculations, you stated that you calculated 44,000 for the gas well producing under the rules which you propose, 21,500 for an oil well on eighty or 43,000 for two oil wells on 160?

A Yes.

Q So that for all intents and purposes, then, the voidage per surface acre between the gas area and the oil area would be the same, would it not?

A Yes.

Q Except that it is true that there is a much thicker section in the gas area, isn't that correct?

A It was brought out this morning on his isopaque map and also on the cross section.

Q So then the voidage in the gas cap area would be less per acre foot than it would be in the oil area, isn't that correct?

A The percentage of the total reserves would be less depending on the thickness of the pay.

Q Then would this result in a tendency for the gas cap to expand under these original conditions?

A With all these theoretical limitations, it sure would.

Q After all, Mr. Dugan, you have made certain assumptions, haven't you?

A Yes.

Q And you have stated that here. You know of very many engineering calculations that are made without making some assumptions up and down the line?

A I'm sure that they can be made if you have the correct data.

Q That is not unusual in engineering calculations, is it?

A I don't think so.

Q All we are doing here is making a comparative analysis, isn't it?

A That's what I was trying to do, yes.

Q So then if the gas cap is expanding, can you see how anybody's correlative rights can be hurt insofar as the oil area is --

A Assume the gas cap is expanding, the people in the gas cap --

Q In the oil area, they are going to get help?

A It would appear that under these circumstances.

Q And under the rules that you have proposed?

A Yes.

Q Okay, thank you. Now with regard to the Dakota development, actually insofar as having dual completions is concerned under the present spacing there can only be one dual completion, can there not, under the 320 acres?

A That's correct.

Q Actually Mr. Weaver's lease has more than that, but those wells were drilled prior to the Dakota spacing?

A Yes.

Q So he didn't have the advantage of the wider spacing. Now in cross examination by Mr. Buell, he compared the minimum

well costs which were shown on your Exhibit No. 7 to the actual recovery dollar-wise from the Weaver lease.

A Yes.

Q Can you see that that comparison has any relevance, does it signify anything to you, or is that like trying to compare apples with doughnuts?

A No, I can't see that it has any point other than the fact --

Q They're just two separate figures?

A Yes.

Q And they are actually picked out of context from separate circumstances that you are trying to depict on two separate exhibits?

A Well, my figure on Exhibit 6, I believe, is purely theoretical.

Q Actually it has no foundation in basis, does it, no foundation in fact, I mean to say, that type of comparison?

A Well, the comparison, although the figures, if you went in to drill a well today and had no trouble, you could probably complete one for that amount of money.

Q But actually, Mr. Dugan, it cost Mr. Weaver more than that, didn't it?

A Yes, of course, he drilled the discovery well.

Q When an operator goes out and drills the discovery wells and takes the risk, sometimes it costs more money?

A Yes, my experience in drilling a well in a new area is generally two or three times as expensive.

Q Now with regard to perforations, or the perforations of the McAdams' No. 3, that was reperforated immediately after you found the perforations were too low initially?

A Well, it was apparently done right immediately after the well was put on production. I don't know the dates.

Q So far as you know, they attempted to correct that as soon as possible?

A I am sure they did.

Q That was because the perforations were too low?

A Yes, due to a mechanical error.

RECROSS EXAMINATION

BY MR. PAYNE:

Q Assuming a 6,000 to 1 gas-oil ratio limitation, and assuming an oil well on eighty, if the gas well produced approximately 900,000 cubic feet per day, it would void approximately the same space as the oil well, is that correct?

A The actual voidage is practically the same, that's correct.

MR. PAYNE: Thank you, that's all.

A No, that might be mistaken. The voidage of the gas well, well, you said 900,000, didn't you?

MR. PAYNE: Yes.

A Half that, that would be about right.

BY MR. NUTTER:

Q What is the payout that you expect under the 160 acre spacing for this gas area with a ratio of 6,000 to 1?

A This curve showing the actual cost would be very close to being correct.

Q You mean one of these lines depicts the 160 acres?

A No, the actual costs, the lease costs.

Q Yes. Well, now, this line that goes up here and intercepts the lease cost at three years and five months, that was under existing conditions prior to reclassification, wasn't it?

A Yes.

Q Then the line that intercepts the lease costs in 1966, nine years and seven months, that's a payout under the present condition with a 2,000 to 1?

A 2,000 to 1.

Q Where is the interception of the 6,000 to 1 and 160 acre line?

A Well, these wells were producing, with the restrictions placed on them by the transporter of the gas, were producing in the neighborhood of what we're asking for, I believe.

Q I see. In other words, with this reshuffling of acreage and gas-oil ratios you would get approximately the same payout that you had before the reclassification?

A Let me make it plain that I haven't figured that, tried to attempt to figure the payout with what we have proposed,

although that would be my estimate, yes.

Q In working out these payouts and so forth, have you given consideration to the liquids that are produced?

A Yes. Also this is considering,this actual curve is considering the gas produced from the Dakota.

Q Now, Mr. Dugan, you stated that some of these wells have increasing gas-oil ratios, as a matter of fact, Exhibit 5 shows that?

A Yes.

Q As those gas-oil ratios go up on the oil wells, the voidage of those wells is going to be less and less, is it not?

A As the gas-oil ratio increases, the more gas is produced the more the voidage will be, assuming --

Q But I mean the voidage on account of oil will become less, won't it?

A If the oil is restricted due to a gas-oil ratio; however, the space that barrel of oil takes up as compared to the space that a thousand cubic feet of gas is less, probably a third less, probably.

Q You were considering, in making your approximation of voidage, you were considering 150 barrels of oil?

A Yes.

Q And 888,000 cubic feet of gas per day, weren't you?

A No, it would be 6,000 to 1 gas-oil ratio, which would be six times the 150.

Q Yes, that is 902,000.

A Oh.

Q Actually that allowable is 148, approximately 900,000, but as time goes by, will those oil wells tend to void less or more space in the reservoir?

A As the gas-oil ratio goes up, they will void more space. In other words, you are taking out.

Q They are still going to be restricted, though, aren't they?

A Yes, but the percentage --

Q Right now aren't they taking,under your theoretical calculation, they are eligible to take out 888,000 cubic feet of gas plus 150 barrels of oil?

A Yes.

Q As times goes on, they will come down to the 188,000, won't they, as the ratios go higher as you have stated they are going, the amount of gas will increase?

A If you are restricting the amount of gas, yes, you are right, as the oil produces, the total oil produced comes down, the voidage space will be less.

Q So at a later date in the course of the depletion of this field, it will be less necessary to have this sort of formula that you have introduced here today than it is right now, the need for it won't exist as strongly later on as it does now, is that correct?

A Well, now, I don't agree with that.

Q Aren't you attempting to get ratable withdrawals between the oil zone and the gas zone right now? If the oil zone is producing less later on, you won't need to produce as much from the gas cap, will you, to have equal withdrawals from the two areas?

A Of course, that percentage is very small, you realize, the percent or the space that one barrel takes up in the reservoir, one hundred barrels isn't going to make very little effect on the total voidage space, I don't think, it would be rather negligible.

Q Why did you use the figure 6,000 to 1? Is that the figure you came up with when you had a certain amount of --

A No, the 6,000 to 1 was based on the production history to date of the wells in the oil rim.

Q What do you mean?

A Originally. Well, the gas-oil ratio averaged slightly more than 6,000 to 1 of the three wells that I have accurate gas-oil ratios on in the oil rim.

MR. NUTTER: Any further questions? Mr. Utz.

BY MR. UTZ:

Q Mr. Dugan, did I understand you to say that you are not taking or didn't know of any bottom oil samples being taken?

A I know of no bottom hole samples that have been taken.

Q The Huerfano 107, I believe you said, had a ratio of 2573?

A Yes, that's correct.

Q Would you say that any of that gas produced from that well would be part of gas cap gas, or would that all be gas in solution?

A I would assume that since this well is located in the oil rim that it would be probably solution gas.

Q And the Huerfano 105 I believe has a ratio of 11,210?

A Yes.

Q Would you say that part of that could possibly be gas cap gas?

A That would be pretty hard to determine.

Q Pretty close to the gas-oil contact?

A Although I'll admit it's getting close to the contact.

Q Can you tell me how much daily volume that you would need to produce from each of your wells in order to receive a three year payout?

A In gas?

Q Yes, sir.

A I could with a little work, I believe.

MR. HOWELL: Well, may I make a comment off the record?

MR. NUTTER: Yes.

(Discussion off the record.)

A We would need a revenue of roughly in the neighborhood of $600.00 per day which if you figure --

Q (By Mr. Utz) Revenue of thirteen cents, you are assuming?

A Well, after overhead and royalties, it would be in the neighborhood of 9.7.

Q $600.00 gross?

A That would be, we would have to recover $600.00 net.

Q Net?

A To pay out --

Q Three years?

A -- in three years, yes. So that's 6.2 million or so a day of gas.

MR. PORTER: I believe there's something wrong with your figure, but that would be over $600,000.00.

A Well, counting your interest at the end of three years, that would be about $680,000.00.

Q (By Mr. Utz) I'm not figuring on a lease basis, I am figuring on a per well basis.

A The only accurate costs I have are the total lease costs.

Q You gave a figure here of $78,000.00 for a well?

A Yes.

MR. HARRIS: That's an assumed cost.

Q (By Mr. Utz) You wouldn't expect us to give you an

allowable for a dry hole?

A In fact, we don't have a dry hole, they are all good wells.

Q But the one hasn't produced as much as the other three, though.

MR. PORTER: You are figuring on the basis of four wells?

A Yes, that's correct.

Q (By Mr. Utz) It would be for the four wells?

A Actually it's three duals and one single with the total lease cost.

Q The Dakota also?

A Yes, I include Dakota in there.

Q So the six million a day would be for Dakota and Gallup production?

A Yes.

BY MR. NUTTER:

Q This 616,000 is the cost of developing the lease in the Dakota and the Gallup?

A Yes, it is.

Q You have included the Dakota revenues in these lines?

A Yes, I have.

MR. NUTTER: Any further questions of Mr. Dugan? Mr. Fisher.

BY MR. FISHER:

Q Mr. Dugan, when you said what you did, when you figure payout, you took a half of the price of the well, is that right, and you charged off to the Gallup zone half the price?

A That was just on a theoretical basis. When you start to drill a well or a proposed well, you don't have too good of an idea on what kind of a well, the size of a well you are going to get in Gallup, or the size in the Dakota. If you are fortunate enough to get a darned good Dakota well, after the well is completed you may be able to prorate it on the size of the initial I.P. or some other method.

Q But I'm getting something else.

A I was thinking what, if I were going to drill a well now in that area how I would try to justify it.

Q Going on your net of half to the Dakota and half to the Gallup, or any percentage that we want to choose, then, you let each zone,by your method, do you let each zone pay itself out?

A No, you wouldn't, after the well is completed, you take the total revenue from both zones and try to make your payout on that basis, but before you started to drill a well, or on a theoretical basis, why you would have to approach it from that standpoint,or that's the way I would approach it, and there might be some other --

Q That's answered my question, thank you. This McAdams No. 3 of yours, is there other types of lines in that area besides

a five hundred pound line?

A I believe I'm correct in saying that the gathering system is a 250 pound system and they have installed back pressure regulators on all the wells and holding 500 pounds against them, against it.

Q Is there any line in there that the McAdams No. 3 could feed into, you say it's flowing out to the atmosphere because it can't buck the 500 pounds?

A I don't know unless I tried it, but it might flow against the 250 pounds.

Q What if the Commission put in the no flare order that you asked for, what would you do then?

A Well, we would have to change the method of producing it, probably.

Q To what?

A The well might possibly produce with a bottom hole choke and a free piston into that system, but it is only, it would have to be tried.

Q There's a possibility, however, that you might have--

A Install a gas lift.

Q Yes.

A Or other types.

Q You would go to the expense and work to try to buck that or increase the capacity of that well, the ability of that well to buck into that 500 pound line, is that right?

A I'm sure that they would.

MR. FISHER: Thank you, that's all.

BY MR. NUTTER:

Q Mr. Dugan, here on your Exhibit No. 7, I was just wondering, you talked in here about estimated oil production per day at the above rate, 2.42 barrels. What kind of well are you talking about there?

A That was made for a typical well in the gas cap area. That 2.4 was figured on a 75,000 to 1 gas-oil ratio.

Q 75,000 to 1?

A Yes.

MR. NUTTER: Any further questions of Mr. Dugan? If not, he may be excused.

(Witness excused.)

MR. NUTTER: Do you have anything further, Mr. Sperling?

MR. SPERLING: No, sir.

MR. NUTTER: Does anyone have anything further they wish to offer in this case? Mr. Buell.

MR. BUELL: If it please the Examiner, Pan American has one witness.

MR. HOWELL: El Paso has two witnesses.

MR. NUTTER: The hearing will come to order. Mr. Newman, did you want to make an appearance?

MR. NEWMAN: Oh, yes. I thought we had made an appearance. Kirk Newman of Roswell, New Mexico, and Guy Buell of the Texas Bar representing Pan American Petroleum Industries.

MR. BUELL: We have one witness, Mr. Examiner, Mr. Marshall.

(Witness sworn)

CHARLES R. MARSHALL,

called as a witness, having been first duly sworn, on oath, testified as follows:

DIRECT EXAMINATION

BY MR. BUELL:

Q Mr. Marshall, state your full name, by whom you are employed, in what capacity, and what location, please.

A My name is Charles R. Marshall. I am employed with Pan American Petroleum Corporation as a petroleum engineer in Farmington.

Q Now, you've testified at prior Commission hearings, have you not?

A Yes, sir.

Q And your qualifications as a petroleum engineer are a matter of public record?

A Yes, sir, they are.

Q Right at the outset, Mr. Marshall, would you briefly summarize the recommendations you will make today with respect to this pool?

A As a result of my study of this reservoir, the Angels Peak-Gallup reservoir, it's my recommendation that the oil wells in this field be spaced -- assigned an 80-acre allowable, spaced on 80 acres, and wells classified as gas wells be allowed to have acreage up to and including 320 acres dedicated to them. It is my further recommendation that the allowable set for oil wells be in accordance with the existing statewide Rule 505, and that the gas allowable -- allowable for wells classified as gas wells be set equal to four times the unit gas, the 80-acre gas limit. Also, it is my recommendation that we define a gas well as being any well producing with a gas-oil ratio in excess of 25,000 cubic feet per barrel, and an oil well producing less than 25,000 cubic feet per barrel.

Q What would be your recommendation with respect to a limiting gas-oil ratio?

A It is my recommendation that this reservoir would best perform under the ratio that exists at the present time, or 2,000 to 1. Consequently, it is my recommendation that the limiting ratio be set at 2,000 cubic feet per barrel.

(Whereupon, Pan American's Exhibits were marked for identification)

Q Mr. Marshall, I direct your attention now to what

has been marked as Pan American's Exhibit No. 1. What is that Exhibit?

A Exhibit 1 is a structure map contoured on top of the main Gallup pay sand, on a contour interval of 25 feet of the Angels Peak-Gallup field area.

Q Is that Exhibit similar to Pan American's Exhibit No. 1 in Case 1661?

A Yes, sir, this is the same Exhibit except that I have added gas-oil ratio information.

Q All right, so this record would be complete in itself, would you briefly, very briefly, review what is reflected by this Exhibit 1?

A Exhibit 1, as I said, is a structure map of the area contoured on the main Gallup sand based on log information available. I have indicated in green what I estimate to be the productive -- commercial productive limits in this reservoir, both on the northern side and the southern side also. As the reservoir has not been defined to either the southeast or the northwest, in order to have an area to consider, I had arbitrarily cut off the reservoir by these broken lines on the northwest edge and the southeast edge. Also, this orange band, as indicated on the Exhibit, reflects the area in which we have gas in immediate contact with oil. And I have indicated a solid orange line through the middle of this Exhibit, which would indicate the gas-oil contact at an elevation of 420 feet.

Q I direct your attention to what has been marked as Pan American's Exhibit No. 2. What is that Exhibit?

A Exhibit 2 is a cross section, I have shown a trace of it on Exhibit 1, AA prime, and it is taken through, starting with El Paso's Huerfano Unit No. 104 on the south, going through their 1, Huerfano No. 103, the Weaver McAdams No. 4, and No. 3 and Pan American's McAdams "B" 1 and Pan American's J. C. Gordon No. 1.

Q In respect to the main Gallup sand, how have you shown that portion of the sand which would be oil productive and that portion of the sand which would be productive of gas?

A The portion of the sand that is oil productive, I have indicated in green, and the portion that is gas productive, I have indicated in pink.

Q All right, sir. Where on this cross section will we see the same section that is reflected by the orange shaded area on your Exhibit 1?

A The orange shaded area is the, what you would see in the horizontal plane of this distance of overlap of the gas over the oil, or from here to here. Of course, they are not on the same scale, but that is the area represented by this --

Q The cross section, is that the approximate location of the Weaver McAdams No. 3 Well?

A That is correct.

Q And that shows the overlap of the gas being above

the oil?

A Yes, sir.

Q All right, sir. Do you have any other comments to make on Exhibit 2?

A No, sir.

Q I direct your attention now to what has been marked as Pan American's Exhibit no. 4. What is that Exhibit? Exhibit No. 3, pardon me.

A Exhibit 3 is a plot of all available surface pressures taken on gas wells in this field. It is a plot of these pressures in PSI, pressures versus times and months.

Q Would you briefly state for the record the color code?

A The color code is listed on the attachment, each well appearing with a color corresponding to the ledger. It represents pressure taken on that well.

Q All right, sir. When you examine these data, Mr. Marshall, is this performance what you would normally expect in a reservoir of this type?

A Yes, sir, the pressure decline is what would be expected in a reservoir of this type.

Q All right, sir. Do you have any other comments to make on that Exhibit?

A No, sir.

Q I direct your attention now to what has been marked

as Pan American's Exhibit No. 4. What does that Exhibit reflect?

A Exhibit 4 is the same information that appears on Exhibit 3, entitled in addition to the dates of the tests that the various pressures were taken from, the type of tests that they were taken from, and cumulative production figures for the various wells, which pressures were available.

Q This is more or less self-explanatory. Do you have any further comment you would like to make on it?

A No, sir.

Q I direct your attention now to what has been marked as Pan American's Exhibit No. 5. What is that Exhibit?

A Exhibit 5, let me say this. On Exhibit 4 there were, all the pressures available to me are listed. Exhibit 5, I took the pressures, the initial pressures for wells on which initial pressures were available. In other words, these are shut-in surface pressures taken prior to any production from the particular well and plotted these pressures versus times and months, as was in Exhibit 3. Also, the color code on this Exhibit is identical with Exhibit 3 except some of the wells, where initial pressures were not available, have been left off.

Q What do you observe when you plot these data, Mr. Marshall, with respect to the initial pressure of completed wells?

A The initial pressures of each subsequently completed well is less than what is my estimation to be at or near the original reservoir pressure. The pressure taken on the Weaver

McAdams No. 1, the first or yellow dot, is 1356 pounds. That pressure was taken when the well had produced only 1,486 MCF. I expect the initial surface shut-in pressure in this reservoir would be close to the 1356, possibly some less by virtue of this small amount of production.

Q All right, sir. What does this indicate to you from the standpoint of communication of wells in this pool, Mr. Marshall?

A It indicates that there is excellent communication between the various wells completed in this pool.

Q All right, sir. I direct your attention now to what has been marked as Pan American's Exhibit No. 6. What does Exhibit 6 reflect?

A Exhibit 6 again is a tabulation of the information contained on our Exhibit 5 with additional information: the date of the pressure measurement; shut-in time is given, the initial shut-in pressure; also, the radial distance to the nearest well producing at the time the pressure was taken is given.

Q All right. Would you use Exhiblt 6, and in conjunction with Exhibit 1 discuss the varying distance that we have observed communication between these wells?

A The -- of course, the McAdams was the original pressure, 1356, the No. 1 Well,which is located on the NW/4 of Section 34, Township 27 North, 10 West; the Huerfano Unit 92, which is located some 15,500 feet away in the NW/4 of Section 7, Township

26 North, Range 9 West, on its initial pressure, which was a pressure taken on this well before it had produced any gas from the Gallup, was 1325 pounds, or 31 pounds less than what is estimated to be the original pressure. Now, the Huerfano Unit 99, which is located in the NW/4 of Section 2, Township 26 North, Range 10 West, had not produced when this pressure was taken on August the 19th, and it had a shut-in pressure of 1269 pounds. It is located 3350 feet from the nearest producing well, which would be the McAdams -- Weaver McAdams No. 2. This -- and it had a pressure drawdown of 87 pounds. This would indicate a minimum drainage area of 810 acres, and I didn't point out that the interference communication that was indicated between the 92 and the first well, the McAdams No. 1, 15,500 feet, would indicate a drainage area of 17,000 acres. The McAdams No. 4, which is located in the SE/4 of Section 34, Township 27 North, 10 West, had an initial pressure of 1,081 pounds, and it is located 2550 feet from the nearest producing well, which was, I believe, the No. 1 or 2. They are quite close, whichever one you consider. The radius is very close. It had a pressure drawdown of 275 pounds. That radius would indicate an effective drainage of 480 acres. Now, the El Paso 103, located in the NW/4 of 3, 26, 10 had an initial pressure of 1,088 pounds, and it was 1900 feet from the nearest producer, which was the No. 4, Weaver McAdams No. 4, or indicating a minimum drainage area of 260 acres. Now, I might point out that in the case of Huerfano Unit No. 92, we have com-

munication indicated over a rather large area, 15500 feet. However, this is also supported by most of the other pressures on here in that the -- for instance, the No. 4 Well had a pressure drawdown of 275 pounds by virtue of production from a well 2550 feet away. Any method that we can use to calculate pressure distribution as a function of its radius from the well would indicate that if you use this point, 2550 feet, and know that the pressure there is 275 pounds lower, you can project the distribution as a function of radiuses in excess of that, and all of the cases on here would result in -- the calculations would result in maximum effective radiuses considerably in excess of 15,000 feet.

Q All right, sir. Now, you have recommended that the Commission authorize the assigning of up to and including 320 acres for a gas well, have you not?

A That is correct.

Q Do these interference data, which you have just reviewed, indicate to you that a well completed in this pool would effectively and efficiently drain in excess of 320 acres?

A Yes, sir. These magnitudes of the pressure drawdown as a result of other production from other wells, indicate to me conclusively that the reservoir would be capable of draining areas considerably larger than areas of 320 acres.

Q All right, sir. With respect to oil proration unit, it was your recommendation that the Commission adopt 80-acre proration units for this pool, was it not?

A That's correct.

Q In your opinion, would an oil well completed in this pool economically and efficiently drain in excess of 80 acres?

A Yes, sir. From the information available on these pressures, although there may be some difference; of course, there is some difference in the mobility of oils as compared to gas, the magnitude of these figures causes me to conclude that an oil well will drain considerably in excess of 80 acres.

Q All right, sir. I hand you now what has been marked Pan American's Exhibit 7. What does that Exhibit reflect?

A Exhibit 7 is a tabulation of gas-oil ratios together with dates on which they were taken, of the wells in the Angels Peak-Gallup Field, which I have indicated by the red number on Exhibit No. 1.

Q Would you go to Exhibit No. 1, Mr. Marshall, and review these GOR data, and in the interest of saving time, make any comment you would like about the structural position of the well when you are discussing ratio?

A All right, sir. In the order in which they appear on the tabulation, Exhibit No. 7, the McAdams No. 1 had a ratio of 88,500. You'll notice that all of these wells which were listed with ratios in excess of, I believe, 47,000 are well up structure from the orange band. The McAdams No. 2 had a ratio of 129,930. The McAdams No. 3, which is located in the orange band, had a ratio of 5,221. The No. 4 Well, McAdams No. 4 had a

ratio of 116,636. El Paso's Huerfano Unit 99 had a ratio of 5,506. The 10 -- Huerfano Unit 103 had a ratio of 98,947. Huerfano No. 105 had a ratio of 11,310. This ratio is somewhat peculiar. However, it is not too surprising in that in this area the structure is dipping at a less of an angle than it is in this area, and because of the larger aerial extent of the zone in which you have oil immediately in contact with gas, you might expect additional free gas production from this free gas cap area that underlies this well. The Huerfano Unit 107 had a ratio of 2573 cubic feet per barrel. This well is located just at the edge of the orange band, and possibly could be producing some amount of free gas. However, with the amount of pressure drawdown that is evidently occurring in this reservoir, the majority of this high ratio could be explained by the fact that as the reservoir -- as the oil zone is depleting more, the solution gas, more gas is coming out of the solution and that probably a large amount of this is solution gas. The Huerfano Unit 92 had a ratio of 47,375. This well has not had too large -- did not have too large of a gas potential from the Gallup. However, the completion of this well was rather lengthy in that there was trouble experienced in completing the Dakota, and the Gallup was standing with mud on it for a considerable length of time, which, in my opinion, damaged the productivity somewhat of this well. The ratio on the Pan American's McAdams "B" 1, which is also located just inside the orange band, is 26,075 cubic feet per barrel. From the main zone this well also, I think,

probably the ratio is high as a result of depletion in the oil zone with possibly some free gas being produced. And that's all I have.

Q With respect to the oil wells, Mr. Marshall, when you, as a reservoir engineer, consider the structural position, and you also consider the substantial amounts of gas that have been produced from this pool, do you see anything unusual or abnormal about the gas-oil ratios that we are experiencing?

A Would you repeat that?

Q Sir?

A Would you repeat that, please?

Q Yes. Now, with respect just to the oil wells, when you consider their structural position and when you consider the substantial amount of gas that has been produced in this pool, do you see anything unusual about those gas-oil ratios on those wells, or about what you would expect when you consider all the facts?

A Now, as I just mentioned, with the depletion that has taken place, and also the fact that some possibility of free gas production exists in this as well as these in the orange band, there is nothing startling about the way they perform.

Q In your opinion, do you feel that low ratio oil wells will be completed in this pool?

A Yes, sir. I feel that as wells are developed away from this transition zone, which may become further from the edge of the field as we go in these directions that low ratio wells

will be completed.

Q Why, Mr. Marshall, do you need a limiting gas-oil ratio in a pool of this type?

A In order to allow the efficient oil wells to produce their proportionate share of the oil and not have the oil produced inefficiently through inefficient wells with high gas-oil ratios.

Q All right, sir. You recommended a limiting ratio of 2,000 to 1. Why did you make such a recommendation?

A Based on all the information I've -- I can obtain, it is my estimate, my opinion, that the solution ratio in this reservoir is probably in the neighborhood of 550 cubic feet per barrel, or at least I wouldn't expect it to be in excess of 550 cubic feet per barrel with a solution ratio of this magnitude; the limiting ratio should be kept down. It is my opinion that it shouldn't be kept at the solution ratio because of practical considerations as well as the fact that you may be over-penalizing wells which are still being considered efficient, but do not -- are not producing the solution ratio. Now, it is my opinion that the 2,000 to 1 ratio which has been used considerably, the difference between that figure and the solution ratio in this reservoir is a reasonable difference, and consequently, I would recommend the 2,000 to 1 ratio.

Q Let me ask you to make a comparison for me, Mr. Marshall. First, I am going to ask you to compare the recovery we would expect from this reservoir as we know it today with the re-

covery that we could expect of oil if you could completely separate the oil portion of the reservoir from the gas portion?

A Under the -- if the field -- if we assume that the field is produced under the recommendation which I made previously, it is my opinion that it will recover approximately thirty percent more than it would recover were this gas cap not in communication with it or if we did not have a gas cap available to give us an additional reservoir energy.

Q All right, sir, let me ask you this. From the standpoint of physical waste, from the standpoint of increased ultimate recovery of oil, will we recover more oil under a 2,000 to 1 limiting ratio or a 6,000 to 1, which has been recommended here today?

A We would recover more oil under 2,000.

Q What is the magnitude expressed in percentages?

A The difference would be approximately, based on this study, fifteen percent.

Q What would that be, expressed in barrels of oil?

A Somewhat in excess of a half a million barrels.

Q So certainly, then, from the standpoint of serving conservation and increasing the ultimate recovery of oil, a 2,000 to 1 limiting ratio would better serve conservation than a 6,000 to 1 limiting ratio?

A That's correct, and it would result in additional recovery, yes.

Q All right, sir. Now, let's look at it from a correlative rights standpoint. With a limiting ratio of 2,000 to 1 in conjunction with the other rules you have recommended here today, with such a limiting ratio, would that allow the owners of the gas to recover the gas hydrocarbons under their tract?

A Yes, sir. According to volume and reserve calculations by other methods, it is my opinion that they will recover essentially the gas in place under the tract if this recommendation is adopted.

Q Mr. Marshall, under the rules you've recommended, what allowable would accrue to a 160-acre gas well?

A If we assumed, for simplification, that we had 160-acre oil allowable, 600, at 148, it would be somewhat less than 600,000 cubic feet per day per 160-acre gas well.

Q I wonder, Mr. Marshall, are you familiar in any way with the average allowable of some of the gas pools in the northwest?

A Yes, sir.

Q Give me an example of two or three fields, if you will.

Q The Blanco Mesaverde Field during 1958, considering all wells, had an allowable of 3,005 cubic feet per day. The Fulcher-Kutz Pictured Cliffs Field, I believe, had an average allowable of 80 MCF -- no, West Kutz Pictured Cliffs Field had an allowable of 80,000 cubic feet per day.

Q Give us one or two more.

A The Ballard Pictured Cliffs had 148, the Tapacito Pictured Cliffs Field had an average allowable of 320 MCF per day average. All prorated gas fields in the San Juan Basin, weighing the field by the number of wells in the field, the average production per well was 216,000 cubic feet per day, or 216 MCF per day.

Q How does that compare with the allowable of a gas well that would occur under your recommended rule here today?

A A gas well drilled on 160 acres would have an allowable essentially three times the average for prorated gas wells in the San Juan Basin.

Q All right, sir. Now, you also stated, Mr. Marshall, that you would define a gas well in this pool as any well producing with a ratio of 25,000 to 1 or greater?

A That's right.

Q Upon what do you base that recommendation?

A The recommendation to set a 25,000 cubic feet per barrel dividing line is more or less arbitrary in this type of reservoir. It is hard to assign a number above which you should call a gas well and below which you should call an oil well. However, if you'll notice, the well which I would consider an oil well that has the highest ratio in this field is the Huerfano 105, which had a ratio of 11,210. The gas well, or well which I would consider a gas well, with the lowest ratio was the Huerfano

Unit 92, which had a ratio of 47,000. The 25,000 comes out to be between these two. It is approximately twice the highest oil well and half of the lowest gas well, and I think that that would be a fair comparison and would not result in any problems as far as classifying these wells.

MR. BUELL: That's all we have at this time, Mr. Examiner.

MR. NUTTER: Are there any questions of Mr. Marshall?

MR. PORTER: I have a question.

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Marshall, I believe you recommended 2,000 to 1 GOR and 25,000 to 1 would be the dividing line between an oil well and a gas well?

A Yes, sir.

Q And 320 acres -- up to 320 acres should be dedicated to a gas well?

A Yes, sir.

Q And that the gas well would receive, in the event you had a 320-acre gas well, that it would receive four times the amount of gas allowed the oil well?

A Yes, sir.

Q Then you could have -- conceivably you could have a well with say 24,999 classified as an oil well, which would receive 300 MCF under present level of allowable and 12 barrels of

oil, whereas you might have another well which would have a ratio of 25,000 to 1 that would get 1200 MCF, and, of course, you couldn't determine the amount of oil because I believe you would concede that the production rate of ten changes the GOR?

A Yes, sir.

Q Had you thought of all these possibilities, that much difference between the allowables assigned, say, adjoining wells?

A Yes, sir, I have, and in arriving at any arbitrary delineation line between these two, you could conceive of the situation which you just described. There are -- it is doubtful in my mind that that situation would exist for a very long period because I expect the ratios of wells to increase. However, that is a problem. There are other considerations for determining or defining gas wells, one of which I believe has previously been mentioned, gravity. However, that has its problems in that they are mixing fluids and you have varying amounts of free gas, and the distillate has a higher gravity than oil, and to pick an arbitrary limit, you are going to have that problem. However, I do not believe in this reservoir that it will be a serious problem.

Q Suppose you had this situation too: A gas well to which you have dedicated 320 acres, and the GOR should fall below the 25,000, necessitating the redefinition of the well to an oil well. What would -- what acreage would you dedicate to it?

A Well, sir, let me say that the way we expect this

reservoir to perform, under our recommendation, we expect the gas cap to always be expanding somewhat, and, of course, as we take the oil out, the pressure is going down so that I cannot visualize a well in which the ratio would go down.

Q But it could happen?

A I guess it could. Anything could.

MR. PORTER: That's all I have.

MR. NUTTER: Any further questions of Mr. Marshall? Mr. Errebo?

QUESTIONS BY MR. ERREBO:

Q Mr. Marshall, if you will refer to your Exhibit No. 1 up on the board there -- before we talk about that, I would like to ask you this: Have you been located in the San Juan Basin for some time with Pan American?

A I have been located in Pan American's office which operates the San Juan Basin for three years, I believe. Three or four years.

Q And in connection with your duties, I take it that you have had an opportunity to study a number of these fields which are similar to this in the Gallup trend, is that correct?

A No, sir, I haven't had an opportunity to study a field similar to this one in the Gallup. I don't know of a similar field.

Q Well, would you consider Bisti, that is a Gallup field, isn't it?

A That is about the extent of the similiarity; they are both Gallup reservoirs.

Q Otero Gallup, that's also in the same general trend, isn't it?

A It's very different in its pay characteristics. It is in the Gallup.

Q Well, that's fine. And all of these fields, I think, are old shoreline deposits, isn't that correct, that provide the primary bases for accumulation?

A That's true in most of the upper Cretaceous.

Q Then, with that knowledge, tell me, what is your opinion with regard to the accumulation of oil and gas insofar as it relates to structural characteristics? Let me rephrase that just a little bit, perhaps to make it more clear, so far as it conforms to structural characteristics?

A The accumulation of oil as it conforms to structural characteristics?

Q Does it generally conform to the structural characteristics, or can the accumulation cross, say, structural line?

A In the Gallup?

Q Yes.

A Yes, there are cases. The Horseshoe-Gallup field is a Gallup sand which practically is perpendicular to the structure.

Q Would you say that is fairly normal in this type?

A Well, it is one of four or five. It is not normal

in that it is the smaller of t he group. Most of them occur generally on trends, trending northwest and southeast.

Q Actually,you have shown this field to follow almost exactly the structural contours, haven't you?

A Well, except for the ends.

Q Except for the ends, but your green line,that follows exactly the 375 line plus 375 on the north?

A Yes, sir.

Q And on the south the green line follows the 550.--

A Yes, sir.

Q -- exactly. It doesn't differentiate from it, does it?

MR. BUELL: Mr. Errebo, let him finish his answer, please.

MR. ERREBO; Excuse me.

A As I have noted on there, these are estimated limits of production. In an area of this size with no more wells than we have in there, I don't think that I would have been wrong to run them anywhere in this direction,however, since it was easy to trace that line.--

Q It was just a matter of convenience, wasn't it?

A Yes. It doesn't mean that necessarily the sand follows the structure. It can cross it or widen out, but this was more or less a matter of convenience.

Q Do you have any opinion as to whether this accumula-

tion actually crosses structural lines at an angle or whether it, probably with the knowledge that you have, now conforms quite closely, in fact, exactly, with the lines that you have drawn now?

A From what we know about the reservoir, well, no, I wouldn't say that. You notice this nosing in here. Now, although I've got the limits nosing too, the quality of pay development does not necessarily change with these contour lines, so that I couldn't say that it absolutely followed the structure.

Q That is exactly what I have been getting around to, Mr. Marshall, in this line of questioning. Then, actually, the fattening at the northwest portion of this yellow band actually is a matter of convenience rather than reality, as far as you know, is that correct?

A You mean between -- you mean the difference in width between here and here?

Q Notice the width of the orange band.

A The width of the orange band is governed by the structure.

Q Yes, sir.

A I have controlled information here, controlled information here.

MR. BUELL: Mr. Marshall, when you say "Here," he can't get the location into the record.

A Excuse me. I have control information on the 107 Well. All wells in the Angels Peak-Gallup field, naturally in

addition to some well that's outside, it is my opinion that in this area right through here, the contour, the structural information is pretty well accurate, it is controlled. Now, naturally, if you've got gas,then it is going to seek its level in relation to oil. As the dip of the bed decreases, the width that you would see, looking down on this area, would get wider. And I don't --

Q Providing there is development along that same area?

A There is a well in the middle of it which had a potential of 4325 cubic feet per day.

Q So then, are you saying this, Mr. Marshall, that actually, then, the oil, the southern oil limit follows contour lines, is that correct, and that you have actual control to lead you to believe that?

A Are you speaking now of the green line or orange?

Q What would be the southern limit of oil accumulation. Would not that be the southern limit or the southern line on your orange band?

A Yes. Oh, I see; yes, that is based on the structural information, that would be where the -- if this gas-oil contact is correct, which I believe it is, that would be the southern limit.

Q Actually, then, that area,that was based on control and not on --

A That's right. The whole thing is based on control, --

Q Well, -- excuse me, go ahead.

A But, the -- except the general location of this line is based on control. The fact that it wiggles around and follows this structure line is convenience, the general location of it is control.

Q Then, actually, the fattening there at the north-west part is control and not convenience, is that right, of the orange band?

A Everything above the orange band, I think in this area here, is -- has good control.

Q Now, Mr. Buell, in his direct examination of you, asked you to accept the hypothesis that the gas and the oil were separated?

A That's right.

Q I might have missed that some way.

A Yes.

Q Now, your estimate of some fifteen percent loss of ultimate recoverable oil, is that based on that hypothesis?

A No, sir.

Q It was not?

A No, sir, the fifteen percent difference between 6,000 limit and 2,000. No, that had nothing to do with it.

Q Had nothing to do with the hypothesis?

A That's right.

Q Actually, how did you calculate that, Mr. Marshall?

A By running material balance on the reservoir; I was studying under the various assumed possible ways that we could produce it.

Q Mr. Marshall, would you tell me in little more understandable language exactly how that worked? I understand when the crank is turned on the material balance, certain things come out, but that doesn't help me to really understand completely how you figured that.

Q Well, --

MR. BUELL: Let me be sure I understand. You want him to explain material balance to you?

MR. ERREBO: In other words, he was telling me and telling us all that we will have fifteen percent more oil production under the rules you advocate. I asked him how he calculated that. He said by material balance. Well, that is fine, but I would just like to know if there is any further explanation that he could give us other than asking us to accept the results of a material balance claculation. In other words, could it be simplified any?

MR. NUTTER: I think it should be appropriate that he explain the fifteen percent that he expects to recover.

A I consider -- as I have stated, I had an area which I had under consideration. Using the assumption that we would produce it with a 6,000 limit, and a 140 oil allowable, and with other factors, which we use in the material balance, assuming that

this area was developed, I calculated a recovery factor from the material balance under those conditions. I calculated a recovery factor using the same conditions except changing the limiting ratio and possibly a few other factors. Let's see, the -- limiting ratio, the oil allowable would have been the same. The gas allowable was changed somewhat, or what we would allow these wells to produce.

Q You say it was changed?

A My recommendation results in a somewhat different gas allowable. In the assumption I used as a gas allowable in the 6,000 to 1 case, I ran the material balance using that method, and I calculated what I estimated the oil in place, and multiplied the two respective recovery factors by the oil in place, and for the fifteen percent, I just took the difference between the two recovery factors, they are fifteen percent apart, the 2,000 is fifteen percent higher than the 6,000.

Q I wonder if you could tell me what the reservoir mechanism or operation is that the results of your material balance indicate? What is going on down there that is reflected by the results of your material balance?

A Well, I don't quite understand your question. You mean is the material balance telling us the reservoir mechanism or the mechanism by which this reservoir would produce?

Q No, I would like to know if you could tell me what the movement of oil, what the production effect is, as actually

present, which is measured by the results from your material balance.

A I think I understand your question to mean why we would get a different answer under the two cases?

Q Yes, I think that is right.

A The reason for that is (1): the fact that because we have this large transition zone, a 6,000 ratio limit will allow production of considerable more gas than a 2,000. The fact that a well has a limit of 6,000 to 1 doesn't affect it if it can't make 6,000 to 1. That fact, together with the fact that under those two cases that I calculated, I was assuming that a gas well drilled on 160 acres would have a daily allowable of 600 MCF per day, and under the other case, I was calculating that a gas well would have an allowable somewhere -- I ran more than one 1500 MCF per day, 1200 MCF per day, and I think one 2100 MCF per day.

Q Actually, how many wells in this field now produce or test at a rate of less than 6,000 to 1?

A Well, it is my opinion -- it depends on how you define the word "Test." Based on information, performance information and test information of your Frost, I think it has a ratio of less than 2,000 to 1. We -- the basis for this statement is the fact that in recovering load oil on the McAdams "B" 1 from the main Gallup sand, it was not necessary to pump it very much, you could agitate it, and with this 2600 ratio it would flow.

Q It is flowing load oil?

A It was flowing load oil, and it would flow for a short period of time. The Frost, it is necessary to pump this well to get every barrel, and I conclude from that test information that the ratio on the Frost will be significantly less than the ratio on the McAdams was, providing -- the only reason -- the only explanation for the fact that it wouldn't be is the fact that depletion has occurred from these gas wells, which would cause the gas saturation around those wells to be higher, but I wouldn't expect it to be that extensive.

Q You appear to be apologizing for the Frost Well. Do you think it needs an apology?

A Not yet, no.

Q Tell me, you haven't shown the gas-oil ratio information for the Frost Well on your Exhibit No. 7, have you?

A No, sir.

Q Why was that?

A Well, as I said, I don't know what it is. I say it will be less than 2600, based on that test information I gave you. There has not been a ratio test conducted on it.

Q Now then, on the McAdams "B" No. 1, what is the initial test on that well?

A That well, we did quite a bit of testing on it. It stabilized at a rate of 48 barrels of oil per day with a ratio of 2675 from the main zone.

Q That was the initial test on the well?

A That was the stabilized flowing rate, yes, sir.

Q Actually, the gas-oil ratio information on your Exhibit No. 7, is that initial test information or just the best information that you have?

A That is the stabilized flowing rate of the well and of the gas-oil ratio taken at that time.

Q I guess I didn't make myself clear. I was talking about all the information shown without regard to any particular well.

A I am sorry. You mean all of the wells?

Q Yes, that purport to be a reflection of initial tests or current tests?

A Well, the dates are given on the Exhibit, --

Q Yes,

A -- which were the dates corresponding to the tests.

Q Actually, there are some tests which have been made which don't show on here, isn't that correct, on some of these wells?

A Oh, yes. This should be the latest test information.

Q This should be the latest. Actually, the McAdams No. 3 has somewhere around 5700 to 1 as previously testified?

A I will put it this way. This is the latest information that has been reported to the Commission, I believe.

Q Now then, you apparently have made a study of the

allowabilities of gas pools in the San Juan Basin, is that correct, at least a cursory study so that you could give the Commission an --

A The average allowable, yes.

Q Now, you came up with an average allowable of 350,000 on the Blanco Mesaverde, is that correct?

A Yes, sir.

Q That was average?

A Yes, sir.

Q And you came up with -- would you state again what the average for the entire number of fields or the basin was?

A The entire number was an average of 216.

Q 216?

A MCF per day.

Q I wonder if you could give me also -- I think it would be helpful to the Commission, an average deliverability of the wells to which those allowables were assigned?

A I couldn't give you that information now.

Q Could you tell me what the average deliverability of wells in the Blanco Mesaverde is?

A No, sir.

Q How about the Fulcher-Pictured Cliffs?

A No, sir. I don't have any average deliverability. Of course, these allowables are based partially on deliverabilities. They depend on other things, but I don't have any average deliver-

abilities of any of these wells.

Q Actually, isn't it true that when you take an average, you have to have some highs and some lows in order to get an average, don't you?

A That's correct. However, with an average of 305, knowing, just knowing thecharacteristics of the wells in the Blanco Mesaverde.

Q You say knowing the characteristics?

A I don't know the deliverability, but we have a general conception of the type of wells completed out there.

Q But you don't know any of the deliverabilities?

A No.

Q Does Pan American have any wells in the Blanco Mesaverde?

A Yes, sir.

Q Are they within your jurisdiction?

A Yes, sir.

MR. BUELL: May it please the Examiner, I believe we are kind of wandering here at this time. If you feel it is proper to go into the deliverability in the Blanco Mesaverde, give us a little time and we will do it.

MR. ERREBO: Mr. Examiner, I am through with this line of questioning. I did feel it was proper on account of the statement he did make about allowable as directed to the deliverability, and that's the only reason.

MR. NUTTER: I think he is pursuing a point that he brought up. Proceed.

MR. ERREBO: That's all I have.

MR. NUTTER: Do you have any further questions, Mr. Errebo?

MR. ERREBO: I believe that's all. Thank you.

MR. NUTTER: Does anyone have any questions of Mr. Marshall?

QUESTIONS BY MR. HOWELL:

Q Mr. Marshall, referring to Pan American's Exhibit No. 1, I believe you have testified that you consider the area on this map lying north of the orange band and south of the green line as being potentially commercial oil production?

A That's correct.

Q And there are a number of locations which have not been drilled and in which you would expect oil wells to be drilled in the future?

A Yes, sir.

Q Now, I believe you also testified that you would expect in that area to find initial gas-oil ratios to be considerably lower than the wells that have been completed?

A Yes, sir.

Q Now, if the gas cap gas were withdrawn on a ratio of 6,000 to 1, what would be the effect of such withdrawal with reference to migration of oil from any wells located in this area, having a low gas-oil ratio such as 1,000 to 1?

A Well, sir, as I have stated previously, I think the -- part of the result of the ratio and of the Pan American McAdams "B" 1 was because of pressure depletion. I think that that pressure situation would undoubtedly expand in varying degrees.

Q Would that be likely to cause any migration of oil as a result of voiding the gas cap pressures there, lowering the pressures?

A Yes, sir. If the reservoir depletes and goes down in pressure and there is no production, the only place it can go is away from where it is, so there would be migration.

Q Would that be likely too, in your opinion, to create a problem of migration by using the 6,000 to 1 ratio rather than the 2,000 to 1 ratio?

A Yes, sir.

Q And it is a fact, is it not, that whenever oil migrates within the reservoir, that it is extremely wasteful in that the ultimate recovery is reduced?

A Yes, sir, that's correct.

MR. HOWELL: That's all.

MR. NUTTER: Anyone else have any questions?

QUESTIONS BY MR. UTZ:

Q Mr. Marshall, using your 2,000 to 1 ratio, what would you expect the gas-oil contact on the southern edge where you show your gas-oil contact? Will it stay, will it recede or --

A The contact itself?

Q Yes.

A As I said, it indicates that we would have pressure maintenance so that the gas cap would expand to some degree, causing the contact to move.

Q Now, under a 6,000 GOR, what would you expect to do?

A The same situation would exist. We would still have some pressure maintenance by virtue of the existence of the gas cap. As I mentioned, fifteen percent less efficiency. However, the same thing would occur to a lesser degree.

Q And the gas-oil contact, then, under 6,000 would recede, go down structure?

A Yes, sir, somewhat.

MR. UTZ: That's all I have.

MR. NUTTER: Mr. Fischer.

QUESTIONS BY MR. FISCHER:

Q In your Exhibit No. 2, I believe, El Paso Huerfano Unit No. 104 --

A Yes, sir.

Q -- I notice that it potentialed at 393 barrels of oil per day with a GOR of 1500. Do you have it on your Exhibit?

A Yes, sir.

Q Do you know, or were all these perforations as shown on this 104 opened at that time, when that 993 potential was taken?

A As far as I know, they were all opened.

Q Then you have the estimated limit of commercial production here projected in your main Gallup sand over to your lower set of perforations?

A No, I don't mean the estimated limit of commercial production, I mean the wavy line that crosses it, I have the correlative interval extended to the Huerfano Unit 104, the interval that correlates with the main sand further up in the reservoir. The permeability from the logs indicates that the pay is very very poor, if existent at all, in that well. However, it does seem to correlate with a similar interval in which the sand is developed further back to the north. The fact that that well had a gas-oil ratio of 1500 to 1 is not unusual in that if there is any pay development there at all, it is very small, and with a solution ratio of 550, you would normally expect that there was some amount of free gas produced from this well.

Q Free gas from those sets of perforations?

A I couldn't say it was from those sets of perforations, but if my estimate of solution ratio is correct there was free gas produced from that potential test.

Q It seems to me from your SP line that that particular interval in there might be less shaly than the interval up above. Does that seem true to you?

A Well, --

Q In other words, your sand would be cleaner possibly?

A They are both very poorly developed sands, but it is possible that the lower one is a little bit better than the one just above it.

Q In looking at this SP line again, it seems like it is less shaly than just about any other section that is perforated in there except maybe the top set of perforations.

A Well, that would be from the fact that the resistance curves are higher. You wouldn't expect as much shale lying in this as the others. The SP is indicating essentially the same degree of shaliness in each one. It is a pretty fine line, but it does appear to me that the line dividing 5700 feet below that, it appears to me that that interval is less shaly than the majority of the others. But, as I say, there is not very much difference. It is the fact -- of course, we have considerable footage opened all total in the well, and the lower interval is only a small fraction of the total footage opened.

Q In your Exhibit No. 6 where you have this surface pressure data, this shut-in time listed here, was that stabilized shut-in, were all of these wells that stabilized shut-in when these pressures were taken?

A I don't know that they were. Those were the pressures, I assume at the end of seven days. I don't have any build-up information between, prior to the seven days from the permeability. Evidently permeabilities in this reservoir, I would venture an opinion that they are built-up pressures.

Q They were. On your Forst Well, do you know the total amount of load oil in that well when you began?

A Not exactly. It was between 1100 and 1200 barrels, I believe.

Q Do you know at what rate it has been returning day by day? The first day and second day, how much came back?

A A breakdown by days?

Q Yes, do you have any idea?

A Well, no, I don't. It started out a little higher. We have had pump trouble. We had to pull the pump on it, and it had gone down to somewhere around 20 barrels a day, and we pulled the pump on it, and I think we had to repair the pump to some degree, and it was run back in, and I believe we only have one day's production, or one portion of one day's production since then, or at least available to me, and it was about 40 barrels a day. But I don't have a breakdown. I would say it had been averaging about 40 barrels a day, 30 to 40 barrels a day.

Q I don't want an average. Do you have an idea of the breakdown? Has it been decreasing?

A There has been no large degree of decrease, no, sir.

Q Would you venture a guess as to the outcome of the production of this well on completion?

A Well, right now we are contemplating restimulating the well.

Q You don't think too much of it now, however?

A Well, it looks like it is going to be around a 30 barrel well right now, 30 to 40 barrel well.

Q Did you have a GOR test on this well even though it is load oil? Have you taken a GOR test?

A No, sir.

MR. FISCHER: That's all I have.

MR. ERREBO: I have a brief question.

QUESTIONS BY MR. ERREBO:

Q Mr. Marshall, you stated a while ago, talked about the Jack Frost No. 1, which I believe is your latest well up here?

A Yes, sir.

Q That is located generally in the southeast of Section 27, is that correct?

A Yes, sir, that's correct.

Q Now, would you recommend to your management that they drill a well in the NW of the SE of 27, on the basis of what you know now on the Jack Frost No. 1?

A The NW/4 of the SE/4?

Q Yes, sir, that would be as I described it.

A It usually takes me a little longer than this to make a recommendation to management.

Q It would take you a little longer in this case?

A Possibly a little longer in this case. I will say this, there are areas developed by various operators and areas comparable to this, and under certain circumstances I would recommend

that a well be drilled in this area at this location.

Q How about under these circumstances here, would you recommend that?

A Well, these circumstances what do you mean by "These circumstances?"

Q Well, the circumstances that exist as you presently know them with regard to Jack Frost No. 1? You are fully familiar with it, aren't you, Mr. Marshall?

A Yes. Before I made a recommendation to drill a well at that location, possibly I would want more control information on the Frost. As you put it the way you do, would I right now, no, I think probably I would after we have completed the Frost.

Q Then you would what?

A Make a recommendation.

Q So, you are saying now, on the basis of the Frost No. 1, information which is presently available, that you had to make a choice, you would recommend the drilling of another well?

A Well, I would wait until I had the information available, then I would make the choice.

Q You would then make the choice?

A That's right.

Q And your choice would be to drill or not to drill?

A That's correct.

Q Actually, you have seen quite a few wells completed in the San Juan Basin, haven't you, and observed the test informa-

tion and other information which becomes available to a company of your size during completion of a well?

A Yes, sir.

Q And what do you think of this well, which is still recovering load oil thirty days later? Does that look like a very good well?

A Well, it is better than some we've drilled. It does not appear to be a red hot prospect, so to say.

Q You don't have any evidence, do you, of, or any belief that wells will be drilled in the oil rim which will produce initially or at any subsequent time at a ratio of less than 1,000 to 1?

A Yes, sir, I do believe that.

Q And what is that based on?

A The fact that I estimate the solution ratio to be 550 cubic feet per barrel.

Q That is certainly not based on any information that you have now, is it?

A Yes, sir. It is based on the information that I used to arrive at the solution ratio.

Q But not on any presently known initial gas-oil ratio information?

A We don't have a measurement of a well -- yes, sir, we do. We have a -- it is a little bit involved, but we have a ratio on the McAdams of 2675 cubic feet per barrel.

Q Was that initial ratio?

A That was the initial stabilized pressure. We have reason to believe that the reservoir pressure in this area has been drawn down by virtue of the fact that the gas wells have been producing. You can turn the calculation around, and knowing the approximate magnitude of pressure drawdown, you can go backwards and calculate what you would have expected the ratio to be had there not been any pressure drawdown. So, in that respect, we did have.

Q Except in this case here, you haven't found any with initial pressure of less than that so far?

A Except, I think a thousand, I would say a thousand, no.

Q What evidence do you have as to the -- what the gas-oil ratio in the Frost No. 1 would be?

A As I previously stated, because of the performance of this well in comparison to performance of other wells, I believe that the ratio would be less than 2600 to 1 by a significant amount.

Q In other words, you are saying that you've gotten so far in recovering your load oil you really can't tell now, but based on your observation of other wells, you can't predict what the gas-oil ratio will be, but you can predict whether or not you will drill another well in that area, is that correct?

A Well, the gas-oil ratio is a fact. There are a

lot of considerations that go into whether or not you drill another well. I wouldn't make it on the type of comparison that you did.

MR. ERREBO: Thank you.

QUESTIONS BY MR. NUTTER:

Q Mr. Marshall, do you know what kind of a test this was on this Weaver No. 1 that shows the initial pressure to be 1310?

A No, sir. All I know is that that was the pressure reported as the, I believe it is designated rock pressure on the final log form which is filed with the Commission and the U.S.G.S.

Q And this 1356 is the surface pressure determined on the initial deliverability test?

A Yes, sir. Seven-day build-up.

Q How about all these other tests that were reported here on your Exhibit No. 3 and Exhibit No. 5? Are these all surface pressures that are measured during deliverability tests?

A Yes, sir, there are a few that were measured during packer leakage tests. They are all seven-day build-up tests.

Q All have the same build-up time?

A All except the ones that I have not indicated any build-up time which is the 91, M the second test, and the one which you just referred to. And I do not know the build-up time there, and the 103 had a nine-day build-up.

Q Are these all dead weight pressure gauges, or would

they be spring gauges on top of the wellhead in some cases?

A The deliverability test pressures are, I feel confident they are dead weight pressure tests. I am not too sure on the packer leakage test, as to what type of tests they are.

Q I just wondered how reliable this initial test on the 92 is. What kind of a test is that? That was a packer leakage test, wasn't it?

A Packer leakage test. To me, a packer leakage test should be conducted, naturally, where the pressures are critical. I personally, as long as we are talking about drawdowns in the range of 31 pounds, would have every confidence that that was an accurate pressure for the purposes of that consideration.

Q Do you also feel that it is an -- a natural assumption that this well is showing a drainage radius there of 17,000 acres?

A I feel that this well has felt the effect of production from the wells 15,000 feet away.

Q Notwithstanding the fact that you don't know what kind of a pressure measurement that was on that packer leakage test?

A Notwithstanding that. May I say -- I think I stated it before, another reason that I have confidence in that fact is the magnitude of pressure drawdowns in the other wells which are located closer, and analytically extending that or

extrapolating that pressure build-up by the method that we have to do it with, you can calculate a radius greater than 15,000 feet, so with that information in conjunction with the packer leakage pressure, that is the full reason for my confidence in it.

Q There is also the possibility, isn't there, that there is variation in the permeability in the No. 92 Well, and possibly the shut-in time might have resulted in a lower pressure building up?

A There is a possibility of that. As I said, the logs on the Huerfano Unit 92 are comparable with other wells in the area further up to the northwest. And I would expect seven days to be adequate shut-in time on that well, but, of course, there is that possibility.

Q Now, in compiling the information that you have here on Exhibit No. 5, you show initial pressures of 1,2,3,4,5 wells. Are those the only five wells that you had initial pressure data on?

A No, sir. I had an initial pressure on the McAdams No. 2.

Q When was that pressure taken and what was the --

A It was -- I don't know when it was taken. It was taken during the month of May, and it was reported the same as No. 1, as the rock pressure on the form, final log form, which is filed with the Commission and the U.S.G.S.

Q Now, do I understand you correctly, Mr. Marshall,

when you have proposed that oil wells as well as these gas wells all be subject to a limitation of 2,000 to 1, you have proposed that oil wells have dedicated to them 80 acres?

A Yes, sir.

Q You have proposed that gas wells may have dedicated to them up to 320 acres, --

A Yes, sir.

Q -- any amount of acreage up to 320?

A Yes, sir.

Q Now, what have you proposed for the amount of gas that these gas wells can produce?

A On the 320?

Q Well, for any size of gas proration unit?

A Well, I based it on the 320, and I recommended -- I recommend that a well that has 320 acres assigned to it be allowed to produce four times the gas limit of an 80-acre oil well.

Q How about a well that is on 160 acres?

A Half or the ratio that the acreage bears to 320, or half.

Q In other words, it would be multiples of 80, depending on the amount of acreage that is dedicated to the gas well?

A Yes.

Q Do you feel that the rate of withdrawal -- now, we've been concerning ourselves quite a bit here today with these

four Weaver wells; they are on 160 acres each?

A Yes, sir.

Q So, do you think that the rate of withdrawal for those wells that are 160 acres under this 2,000 to 1 limiting ratio, it would receive twice the amount of gas that the oil wells are receiving right now?

A Yes, sir.

Q Do you think that this is an equitable rate of withdrawal for gas wells versus oil wells?

A Well, it would receive twice the rate of a well, that would, yes, sir, twice the rate of the well that would produce that limit, it would receive twice the gas. Of course, it would be draining a reserve of whatever is under 160 acres whereas the oil well would be draining a reserve of whatever is under 80 acres.

Q And the oil well would also be receiving the volumetric space occupied by whatever fluid it is producing?

A Yes, sir.

Q Have you made any volumetric withdrawal calculations on this thing to determine the amount of gas that should be withdrawn as related to the amount of gas or liquid that are withdrawn down in the lower portion of the pool?

A Yes, sir, I believe that, in effect, these material balance calculations did that.

Q Now, in these material balance calculations, this

fifteen percent more recovery on the 2,000 to 1 rather than on the 6,000 to 1, does that result from decreasing the takes in the gas cap?

A Yes, sir, partially.

Q In other words, you have reduced the takes one-third from 6,000 to 2,000 in making comparison, so --

A Yes.

Q So you are taking one-third less pressure off that gas cap?

A That is partially, and the other part is the fact -- these wells in the transition zone which are producing, which would produce it more efficiently under 2,000 than they would under 6,000, which are classified as oil wells, but which immediately would have a 6,000 limit, and consequently produce that 6,000 limit, and that in addition to the difference in rate, yes, sir.

Q But eliminating that portion of it, this gas cap would be a part of this fifteen percent, would be due to a less efficient gas cap operation?

A Yes, sir.

Q By tripling the withdrawal from the gas cap?

A Yes, sir.

Q Now, you stated that if you isolated the gas cap from the oil zone, you would have 30 percent, you would have 30 percent less recovery than you do now with the gas cap? What would be your mechanism to produce the oil solution, gas drive, or

what?

A Yes, sir, for the purpose of that calculation. I assumed we just had a depletion drive reservoir of the characteristics of the oil area in this reservoir, and ran a depletion material balance on that assumption.

Q You stated that you didn't know the solution gas-oil ratio. I don't suppose you know the bubble point of the oil in this oil zone either, do you?

A Well, its being in contact with the gas, it is under-saturated, so that 16 -- what I calculate to be the bottom hole pressure from the surface pressure information of 1630 pounds.

Q Is that your estimate of the bottom hole pressure?

A Yes, sir.

MR. NUTTER: Does anyone else have any questions of Mr. Marshall?

QUESTIONS BY MR. PAYNE:

Q Mr. Marshall, do you feel that would be the proper way to handle this pool from an engineering standpoint of waste?

A From an engineering standpoint, the field could probably be better produced if there was not the problem of diversion ownership.

Q Now, I realize that you've got the human element in there, but as far as correlative rights are concerned, if there

were poolwide unitization, no correlative rights would be impaired, would they?

A Providing the field was unitized and producing under optimum conditions by virtue of being unitized, I cannot see where there would be any violation.

Q Do you know if your Company has any particular objections to entering into a unitization agreement in this pool?

MR. BUELL: Perhaps I'd better answer that, Mr. Payne. Specifically, with respect to this pool, I have no knowledge of what our Company's attitude would be. I do know that we favor unitization where conservation will be served and where the proper unitized contract could be negotiated. I am sure we will be glad to look at this.

MR. PAYNE: Thank you. That's all.

MR. NUTTER: Any other questions of Mr. Marshall? He may be excused.

(Witness excused)

MR. NUTTER: Do you have anything further you wish to offer?

MR. BUELL: No.

MR. NUTTER: Did you offer your Exhibits, Mr. Buell?

MR. BUELL: I think I did. I will do it again. I formally offer Exhibits 1 through 7 inclusive.

MR. NUTTER: Without objection, Pan American's Exhibits 1 through 7 will be admitted.

MR. NUTTER: Mr. Howell, do you have --

MR. HOWELL: We have two witnesses.

(Witness sworn)

MR.HOWELL: Call Mr. Lemon to the stand.

RICHARD F. LEMON,

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. HOWELL:

Q Would you please state your name for the record?

A Richard F. Lemon.

Q How do you spell that?

A L-e-m-o-n.

Q And by whom are you employed and in what capacity?

A El Paso Natural Gas Company, as senior petroleum engineer.

Q Now, what education did you have in the field of engineering?

A I received a Bachelor of Science degree in engineering from the University of Oklahoma, Master of Science degree from California Institute of Technology, and in addition to that, I have done some graduate work at the University of Houston in petroleum engineering.

Q What year did you graduate from each of the institutions from whom you received degrees?

A 1945 from the University of Oklahoma, 1948 from California Institute of Technology.

Q And by whom have you been employed and in what capacity after your graduation from these schools?

A In 1948 I was employed by Stanolin Oil & Gas Company as a petroleum engineer.

Q In what area.

A Generally West Texas.

Q And how long were you with Stanolin?

A Six years.

Q And by whom have you been employed since that time?

A El Paso Natural Gas Company.

Q And in what capacity have you been employed by El Paso Natural Gas Company?

A As a reservoir engineer.

Q As such, have you made studies of the San Juan Basin area?

A I have.

Q Did you make a study of this particular Angels Peak-Gallup Field to determine the recommendations which you felt should be made to the Commission regarding field rules?

A I studied to the effect of reservoir performance.

Q Just tell the Commission what you did, or what you looked at, and what data you had available.

Q The first thing I paid consideration to was the

matter of drainage, just how much area you might expect an oil or a gas well to drain. Based on the initial wellhead completion pressures on the McAdams No. 1, Weaver's McAdams No. 1, I determined that the initial bottom hole pressure was in the neighborhood of 1625 pounds bottom hole conditions, and from that, I studied the offsetting wells to the Weaver McAdams lease, and from that, based on El Paso's Huerfano Well No. 107, which was completed as an oil well in the oil rim area, with the initial completion of 287 barrels of oil with a GOR of 4142, bottom hole pressure survey on that well run in March of '59, which was approximately roughly a year after the McAdams Well No. 1 was completed. During that period of time from the production in Section 34, the McAdams lease, that roughly approximately 170 pound drop in bottom hole pressure was observed in our El Paso's No. 107. The initial delivery date on the Weaver McAdams No. 1 was, I believe, in April, '58, which would be eleven months, so that during that time and also due to the other wells on the McAdams lease, this drop in bottom hole pressure had occurred. Now, the distance between the nearest well to the 107 is the McAdams No. 3 on the Weaver lease. The distance there would be about a half a mile. So on that basis, it is conceivable that an oil well would drain as much as 320 acres. In addition to the interference data here, the average permeability of the area appears to be around thirty millidarcies, which should afford good movement of the oil through the formation.

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Now, dropping down in Section 3, which is south of the Weaver McAdams lease, I looked at El Paso's Huerfano 103. That well was completed in January of '59 with a GOR of 5827. Bottom hole pressure survey was conducted in March, '59 with a resulting bottom hole pressure of 1270. That was corrected to a tentative gas-oil contact of 420, since this well is in the gas area there. The resulting difference in bottom hole pressure from that Weaver McAdams No. 1 was 375 pounds. I would like to correct that to 355 pounds. Magnitude is what is important. Let's see, that well is now tied in, but at the time the bottom hole pressure survey was taken, it hadn't produced any substantial quantities of gas, only that that was taken on potential. The nearest well to the El Paso Huerfano 103 is the McAdams,Weaver McAdams No. 4. There again, there is approximately half a mile distance between the wells. So, from that, it is apparent that you could drain an area of 320 acres,at least.

Another well which offsets the Weaver McAdams lease to the west is the Huerfano 106. In that particular instance I estimated bottom hole pressure based on the surface pressure to be 1360 PSIG, which would be 265 pounds less than the initial pressure I estimate on the Weaver McAdams No. 1. So, there again, we have an indication of good communication between the area there,and the distance again is approximately half a mile, which would surely give you 320-acre drainage.

Q Have you completed that Exhibit?

A That completes it.

Q Did you then conclude as to the recommendations which you would like to make to the Commission as to the acreage to be allotted to an oil well, a well completed in the oil section classified as an oil well, and the acreage which may be attached to a gas well?

A Yes, sir.

Q What are those recommendations?

A My recommendation would be that an oil well be placed on 80 acres, and a gas well would be placed on acreage amounting up to 320 acres.

Q Are you of the opinion that an oil well will efficiently drain an area of 80 acres surrounding it?

A Yes, sir.

Q And are you of the opinion that a gas well will efficiently drain an area of 320 acres surrounding it?

A Yes, sir.

Q Now, to what other points did you address your studies?

A Realizing that the apparent development date, at least, has been in the gas cap area with some wells in the oil rim area, I prepared a correlation which shows graphically approximately the same information illustrated on Pan American's Exhibit No. 1. That is relating to the gas-oil ratio, considering structural effect. That correlates that as you proceed northward, the GOR's

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definitely decrease.

Q Let me interrupt you there. Did you prepare that in the form of an Exhibit?

A Yes, sir.

Q And what is that Exhibit numbered?

A Exhibit No. 1.

Q It is El Paso Natural Gas Company's No. 1, which has been distributed?

A Yes, sir.

Q Please go ahead and just state what the Exhibit shows, and if there are any additions that you desire to make to the Exhibit at this time.

A Well, since the hearing commenced this morning, it was brought to my attention that some of these perforations are not exactly as represented on Mr. Weaver's Exhibit. I would like to show that the Weaver McAdams, No. 1 McAdams would have an interval on this diagram of 437 to 469, that being the elevation above sea level.

Also, the Weaver No. 3 McAdams would show an interval of 412 to 434 feet above sea level, and in addition to that, I would also like to add the Pan American McAdams No. 1 "B." That well would be shown with a perforation interval of 370 feet to 402 feet with a gas-oil ratio of 2675.

Q Will you just explain what this Exhibit shows here, and then give the conclusions which you draw from this Exhibit?

A This Exhibit shows that as you penetrate the main Gallup sand lower elevation-wise, you encounter a well with a lower GOR. Thereby, as you would proceed possibly to the northwest through the area that is still opened at present and also possibly to the east, by drilling lower on the structure, the chances of encountering a low gas-oil ratio would be vastly improved.

Q Then, did you do any further studies along this line?

A Yes, sir.

Q Will you tell the Examiner just what else you have done in your studies?

A I would like to turn to Exhibit No. 2. Exhibit No. 2 shows the relative reservoir voidage versus producing GOR for various limiting gas-oil ratios. Along the left-hand margin there, the vertical scale shows the barrels of reservoir space voided per stock tank barrel per day per acre. The reason it was placed on per acre basis was, if you set up your allowables on a multiple of the 80-acre spacing, then per acre-wise, assuming you have each 80 acres developed whether by one oil well or by two or -- excuse me -- or by one gas well on 320, per acre-wise, you would still come out with the same per acre voidage.

This Exhibit was based on the assumption that the initial solution ratio was 620, which was estimated based on the characteristics of the crude in the area, and a bottom hole pressure of 1625

PSIA bottom hole pressure. We observe by looking at this Exhibit that with a limiting gas-oil ratio of 6,000 to 1, wells that would be classified as gas wells or wells that produce above the 6,000 limit, would void approximately nine times the reservoir space that a well with a gas-oil ration of 1,000, or, considering a well with a ratio of 2,000, the withdrawals would be approximately three times in the gas cap area.

MR. NUTTER: Excuse me.

A Yes, sir.

MR. NUTTER: These various columns here, now, all correspond to the various GOR's at the bottom of the page, is that correct?

A That's correct.

MR. NUTTER: Thank you.

A With a limiting ration of 4,000 to 1, the discrepancy or inequality is reduced some, but still a well producing above the gas-oil ratio limit would be voiding approximately six times that of a well with a gas-oil ratio of 1,000 or about twice that of a well with a gas-oil ratio of 2,000 to 1. With a limiting gas-oil ratio of 2,000 to 1, you come closer into balance with the relative withdrawal rate, being about 3 to 1 for the well with a gas-oil ratio above 2,000.

Q (By Mr. Howell) What did you conclude should be your recommendation to the Commission as the proper limiting gas-oil ratio in this pool?

A Due to the nature of a reservoir where you have your apparent gas cap with an oil rim, my recommendation would be to place a limiting gas-oil ratio of 2,000 to 1.

Q Why would you select that particular ratio in preference to 6,000 to 1?

A Well, as evidenced by the chart at the top there for limiting gas-oil ratio of 6 to 1, your relative reservoir withdrawal rate would be substantially higher with the higher gas-oil ratio limit so that your oil wells that have the current gas-oil ratio around 2,000 would suffer some loss and also, if I might say, future expansion of the area, in which case you may find your ratios even lower; the inequality would be increased.

Q In your opinion, would the establishment of a 2,000 to 1 ratio result in a reasonable balance of volumetric withdrawal between wells?

A Yes, sir.

Q Now, is there anything further you would like to say in connection either with the spacing of wells or the gas-oil ratio limitation?

A I don't believe so.

Q Now, what would be the effect of permitting 6,000 to 1 ratio withdrawals from the gas cap as to any wells which would be completed in the northern portion of the field that came in initially with gas-oil ratio of less than 2,000 to 1, as to migration of oil?

A Well, in that instance, I think that it would cause a decrease in pressure in your gas area, due to withdrawals, the higher rate of withdrawals, volumetrically speaking, which would cause the oil from the oil rim section to migrate into the gas section, and assuming that that occurs, your loss would be substantial.

Q That would be oil that never would be recovered --

A That's correct.

Q -- if that migration should take place?

A That's correct.

Q Did you make any studies as to the relative economics of wells completed on the spacing which you've recommended?

A Yes, sir.

Q Would you please state to the Examiner and for the record what your studies are and what conclusions you've reached?

A Well, I assume that we would have a recovery of 82 barrels of oil per acre foot for an oil well, and the associate gas would be 236 MCF per acre foot. Assuming that 20 feet of net pay would be encountered, the oil recovery on 40 acres would be 65,600; the associate gas would be 188 million cubic feet. Assuming that the net income per barrel would be a dollar ninety-five, which would throw out your royalty and allow some for lifting cost but not trucking, and assigning about eleven cents to the gas, the net return for a well on 40 acres would be $148,500. Now, I assume that an oil well to the Gallup section not single completion, com-

plete with a pump would cost around 120,000 --

Q That's a single completion to the Gallup?

A Single completion. The return to your investment on that basis would be 1.2. Considering 80-acre spacing, an oil well would be assigned reserves of 131,200, and gas reserves of 376,000,000. Using the same figures for the average oil and gas price, we would have returned $297,000, which would be a return to your investment of 2.5 on gas wells. In a gas area with little or no oil, the gas reserves for 40 acres would be 328,000,000 cubic feet. Assuming eleven cents for the average price of gas, that would be $35,800, which applied against a well cost estimated at $100,000, there would be no payout. On 80-acre spacing, estimated reserves would be 656,000,000 cubic feet. Using the same gas price figure, the return would be 17,500. That applied against a hundred thousand dollar well cost would still not result in payout. On 160-acre spacing, using one million, three hundred twelve cubic feet reserve, the return would be $143,000 with a net return of 1.4. On 320 acres, estimated reserves of two million six hundred thirty-four thousand, the net return would be 286,000, or a return on investment of 2.9. So, it is indicated with wider spacing, the economics are vastly improved.

Q Now, in a reservoir of the character of this Angels Peak-Gallup Pool, with the permeability such as you find there, does gas pass through the formation more readily than oil?

A Yes, sir.

Q And in order to accomplish a leveling or equality of withdrawal, would it -- is it necessary to have a larger area surrounding a gas well than one would have for an oil well to produce the reserves attributable to each within the same period of time?

A Yes.

Q So that in order to achieve a rateable take as between wells, in your opinion, it is proper to give a well classified as a gas well a larger acreage factor than you give the oil well?

A That's right.

Q Now, have you considered the question as to what should be the breaking point as to whether a well be classified as an oil well or a gas well?

A Only generally, that being a ratio of 30,000 to 1.

Q What is your reason for selecting that point?

A That would be the equivalent point, we will say, assuming three dollars for your oil and ten cents for your gas, that ratio would result in about 30,000 to 1, purely arbitrary.

Q Now, can you think of any other points that you've covered in your study or any other testimony you would like to add as a result of whatever other witnesses may have said, or any other comment you would like to make in the form of recommendations to the Examiner?

A I believe that pretty well sums it up.

MR. HOWELL: That's all. We offer El Paso's Exhibits 1 and 2 in evidence.

MR. NUTTER: Without objection these Exhibits will be received.

MR. HOWELL: I think that's all of this witness.

MR. NUTTER: Does anyone have any questions of the witness?

CROSS EXAMINATION

QUESTIONS BY MR. SPERLING:

Q Mr. Lemon, referring to your Exhibit 2, which I believe reflects your estimates of reservoir voidance, what factor, if any, did you assign to sand thickness within these relative zones?

A Actually, this would be based purely on a stock tank barrel of oil being produced.

Q Could you explain to us how, if you introduced the element of sand thickness within these respective areas, this picture might be changed?

A It is possible that change in thickness would alter the resulting pressure, say, brought about by these withdrawals.

Q And to what extent do you think that that might occur?

A I can't say.

Q You made no study of sand thickness with reference to this?

A No.

Q I see. Now, with the withdrawal that you have proposed here, would you anticipate that with the production of oil on the basis that you propose that there would be expansion to any extent of the so-called gas cap into the oil rim?

A Well, the idea in mind here was that, assuming an average thickness, at least the pressures in the oil and gas would be essentially the same, thereby minimizing any travel of your gas or gas-oil contact.

Q Well, now, you say minimizing. Is that the same as saying it does not occur?

A I would say it will hold it to as -- well, I can't say whether it would occur or not. I will just say that this would minimize any difference that might occur.

Q Then, you are saying that it is possible that there will be expansion of the gas cap area?

A I think that's a general --

Q And with that expansion, do you ordinarily anticipate that oil in place within the gas cap area will migrate toward the oil area?

A I don't think that you would have much oil migrating from the gas cap to the oil zone.

Q In other words, the gas might migrate, but it would leave the liquid within the gas cap area in the gas cap?

A The amount of liquid in the gas cap as oil would be, I would say, rather small.

Q Well, that depends upon what you classify as oil and what you classify as something else?

A That's correct.

Q Do you do that on the basis of gravity?

A I would say that that would be a possible means.

Q Well, what effect would the differential in gravity have with reference to the migration problem that we have been discussing or the possibility?

A I don't think it would have any.

Q Well then, you do know that there are large quantities of associated liquids in the gas cap area?

A In the gas?

Q Sir?

A In the gas?

Q Yes.

A Yes.

Q Would you normally anticipate that with continued production from both the gas and the oil areas, that the gas-oil ratios in the oil area would increase?

A They would.

Q With that increase, additional wells that were drilled might very well anticipate gas-oil ratios in excess of those already drilled, isn't that true?

A That's possible.

Q So that assuming the location or the possibility of

discovery of wells having in the ratio of 1,000 to 1 is pretty remote, isn't it?

A Well, I would say that the fact that the lease appears to be opened ended, that it is highly possible that you would find one with substantially lower ratios than those that we have now, that is, in the range of a thousand or so, considering the solution ratio of 620, it would depend on how much depletion you suffered at the time you completed your well. That is, it is possible that by the time you drilled some of the other areas, that the pressure would have decreased to where you would encounter the wells, actually an oil section, but with sections higher than the solution ratio.

Q What affect would that have on a gas-oil ratio of 2,000 to 1, if you encountered that condition?

A How do you mean?

Q I mean, would that affect your projection here and your recommendation?

A No.

Q Have you computed the average gas-oil ratio within the so-called oil rim?

A I -- not in any detail.

Q Has El Paso taken any bottom hole samples which would, as I understand, furnish much more concrete evidence for the reservoir study that you have attempted with the information at hand?

A Not to my knowledge.

Q Would such samples provide considerably more reservoir information?

A Well, I would say that it would help.

Q Is it your opinion that within the oil rim that the bubble point has been reached with reference to the gas in solution?

A I would say that the gas contact, you would have saturated oil to begin with, so that it is always saturated, you might say, at the contact.

Q Have you calculated area-wise this gas-oil contact area?

A Area-wise?

Q Yes. I mean within the field.

A You mean simply area-wise or volume-wise?

Q Area-wise.

A No, sir.

Q You are not prepared to say where that is occurring at the present time with reference to the field location?

A Well, I would say, based on the current completions that pure saturated oil has not been encountered, that is, wherein what would be considered a transition area.

Q Would you say that with additional development in the field, with the increasing gas-oil ratios that you anticipate, that the average of the gas-oil ratios in the future are much more likely to be in the neighborhood of 4,000 to 1 than they are in

2,000 to 1?

A In which areas are you referring to, the areas that might be indicated to be productive?

Q The oil areas, yes, sir.

Q I think it would be a matter of location, that would have a great deal to do with it, that is, if you should get far enough north there, I believe that the ratios would be closer to 2,000.

Q Well, that's purely speculation, isn't it, Mr. Lemon?

A Well, considering the fact that the reservoir hasn't been delineated, I think it would be a reasonable point.

Q Have you made any study at all, or have you taken into consideration in the preparation of your Exhibits here and your testimony, the experience Pan American had with the Frost Well?

A The well they are currently completing?

Q Yes, sir.

Q I do not have any actual up-to-date information -- excuse me -- I would say that based on what I heard that there was not a great deal of associated gas being produced through the load oil, which would indicate in that particular area it is possible that low ratio oil was being encountered.

Q Have you examined the log on that well to determine indications of permeability and sand thickness?

A I did not actually make the determination of sand

thickness.

MR. SPERLING: That's all.

QUESTIONS BY MR. PAYNE:

Q Mr. Lemon, I take it that you agree generally with Mr. Marshall, the Pan American witness, that there will be greater ultimate recovery from this reservoir if the limiting gas-oil ratio is 2,000 to 1?

A That's correct.

Q Now, is that because the higher gas withdrawal rates would cause the oil to migrate into the dry sands?

A That was my opinion.

Q Now, if the Commission adopted 80-acre spacing in this pool, for both oil wells and gas wells, and adopted a 4,000 to 1 gas-oil ratio limitation, would not the gas withdrawal rate be the same as under your proposal and under Pan American's proposal?

A It would be essentially the same.

MR. PAYNE: Thank you. That's all.

MR. NUTTER: Any further questions of Mr. Lemon?

MR. HOWELL: I have one more I would like to ask.

REDIRECT EXAMINATION

QUESTIONS BY MR. HOWELL:

Q Would a gas well, on 80-acres, with the reserves that you give the area be an economical way?

A According to my calculation, a gas well on 80 acres would return $71,500 as compared with a hundred thousand dollars

development cost, which would not be economically sound.

REDIRECT EXAMINATION

QUESTIONS BY MR. PORTER:

Q If it would be under the 2,000 to 1 ratio?

A Actually, the ratio would only determine how much gas per day would be produced. The reserves would not be changed. That is, these reserve figures are only average.

QUESTIONS BY MR. NUTTER:

Q Mr. Lemon, I take it you don't agree with the Weaver witness who stated it costs approximately $78,000 to drill a well?

A I base my assumption on indicated cost on our Huerfano Well No. 106.

Q You didn't take into consideration the drilling costs of any other wells?

A No, sir.

Q Was the 106 an average well, as far as the completion cost?

A Well, I assume that based on the well cost on Mesaverde wells, at around eighty-five thousand, considering this as somewhat deeper, this hundred thousand dollars was a reasonable figure.

Q What's this one hundred twenty?

A That's including the pumping equipment and the necessary tank facilities.

Q Well, you don't have to have the pump equipment on the gas well?

A No, sir, I use the hundred thousand on the gas well, one hundred twenty thousand on the oil well.

Q Just what did you use to determine these reserves that you came up here with, Mr. Lemon?

A I used the core analysis that we had on the Huerfano Well No. 106. The fact that the indicated pay in that well was 22 feet, I assumed that a 20-foot interval would be a reasonable sand thickness for an average figure.

Q What porosity did you use for an average?

A Twelve point nine percent.

Q Twelve point nine?

A That's right. That was the same value that Mr. Weaver's witness reported.

Q Well, what do you use for determining the reserves in the oil area?

A I assumed a 20-foot interval there also; average thickness.

Q And the same porosity?

A Same porosity.

Q Now, I notice that in comparing the recovery rates for the various size proration units, you just doubled up on them?

A I ratioed them up.

Q You are assuming that you would obtain the same amount of production per acre regardless of the size of the area that is being drained?

A For this purpose I was, yes.

Q Is this usually the fact of the matter through?

A Well, I would say so, yes, sir. Generally speaking, in a depletion drive reservoir spacing is not as important. Therefore, you can ratio acreage that way.

QUESTIONS BY MR. PAYNE:

Q Mr. Lemon, that seventeen thousand dollar figure you gave for a gas well on 80 acres, did that take into consideration the liquids that would be recovered from that well?

A In that particular case I assumed that that well would have no liquids. In assuming that, we would have a well, say, that would be -- well, say, would be kind of half and half, assume ten feet of oil and ten feet of gas. On 80 acres, that particular well would recover $184,000, which would, due to the liquid anyhow, show some increase.

Q Do you know of any so-called gas well in this pool that makes no liquid?

A Well, I might add that the data that I based that particular assumption was the oil production that was reported to the Commission, and in those particular examples there was very little oil reported. That is, for instance, the ratio would be in excess of 30,000. In fact, in one instance here, it is a hundred thousand to one, so that with reference to the hundred thousand ratio, that was in the Weaver McAdams No. 4. The Huerfano No. 99 would be based on the reported production, a hundred and

fifty thousand to one. So that, for comparison purposes, your liquid recovery would not be substantial.

MR. PAYNE: Thank you.

MR. NUTTER: Any further questions? Mr. Fischer.

QUESTIONS BY MR. FISCHER:

Q Mr. Lemon, in line with this liquid produced from gas wells, isn't it much cheaper to produce from a gas well than an oil well?

A Assuming that no pump equipment is needed.

Q And lifting cost, too.

A That's right.

MR. NUTTER: Any further questions?

QUESTIONS BY MR. UTZ:

Q Mr. Lemon, using your 2,000 to 1 ratio, producing the pool at that ratio, in your opinion, what would the gas-oil contact be? Would it be static, or would it move in one direction or the other?

A Considering the current completions and assuming also that the allowables would be worked in the manner described here, I would say that it stays close to its current position whenever that rule is put into effect.

Q How about 4,000 to 1 ratio?

A 4,000 ratio, considering current completions, I would predict that it would possibly move or actually would recede into the gas area. That is pulling the oil in.

Q Move up structure?

A It would move up structure, that is correct.

Q And, of course, 6,000 to 1, then, in your opinion, it would move still more?

A That's correct.

Q When oil moves up structure into a gas cap, it wets the sand, does it not?

A In that case it would wet the sand and would need to build up approximately the same residual saturation that you would have in the oil section, that is, the removable oil so that a substantial portion of it would be lost.

MR. UTZ: That's all I have.

MR. NUTTER: Any other questions?

QUESTIONS BY MR. FISCHER:

Q Mr. Lemon, are you familiar with El Paso's Marye wells in this area?

A In what respect?

Q I mean as to the amount of cement used.

A No, sir.

Q You are not?

A No, sir.

MR. FISCHER: That's all I have.

MR. NUTTER: Any other questions of Mr. Lemon?

MR. SPERLING: Just one.

MR. NUTTER: Mr. Sperling.

QUESTIONS BY MR. SPERLING:

Q Mr. Lemon, have you made any calculations on the length of the payout period on the economic study that you have made there on the respective limiting gas-oil ratios of 2,000, 4,000 and 6,000 to 1?

A Yes, sir.

Q And what did you determine?

A Assuming 80-acre spacing and an oil well producing 150 barrels per day with a 6,000 limit and producing at 6,000 limit, I estimate that the return would be in the neighborhood of $104,000 a year.

Q What about 4,000?

A On the 4,000, I estimate that the return would be $160,000 -- excuse me -- $150,000. And on 2,000, the return would be $119,000 a year.

Q That is assuming a 2,000 to 1 gas-oil ratio --

A That's right.

Q -- and not restricted?

A That's right.

Q Which would not be typical of the wells, at least so far as the present development is concerned, is that right?

A That's correct, except for the three wells that have been pointed out that are producing less than 3,000.

Q If they suffer a penalty, naturally, the payout

period would be standard?

A It would be standard.

Q Did you make any comparable study on the gas cap wells?

A A gas well assuming a spacing of 320 acres with the gas production being based on a limit of 6,000 to 1, estimated $142,600 a year. On a well with a 4,000 limit, that is, for the allowable, would be based on 4,000 to 1 ratio, the income would be $94,000 a year. 2,000 ratio, the income would be $47,000.

Q What about assuming a 160-acre spacing, would that simply cut your --

A I would say for this purpose, it would cut the income in half.

Q So 4,000 to 1, it would be half of $94,000?

A That's correct.

Q Annual income?

A That's right.

MR. SPERLING: Thank you. That's all.

MR. NUTTER: Any other questions of Mr. Lemon? You may be excused.

(Witness excused)

MR. NUTTER: We will have a ten-minute recess.

(Recess)

MR. NUTTER: The hearing will come to order, please. Mr. Howell, did you have another witness?

MR. HOWELL: We have.

(Witness sworn)

DAVID H. RAINEY,

called as a witness, having been first duly sworn on oath, testified as follows:

DIRECT EXAMINATION

BY MR. HOWELL:

Q Please state your name for the record.

A David H. Rainey.

Q By whom are you employed and in what capacity?

A El Paso Natural Gas Company as an administrative assistant in the proration department.

Q In your capacity as an administrative assistant, have you studied various proration rules that this Oil Conservation Commission of the State of New Mexico has adopted --

A Yes, sir, I have.

Q -- for various pools?

A Yes, sir.

Q Now, first of all, did you prepare the set of rules which have been distributed marked El Paso Natural Gas Company's Exhibit No. 3?

A Yes, sir, I did.

Q Will you go through the rules without necessarily

reading them word for word, and give an explanation of the rules and also your reason for suggesting the particular rule, and if it is derived, or the basis of it is found in rules applicable to other pools, you might mention?

A All right, sir. Rule 1 is the standard rule that goes in nearly all pool rules as to the designation of a wild cat or a field well. Rule 2 is a standard location rule. Rule 3 is the non-standard proration unit type rule which follows the standard form except -- well, it follows the standard form period. Beg pardon, Rule 3 is not the non-standard proration rule. It is the non-standard proration rule, and it is standard. Rule 4 is a non-standard proration unit rule, and follows very closely, except where I changed the wording slightly to fit the particular case here in Paragraph A. We have changed the wording somewhat from the standard to take care of 80-acre oil units and 320-acre gas units. And Rule 4 is the standard provision for administrative approval of non-standard units. Rule 5 is a standard rule which goes in most of the field rules, exempting this particular pool from the statewide Rule 104, Paragraph K.

Q You might mention for the record what statewide Rule 104, Paragraph K is.

A Statewide Rule 104, Paragraph K is a rule which refers to standard statewide spacing and provides that the provisions of Paragraph H and I which do pertain to standard spacing in the State of New Mexico shall apply only to wells completed

after January 1st, 1950. And this material is taking care of exempting these particular Rules from the provisions of statewide Rule. Rule 6 is a rule which, I believe "an oil well in the Angels Peak Pool shall be a well producing a gas-oil ratio of less than 30,000 cubic feet of gas per barrel." There has been considerable discussion about that, and I think it is pretty well recognized that any breaking point ratio that is put in there is more an arbitrary figure, but as Mr. Lemon testified, that seemed like a reasonable breaking point to us on the basis of approximate relative basis of economic values on the production.

Rule 7 reads that "a gas well in the Angels Peak-Gallup Pool shall be any well producing with a GOR of 30,000 cubic feet of gas per barrel of oil or more." That is just a companion Rule to 6, to define gas wells more specifically.

Rule 8. "No acreage shall be simultaneously dedicated to an oil well and to a gas well in the Angels Peak Gallup Oil Pool."

Rule 9 is a no flare order paragraph.

Rule 10. "In order to prevent waste, the gas-oil ratio limitation for the Angels Peak Gallup Oil Pool shall be 2,000 cubic feet of gas per barrel of oil produced." I might point out at this juncture that all of these Rules have been taken as nearly as possible from previously written Rules in some field or another. They didn't, of course, all come from the same field Rules, but the wording is the wording that has been used, as far as possible, in other field Rules that the Commission has written.

Rule 11 is merely a Rule providing that all gas and liquid shall be measured and reported to the Commission in compliance with their rules and regulations.

Rule 12 provides that we shall have semi-annual gas-oil ratio survey periods in the Angel Peak Gallup Pool in the months of March and April and September and October of each year, in addition to the initial gas-oil ratio required in Statewide Rule 301, and then further provides that they should be reported to the Commission in accordance with the appropriate Statewide Rules.

Rule 13. "In order to obtain needed reservoir data, bottom hole pressure tests shall be taken immediately following the gas-oil ratio tests required in Rule 12 and reported to the Commission in compliance with various Statewide Rules." And I think it has been pretty adequately testified to here today that this is a pool of relatively high permeability, and for that reason, I have provided that the shut-in pressure shall only be seventy-two hours. However, if there is some difference of opinion on that, it was just a figure that I put in; it could be seven days if the Commission prefers.

Rule 14 (a) "Any oil well completed on a tract of less than 80 acres in the Angels Peak Gallup Oil Pool shall be permitted to produce an allowable equivalent to the amount determined by," and the word "A" should be inserted, "by a ratio which has the acreage dedicated to the unit as its numerator and 80 acres as its denominator times the normal unit allowable for an 80-acre oil well

producing at the depth of the Angels Peak Gallup reservoir."

Rule 14. (b) "Any gas well completed on a tract of less than 320 acres in the Angels Peak Gallup Oil Pool shall be permitted to produce an allowable equivalent to the amount determined by ratio which has the acreage dedicated to the unit as its numerator and 320 acres as its denominator times the normal unit allowable for a 320-acre gas well producing at the depth of the Angels Peak Gallup reservoir."

And Rule 14 (c) provides how the normal unit allowable for 320-acre well should be determined. "For purposes of determining the permitted gas production, the allowable of a top allowable oil well shall be determined by multiplying the normal unit allowable for the Northwest Area by a factor of 2.77, as provided in Statewide Rule 505. The gas limit for a normal 80-acre unit will then be determined in accordance with the limiting ratio as hereinabove set out and in accordance with Statewide Rule 506. Gas wells as classified in compliance with this Order will be permitted to produce up to four times the permitted 80-acre gas limit based on the actual number of acres dedicated to the particular gas well. For purposes of this Rule, any well that has between 316 and 324 acres dedicated to it shall be deemed to be a standard gas unit."

Now, those provide that after you have determined basically -- they provide that after you have determined your basic allowables and basic units, that fractional units shall be in direct proportion to the base 320 and base 320-acre units for oil and

gas. I believe that's all the comments I have.

Q Are you aware of any pool in the state in which there is a spacing established for oil wells, and a different spacing established for gas wells in the pool?

A Yes, sir. There are two pools that I have been able to find, and I think I have looked through all the rules, all the field rules sufficiently to check them out. The Blinebry gas and oil pool in Lea County, New Mexico, is in the rules, the same pool, and it is even contemplated in those rules that a well can fluctuate back and forth from oil to gas, and the spacing for gas wells is 160 acres in the Blinebry gas pool and 40 acres in the Blinebry oil pool. But, as I say, they are the same pool by definition except for the description as to the classification as to whether it is an oil well or a gas well. Also, the Tubb gas pool and Tubb oil pool have separate field rules written for them, but the acreage delineating the two pools both horizontal and vertical is identical. There is a 160-acre gas unit Tubb pool and 40-acre oil unit. As I say, they are separate field rules, but the horizontal and vertical limits are identical.

Q Do you have any other comments you wish to make?

A I might say that it seems it would be a little simplier to go ahead and carry this as the Angels Peak-Gallup oil pool, and provide for different spacing. However, we would have no objection, and I don't think anybody else would, to saying you've got an Angels Peak-Gallup oil and an Angels Peak gas pool, and set

in the same horizontal and vertical limits, which would be exactly what has been done in the Blinebry and Tubb areas.

MR. HOWELL: We offer our Exhibit 3 in evidence.

MR. NUTTER: Without objection, it will be received.

MR. HOWELL: That's all our testimony.

MR. NUTTER: Any questions of Mr. Rainey?

CROSS EXAMINATION

BY MR. FISCHER:

Q Mr. Rainey, being employed by the Company that also takes the gas in that pool, do you know of any other line besides the one line, gas gathering line in that pool?

A As Mr. Dugan testified earlier, I think the line is 150 pound line, but we hold back pressure on those wells because our Gallup and Dakota contract provide for 500 pound pressure.

Q Is this only the one line?

A That's right, to the best of my knowledge.

Q In your proposed rules, would you want to put in there a deal where the Secretary Director could approve administratively for exceptions to this no-flare order?

A In cases.-- I didn't realize that there was any flaring going on out there. All the wells were hooked, were capable of producing into our system, and I think it would be appropriate in cases like these two oil wells, where there is relatively insignificant volumes of gas and that it is virtually impossible to do anything else with it.

MR. FISCHER: Thank you. That's all.

QUESTIONS BY MR. NUTTER:

Q Mr. Rainey, it appears from Rule No. 11 that if you had more than one oil well on a lease, you would have to have a separator on every one of those oil wells. Did you intend to --

A That Rule is copied directly from similar rules in other field Rules in the State of New Mexico, and I hadn't given that particular question too much thought. Let me re-read the Rule, if you will.

It is my impression that there is a provision in the Statewide Rules, and it is generally accepted procedure to get a permit from the Commission to commingle various types of production, and that probably would be taken care of as an exception under that rule. I think there should be some method, however, particularly in view of the apparent controversy over the reservoir in general to measure the liquid and gas from each of the zones separately so that we can learn a little more about what this reservoir might be and what we might expect from it.

MR. NUTTER: Any further questions of Mr. Rainey?

QUESTIONS BY MR. PAYNE:

Q Mr. Rainey, do you believe that the special rules for the Tubb gas pool and the Blinebry gas pool was the best possible way to handle those two pools?

A I think so, yes, sir. It is - my recollection of the oil situation in those pools is that they were but gas pools

at the outset, and suddenly there were -- two oil wells appeared in the middle of them. We had a bunch of gas wells drilled, and there were some oil wells drilled along the rim, and I can't really conceive of any other way to handle the situation, and I think it is probably within the scope of the Commission to either do it in one set of field rules or write two separate sets with the same horizontal and vertical limits for the two pools.

Q How about pool-wide unitization? Don't you think that is a more expeditious way to handle a situation like that, especially when you have wells in a small pool like we have here?

A My feeling on that is that there is some considerable doubt, and in light of the testimony here today and what I know about this reservoir on my own, as to whether or not this is a small field or whether it is going to be a pretty extensive field.

Q Even assuming it is extensive, there is a relatively small number of operators, are there not?

A Depends on how far it is extended because there are other operators in adjoining sections who produce at the present time.

Q The pool, as we know it now, only has three operators, does it not?

A To my knowledge.

Q Do you know of any oil pool in New Mexico that has double spacing, one for oil wells and one for gas wells?

A No, not a pool defined as such, other than, as I say, the Tubb and Blinebry oil pool, or synonymous with the Tubb and Blinebry Gas Pools.

MR. NUTTER: Mr. Rainey, has the Commission created a Tubb oil pool?

A I believe so.

Q You made reference to oil wells in the Tubb gas pool. It was my impression that there was no separate Tubb oil pool.

A I stand corrected. There is no separate Tubb oil pool, but there are oil wells in the Tubb pool on difference spacing than the gas wells.

MR. NUTTER: Any other questions of Mr. Rainey? If not, he may be excused.

(Witness excused)

MR. NUTTER: Does anyone have anything further they wish to offer in this case?

MR. ERREBO: I have just a few words in way of a statement. If the Commission please, the applicant has no objection to 320-acre gas spacing as proposed by Pan American and El Paso. They have put on good evidence in this regard, and we certainly have no objection to it. One thing I would like to effectively ask the Commission to keep in mind in considering this case, and that is, it has been brought out here today that certainly the

wells on the Weaver lease will receive comparatively high ratios under the rules which we advocate, but I think that we have to keep in mind the fact that we are thinking in terms, when we think about allowables, of the allowables that are taken from the Mesaverde and Pictured Cliffs Pools in the San Juan Basin. Those wells, of course, are relatively poor wells compared to the nine and ten million wells that there are in this field. And I think that that fact has to be kept in mind, and certainly we don't want to -- I don't think we should reduce the good wells which Mr. Weaver has been fortunate enough to find, to the denominator of a poorer well which we find in the Mesaverde and Pictured Cliffs throughout the San Juan Basin area. Another thing is that expansion of the gas cap is something which has been talked about quite a bit here today. All witnesses have admitted the gas cap would expand. Now, when that gas cap expands even under 2,000 to 1, when that gas cap expands, it is Mr. Weaver's gas that is migrating to the offset leases to the north, it is Mr. Weaver's oil that underlies the northeast portion of his lease that may be pushed on to those other leases. Certainly, we believe that is unequitable. The Commission does not want to permit that, and we think certainly the way to slow down that expansion is to adopt 6,000 to 1 ratio, which we propose here today.

MR. NUTTER: Anyone else have anything?

MR. BUELL: On behalf of Pan American, I hope we have made our position clear enough in the record. Thank you.

MR. NUTTER: If there is nothing further in case --

MR. COOPER: May I make a statement, please? My name is A. T. Cooper with Three States Gas Company. We are a non-operating interest owner in that area and we would like to ask the Commission to adopt the Rules proposed by El Paso.

MR. NUTTER: Any further statements? If not, we will take Case 1641 under advisement, and the hearing is recessed.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

We, Ada Dearnley and J. A. Trujillo, Notaries Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by us in Stenotype and reduced to typewritten transcript by us, and that the same is a true and correct record to the best of our knowledge, skill and ability.

WITNESS our Hands and Seals this, the 15th day of May, 1959, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:
June 19, 1959

Joseph A. Trujillo
NOTARY PUBLIC

My Commission Expires:
Oct 5, 1960

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 1641 heard by me on May 7, 1959.

....., Examiner
New Mexico Oil Conservation Commission

DEARNLEY, MEIER & ASSOCIATES
GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
Phone CHapel 3-6691

CASE 1641 - TRANSCRIPTS FOR 1959

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