BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO
Santa Fe, New Mexico
July 16, 1958

TRANSCRIPT OF HEARING

Consolidated Cases

1276
1325
1384

DEARNLEY - MEIER & ASSOCIATES
INCORPORATED
GENERAL LAW REPORTERS
ALBUQUERQUE, NEW MEXICO
3-6691 5-9546

NEW MEXICO OIL CONSERVATION COMMISSION

Mabry Hall

Santa Fe, NEW MEXICO

ILLEGIBLE

REGISTER

HEARING DATE July 16, 1958 TIME: 9:00 a.m.

NAME:	REPRESENTING:	LOCATION:
J. J. Deaver	Shell Oil Co.	Shell Bldg, Houston Tex
E. J. FISCHER	OCC	SANTA FE.
M. T. Smith	Shell Oil Co	Midland, Tex
R. E. Powers	[illegible]	[illegible]
[illegible] W. Stephens	GULF OIL CORP'N	FORT WORTH
Bill Kastler	"	Roswell
[illegible] Kenney		[illegible]
J. E. Damewood	Indiana Oil Purch Co	Midland Tex.
A. L. Jago	Shell Oil Co	Houston Tex
G. T. Tannison	" " "	" "
H. M. Bayer	Gulf Oil	Ft Worth,
J. H. McClure	Shell P.L.	Farmington
R E Broschat	Amerada	Hobbs
O. C. McBryde	Amerada	Midland
G. L. Shoemaker	Indiana Oil Purch. Co	✓
John Mills	The Texas Co	✓
Bill McCombs	[illegible]	[illegible]
Nancy Royal	W. M. Stackhouse	Santa Fe

NEW MEXICO OIL CONSERVATION COMMISSION

Mabry Hall

Santa Fe, NEW MEXICO

ILLEGIBLE

REGISTER

HEARING DATE July 16, 1958 TIME: 9:00 a.m.

NAME:	REPRESENTING:	LOCATION:
J L Hackney	Humble Oil & Ref Co	Midland, Texas
[illegible]	Humble	Midland
[illegible]	"	Roswell
Bill Sullivan	E.P.N. Gas Prod. Co	Farmington
Sid [illegible]	McWood Corp	Abilene
R L McAlhaney	McWood Corp	Midland
[illegible] M. McNutt	E.P Nat. Gas Prod Co	El Paso
John W. Runyan	O.C.C.	Hobbs
E. L. Kendrick	OCC	Aztec
C. Kidd	Amerada	Tulsa
D. E. Phelps	Amerada	Monument, N.M.
Dan Harrison Jr.	Franciscan Oil	Hobbs
F. Norman Woodruff	El Paso Natural Gas Co	El Paso
S.C. Capps	Amerada Pet. Corp.	Monument N.M.
R L Denton	Magnolia	Midland Tex
[illegible] Moore	Continental	Roswell, N.M.
E.D. Colthorp	Continental	Artesia, N.M.
C.T. Lucas Jr.	Cactus Pet., Inc	Midland Texas

NEW MEXICO OIL CONSERVATION COMMISSION

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HEARING DATE July 16, 1958 TIME: 9:00 a.m.

NAME:	REPRESENTING:	LOCATION:
Jim Knauf	U.S.G.S.	Roswell
E.M. Thomason	USGS	"
T.W. McGrath	[illegible]	"
Booth Kellogg	[illegible]	Denver
Robert N. Maxwell	[illegible]	Denver
John L. Hobbs	Shell Oil	Los Angeles.
R.R. Robison	" "	Farmington
F.C. Hunt	" "	Los Angeles
Dick Booker	CSO	Midland
J.R. Cuthrie	[illegible]	Midland
J.W. Brown	[illegible]	Roswell
E.C. Arnold	NMOCC	Aztec
H.L. Mitchell	[illegible]	[illegible]
R.S. Christie	Amerada	Tulsa, Okla.
J.W. Baulch, Jr.	El Paso Natural Gas	Fed. Bldg.
Jason W. Kellahin	Kellahin & Fox	Santa Fe
[illegible]		Hobbs
M.B. Nelson	Great Western Drilling Co.	Midland.
A.L. Montgomery	OCC	

NEW MEXICO OIL CONSERVATION COMMISSION

Mabry Hall

Santa Fe, NEW MEXICO

ILLEGIBLE

REGISTER

HEARING DATE July 16, 1958 TIME: 9:00 a.m.

NAME:	REPRESENTING:	LOCATION:
[illegible]	Hervey, Dow & Hinkle	Roswell
Roger Cooley	Cooley & Holcomb	Midland
J R Graham	Standard Oil of Texas	Houston
R L McGannon	"	"
F Rutherford	Continental Oil Co	Ponca City, Okla
M L Armstrong	OCC	Artesia

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BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO
Santa Fe, New Mexico
July 16, 1958

IN THE MATTER OF:	
The hearing ordered to be called by Order No. R-1031 to permit Amerada Petroleum Corporation and other interested operators to appear and show cause why 320-acre spacing and the Special Rules and Regulations for the Bagley-Lower Pennsylvanian Gas Pool in Lea County, New Mexico, as set forth in Order R-1031 should be continued in effect beyond August 31, 1958.	Case 1276
In the matter of the hearing ordered to be called by Order No. R-1091 to permit Amerada Petroleum Corporation and other interested operators to appear and show cause why 320-acre spacing and the Special Rules and Regulations for the Bagley-Upper Pennsylvanian Gas Pool in Lea County, New Mexico, as set forth in Order R-1091 should be continued in effect beyond August 31, 1958.	Case 1325
In the matter of the hearing ordered to be called by Order No. R-1136 to permit Amerada Petroleum Corporation to appear and present additional evidence as to the proper designation of the oil producing intervals in its State BTO No. 1 Well located 990 feet from the South line and 2310 feet from the East line of Section 34, Township 11 South, Range 33 East, in the Bagley-Pennsylvanian area of Lea County, New Mexico, and to show cause why the above-described well should be permitted to continue to produce as a dual completion.	Case 1384

BEFORE:

Mr. A. L. Porter
Mr. Murray Morgan

TRANSCRIPT OF HEARING

MR. PAYNE: In the matter of the hearing ordered to be called by Order No. R-1031 to permit Amerada Petroleum Corporation and other interested operators to appear and show cause why 320-acre spacing and the Special Rules and Regulations for the Bagley-Lower Pennsylvanian Gas Pool in Lea County, New Mexico, as set forth in Order R-1031 should be continued in effect beyond August 31, 1958.

In the matter of the hearing ordered to be called by Order No. R-1091 to permit Amerada Petroleum Corporation and other interested operators to appear and show cause why 320-acre spacing and the Special Rules and Regulations for the Bagley-Upper Pennsylvanian Gas Pool in Lea County, New Mexico, as set forth in Order R-1091 should be continued in effect beyond August 31, 1958.

In the matter of the hearing ordered to be called by Order No. R-1136 to permit Amerada Petroleum Corporation to appear and present additional evidence as to the proper designation of the oil producing intervals in its State BTO No. 1 Well located 990 feet from the South Line and 2310 feet from the East line of Section 34, Township 11 South, Range 33 East, in the Bagley-Pennsylvanian area of Lea County, New Mexico, and to show cause why the above-described well should be permitted to continue to produce as a dual completion.

MR. KELLAHIN: Jason Kellahin, Kellahin and Fox representing Amerada Petroleum Corporation. At this time I would like to move for the consolidation of the hearing 1276, 1325 and 1384, all of which

appear on the docket for today. The reason for the consolidation being that the technical information involved in these three cases is similar and the exhibits to be used have been prepared in order that the Commission might have a full and complete picture of all of the producing intervals involved in the area. I believe it would be clearer and would certainly save a considerable amount of time if the three cases were consolidated for purposes of the hearing.

MR. PORTER: Is there objection to the consolidation of Cases 1276, 1325 and 1384? The cases 1276, 1325 and 1384 will be consolidated for the purpose of testimony.

MR. KELLAHIN: We will have three witnesses, Mr. Phelps, Mr. Kidd and Mr. Winger.

MR. PORTER: Let's stand and be sworn at this time.

(Witnesses sworn.)

MR. KELLAHIN: I would like to call as the first witness, Mr. Phelps.

ORVILLE E. PHELPS

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

DIRECT EXAMINATION

By MR. KELLAHIN:

Q Would you state your name, please?

A Orville E. Phelps.

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

A I am employed by the Amerada Petroleum Corporation as

geologist.

Q Where are you employed?

A I'm employed at the Monument Office, Monument, New Mexico.

Q Have you ever testified before this Commission in the past and had your qualifications accepted?

A No, sir, I haven't.

Q Mr. Phelps, would you state briefly for the benefit of the Commission your educational qualifications and experience as a geologist?

A I have a B. S. Degree from the University of Kentucky, Class of 1950, I have been employed under the supervision of Amerada Petroleum since June of '51 to the present time.

Q Where have you worked during that period, Mr. Phelps?

A During that period I have worked two and a half years at the Tatum Office, Tatum, New Mexico and Midland Office, Midland, Texas, and the Monument Office in Monument, New Mexico.

Q Have you had any particular experience in the area involved in the three cases now being heard, Mr. Phelps?

A Yes, sir, I have. At the time that I was at Tatum, New Mexico, the Bagley Field was being defined and I was sitting on the wells that were drilled at that time there.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. PORTER: Yes, sir, they are.

Q Now, Mr. Phelps, have you made a study of the questions

involved in the Bagley-Upper Pennsylvanian and Bagley-Lower Pennsylvanian Pools? A Yes, I have.

Q As well as the area involved in the Amerada State BTO Well No. 1?

A That is correct, sir, I have.

Q Now, referring to what has been marked as Exhibit No. 1, You have the Exhibits before you, do you not?

A Yes, sir, I have.

Q Will you state what that is?

A The Exhibit No. 1 is a plat of the Bagley-Upper Pennsylvanian Gas Pool. It shows with the dotted bands the horizontal limits of the Bagley-Upper Pennsylvanian Gas Pool. The red lines show the individual gas units, the gas wells circled in red are unit gas wells. There's a dashed line running approximately north, in a north-south direction to indicate the line that the cross section was made that will be used later on as an exhibit in this hearing.

Q You said that the gas wells are circled in red. By that, does that refer to wells completed in the Upper-Pennsylvanian Gas Pools?

A That's right. The wells that have been completed in the Upper Pennsylvania Gas Pool.

Q Now, referring to what has been marked as Exhibit No. 2, would you state what that shows?

Exhibit No. 2 is a plat of the Bagley Field showing the Bagley-Lower Pennsylvanian Gas Pool. Again we have a dotted band outlining the horizontal limits of the pool, the red lines indicate the individual gas units, the wells circled in red indicate unit gas wells.

Q Now, referring to what has been marked as Exhibit No. 3, Mr. Phelps, would you state what that is?

A Exhibit No. 3 is a structure map on the top of the Pennsylvanian which is also the top of the Bagley-Upper Pennsylvanian Gas Pool.

Q Is this structure map substantially the same as the structure map which was previously offered in the case involving the Upper Pennsylvanian Gas Pool? A Yes, sir, it is.

Q There have been, however, some changes, is that correct?

A Yes, sir, there has been some minor changes made on it.

Q For what reason?

A Well, different, in two different people contouring and probably a slight difference in the electric log points that could have been picked for it.

Q Did you have some more recent development on which you made some changes too?

A Yes, sir, we have had, a recent well has been drilled since the other maps were made that gave us additional information to make this map on.

Q What are these contours based on, Mr. Phelps?

A Contours are based on correlative points from electric logs or gamma ray neutron logs that are correlated over the entire field.

Q Have you also been able to pick this marker from sample cuttings?

A Yes, sir, this is a point that can be picked from sample cuttings.

Q Now, Mr. Phelps, do these contours indicate the horizontal limits of the pool?

A No, sir, they do not indicate the horizontal limits of the Bagley-Upper Pennsylvanian Gas Pool.

Q They are based then on the structure alone?

A That's correct.

Q Is it productive on the east side of the pool or do you know?

A To my knowledge there's not any production on the east side of the pool in the Bagley-Upper Pennsylvanian Gas Zone.

Q Now, referring to the Exhibit 2, it appears that you show at least partially a separate structure in the northwest portion of the exhibit, what do you base that on?

A I did show a separate structure in the northwest portion of this map, and that's based on two wells that's not shown on this map, one well being the Amerada No. 1 Kelsy which is located in Section 28, Township 11 South, Range 33 East.

Now the point in question here, the top of the Pennsylvanian, or the top of the Bagley-Upper Pennsylvanian Gas Zone, is approximately flat with Mathers No. 1-B Well in the northwest portion of the map. The second well that I used to point was Moss No. 1 State that's located in the section due west of 33 which is Section 32 in the southwest of the southwest quarter, that well was approximately 25 feet low on top of the Pennsylvanian to the Mathers B No. 1 Well.

Q Now, is there another well drilling in the vicinity of this Mathers B No. 1 Well?

A That is correct. The Amerada No. 2 State BTM is at the present time drilling.

Q What is the location of that well?

A That well is located in the southeast of the northeast Section 33, Township 11 South, Range 33 East.

Q It is not shown on this exhibit?

A Yes, sir, it is shown as a drilling well on this exhibit.

Q Now, have any tests been made of the Upper Bagley Pennsylvanian Zone in this well?

A Yes, sir, a test was made on the Bagley-Upper Pennsylvanian Zone and that test gave up 877,000 cubic feet of gas per day on a four hour test. I might also state that the top of the Pennsylvanian was flat to the Mathers B No. 1 Well to the west of the BTM No. 2.

Q You mean then that the structural position of your BTM No. 2

Well is substantially the same as the Mathers B No. 1, is that right?

A That is correct.

Q The Mathers B No. 1 is an oil well, is it not?

A That is correct, the Mathers B No. 1 is an oil well out of the same zone.

Q Now, referring you to what has been marked as Exhibit No. 4, will you state what that is, Mr. Phelps?

A Exhibit No. 4 is a structure map on top of the BTO Oil Zone.

Q Is the BTO Wall No. 1 marked in red?

A No, sir, the BTO Well is not marked in red, but it is located in the southwest of the southeast of Section 34, Township 11 South, Range 33 East.

Q That shows as a dual completion, does it not?

A That is correct.

MR. KELLAHIN: I believe it's marked on the other exhibits.

MR. PORTER: Circled in red?

MR. KELLAHIN: Circled in red.

A I'm sorry.

Q What is the basis of your contours in this exhibit, Mr. Phelps?

A The basis of the contours on this structure map are picked from electric logs on a correlative point that can be carried over the entire field.

Q This Exhibit would indicate that the structure of the BTO

Oil Zone is present over the entire area, is that correct?

A That is correct.

Q Have you any comment to make as to its characteristics throughout the zone?

A Well, the zone is present but porosity is not developed throughout the zone. From the information we have, the only well that porosity has been developed in within that zone is the BTO No. 1.

Q Have you examined cuttings of sample logs in connection with that question? A That is correct.

Q Then you did not find porosity development anywhere except in that one well?

A That's the only well we found it developed in. Now, on our BTM 2, the well that is now drilling, we tested the same zone in that well, we recovered 20 feet of drilling mud with no shows of oil or gas or water.

Q Where would you say then the productive area in the BTO Zone is located in reference to the area shown on the exhibit?

A Just immediately around the BTO No. 1 Well.

Q In your opinion it's not present on any of the offsetting acreage to any extent?

A No, sir, it's not.

Q Now, referring to what has been marked as Exhibit No. 5, Mr. Phelps, could you state what that is?

A Exhibit No. 5 is a structure map on top of the Bagley-Lower Pennsylvanian Gas Zone.

Q Is this exhibit substantially the same as the contour map presented in the previous hearing on the Bagley-Lower Pennsylvanian Oil Pool case? A Yes, sir, it is.

Q There are, however, some changes in it?

A There are some minor changes due to the difference in the contouring and probably some minor changes, one being the recent well that has been completed since the other maps were made that have additional information to use on this one.

Q What well would that be?

A That would be the BTO No. 1 Well.

Q What is the basis of your contours on this map?

A Contours are based on correlative electric log points that can be carried over the entire field.

Q Do you find a definite marker on which you can base that?

A By electric logs you can, yes, sir.

Q Now, does this indicate that the entire area is productive, Mr. Phelps?

A No, sir, this map will indicate on the north, west and south partial limits of the production where to the east production is based partially on structure and porosity pinchout.

Q But primarily the productive area of the Bagley-Lower Pennsylvanian, with the exception of the east side, is a structural

area, is it not?

A That is correct, on the western side of it.

Q Now, Mr. Phelps, referring to Exhibit No. 6 which is the cross section, would you state what that shows? If you like you can refer to the one that has been placed on the board.

A All right. Exhibit No. 6 is a north-south cross section across the Bagley Field as indicated on Exhibit 1 by the dashed line.

Q Does that indicate to you that there is separation of the various zones involved in these hearings?

A Yes, sir. If you would like we will take these zones as they come. The top zone shown in green is the Bagley-Upper Pennsylvanian Gas Zone; as you can see, that's a correlative point that is carried all the way across the field from north to south. The second zone is the BTO Oil Zone, and as we have colored in around the BTO Well it shows that that is the only place that that is productive across there. The separation between the top of the Pennsylvanian, Upper Pennsylvanian Gas Zone and the BTO Oil Zone remains fairly constant and it has a minimum of 78 feet separation with a maximum of 135.

Now the third band colored in brown is the main pay in the Bagley Pennsylvanian Field. The fourth band colored in green is the Bagley Lower Pennsylvanian Gas Zone.

Q Now, in your opinion is there a complete separation

between the upper gas zone and the zones shown on the BTO Well?

A Yes, sir, there is. There's, as I stated before, there's a minimum of 78 feet separation and a maximum of 135, that interval being a dense line with shale stringers in it.

Q You show on that exhibit again that the BTO Oil Zone is a continuous structural formation. Have you examined the micrologs to see if there is any microlog porosity in the other wells?

A Yes, sir, I have. From micrologs the porosity is not defined within that zone in the other wells in the field.

Q Now, in your opinion is there a separation of the BTO Oil Zone and the Pennsylvanian Oil Zone shown on the exhibit?

A Yes, sir, there's separation between those two zones. However, that separation is not quite as great as it is between the Bagley-Upper Gas Zone and the BTO Oil Zone.

Q Do your sample logs verify your pics on the wells?

A What?

Q Do your sample wells verify your picks as shown on your electric logs?

A It does on top of the Pennsylvanian and on your regular Bagley Oil Zone your sample logs will verify those points.

Q Were they also verified by drill stem tests in some instances?

A Yes, sir, those zones have been drill stem tested, show where you do have porosity deposited and also where it gives up

fluid.

Q In your opinion are the upper and lower gas zones continuous throughout the section? A Yes, sir, they are.

Q Would they, as a geologist, is it your opinion that development on a basis of 320 acres would result in a full development of the area? That is, based on the continuity of the formation and your information available to you.

A Which zone are you speaking of?

Q Well, let's take first, in your opinion would 320 acre development of the Bagley-Upper Pennsylvanian Gas Zone be efficient and economical?

A Yes, sir, it would. You do have continuity all across there.

Q Would your answer be the same as to the Bagley-Lower Pennsylvanian Gas Zone? A That is correct.

Q Does that exhibit likewise show the microlog pay, Mr. Phelps?

A Yes, sir, our microlog pay is shown in black on each well opposite the porous zone.

Q And that has been shown also on the BTO Oil Zone, is that correct?

A Yes, sir, it shows it on the BTO Oil Zone, on the BTO No. 1 only. It is not present on other wells shown in that cross section.

Q Mr. Phelps, in preparing for this hearing did you examine the cross sections which were presented in the previous hearings in these cases? A Yes, sir, I did.

Q Have you also examined the transcript presented in those cases? A Yes, sir.

Q Are you in agreement with the testimony which was offered in that connection in those hearings? A Yes, sir.

Q With the exception, of course, with the changes that you state that you have made? A That is correct.

Q Were Exhibits 3, 4, 5 and 6 prepared by you?

A Yes, sir, they were.

MR. KELLAHIN: At this time we would like to offer in evidence Exhibits 3, 4, 5 and 6. There will be further testimony offered as to Exhibits 1 and 2 and we will offer them later.

MR. PORTER: Is there objection to the admission of these exhibits? It will be received.

MR. KELLAHIN: That's all the questions I have.

MR. PORTER: Any questions of Mr. Phelps?

MR. CAMPBELL: I assume there will be a witness who will testify as to the producing history of the BTO No. 1 Well. I have no questions.

CROSS EXAMINATION

By MR. UTZ:

Q Mr. Phelps, are you recommending any change in the vertical limits of the upper and lower and the middle oil zone from the present limits as stated by the Commission?

A I think the engineers have the information or data on that.

Q They will testify as to that?

A It will be taken up later, yes.

MR. UTZ: That's all I have.

MR. PORTER: Anyone else have a question? Mr. Phelps may be excused.

(Witness excused.)

MR. KELLAHIN: I call as the next witness Mr. Harold Kidd.

HAROLD C. KIDD

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

DIRECT EXAMINATION

By MR. KELLAHIN:

Q Would you state your name, please?

A Harold C. Kidd.

Q By whom are you employed and in what position, Mr. Kidd?

A Employed as a petroleum engineer by Amerada Petroleum Corporation in Tulsa, Oklahoma.

Q Have you testified before this Commission in the past?

A Only at Examiner Hearings. I have never testified at a Commission Hearing.

Q For the benefit of the Commission, Mr. Kidd, would you state briefly your education and experience as a petroleum engineer?

A Yes, sir. I'm a graduate petroleum engineer with a degree, a B. S. Degree in petroleum engineering from the University of

Tulsa, I graduated in 1948 and have been employed since as a petroleum engineer, oh, approximately six years I have been employed by Amerada.

MR. KELLAHIN: Are the witness's qualifications acceptable?

MR. PORTER: Yes, sir.

Q Mr. Kidd, would you refer to Exhibit 1, which has already been discussed, and describe the location of the producing wells and the units shown on that exhibit?

A Yes, sir. Exhibit 1 is a plat of the Bagley-Upper Pennsylvanian Gas Pool, and as mentioned before, the gas units are outlined in red while the producing well on the unit is circled in red. The first unit or BTK Unit which includes the south half of Section 34 and our BTK No. 1 is the unit well. There's another unit in the field, a 320 acre unit of Texas and Pacific State C, Ac/2 Well No. 1. Their unit now covers the north half of Section 4 and it's 320 acre unit. Our Mathers 2 unit is a 320 acre unit, covers the southeast quarter of Section 3 and the northeast quarter of Section 10. We have one other unit in the field. It's our Caudle No. 7 unit. We show it here in a dotted red line as a 320 acre unit.

The royalty interest under that unit have signed, it's a part Federal lease and has been proved locally by the Federal Government and been sent to Washington for final approval. We expect that back at any time, and at that time it will be a 320 acre unit.

Q Referring to Exhibit No. 2, would you give the same information?

A Exhibit No. 2 is a plat of the Bagley-Lower Pennsylvanian Gas Pool. It shows our State BTO Unit covering the south half of Section 34 with the State BTO No. 1 as the unit well. It shows the Shell Amerada State A Unit which covers the southeast quarter of Section 33, a 160 acre unit, and the well shown is the unit well. It shows Texas and Pacific's State Ac/2 C No. 1 Well, it's 160 acre unit. It covers the northeast quarter of Section 4 and it shows our Caudle 7 Unit again as a dotted outline in a dashed red line. It is shown here as a 320 acre unit.

Now, we have been producing this unit on 80 acres, but the royalty interests have signed and this unit too has been sent to Washington for final approval, and we would produce it in a short while as a 320 acre unit.

Q Now, referring to what has been marked as Exhibit No. 7, will you state what that is, Mr. Kidd?

A Yes, sir, Exhibit No. 7 is an isopachous map showing the net gas pay in the Bagley-Lower Pennsylvanian Gas Pool. The microlog pay picks of each well are shown by the well and the map has been contoured on ten foot interval.

Q Is that based on microlog pay? A Yes, sir, it is.

Q Does that, in your opinion, outline the productive limits of the Lower Pennsylvanian Gas Zone in the Bagley Pool?

A Yes, sir, it does. The zero isopack line to the southwest, and to the north is located and controlled by structure while the zero line on the east side represents a porosity pinchout. An examination of logs in the area show the wells to the east of the zero line have no microlog pay, and while the wells to the west do have microlog pay.

Q Now, have you calculated the number of productive acres as shown by this exhibit?

A Yes, sir, I have. The productive area covers approximately 2,000 acres and represents 40,000 acre feet of net gas pay. This is in very close agreement to pressure volume calculations which will be presented later for this zone.

Q Now, have you prepared a similar exhibit showing the net pay in the Bagley-Upper Pennsylvanian Gas Zone?

A No, sir, I have not. I have attempted to prepare one, but the microlog pay in the Bagley-Upper Pennsylvanian Zone is so erratic that it's almost impossible to make an isopachous map of it. It's not based on structure, it appears to be solely a porosity development and you have wells with six feet of pay surrounded with wells with 14 to 20 feet of pay. It was so erratic that I didn't attempt to prepare it, or I attempted to, but I didn't prepare it.

Q Now, have you prepared the productive data on the Bagley-Upper Pennsylvanian Gas Zone? A Yes, sir, I have.

Q Referring to Exhibit No. 8, would you state what that shows?

A Yes, sir. Exhibit No. 8 is a tabulation of gas and distillate production by months and by years for each of the producing wells from the Upper Pennsylvanian Gas Zone.

Q The Exhibit includes several sheets which are numbered 8 through 11. Are those different exhibits?

A Yes, sir, there are a series of exhibits that have been stapled together, but they have been marked by their exhibit number. Exhibit 8 is two pages, the first page showing gas production in MCF and the second page showing distillate production in barrels.

Q And then the Exhibits 8, 9, 10, and 11 are put together?

A Yes.

Q Will you give us a summary of the information on Exhibit No. 8?

A It can be summarized by saying that gas production to July 1, 1958 totaled 2,161,759 MCF while distillate production to that date totals 72,943 barrels. The pool has been produced continuously since April, 1951. There are three wells now on production and an additional well will be added as soon as the 320 acre is approved for the Caudle No. 7.

Q The Caudle No. 7 has not been produced from this zone?

A No.

Q Now, referring to Exhibit No. 9 which is attached to the exhibit, will you state what that is?

A Exhibit 9 is a bottom hole pressure history of the Amerada wells completed in the Bagley-Upper Pennsylvanian Gas Pool. Pressures shown here are taken at a subsea datum of minus 4445 feet.

Q What is the reason for the subsea datum of 4445?

A That sets up the mid portion of the producing interval in the Upper Pennsylvanian Gas Zone.

Q Do you have any comment in regard to the pressures?

A Yes, sir, I would like to just describe the pressures. The last pressure run on each well, Mathers No. 2, 6-27-58 was 2513 pounds. Caudle No. 7 at the same date was 2404 pounds. State BTK No. 1 on June 20, 1958 was 2377 pounds, and Mathers "B" 1 on the same date had a bottom hole pressure of 1959 pounds.

Q Is that, in your opinion, a fairly uniform pressure in the gas zone?

A Yes, sir, I believe that the pressures are reasonably uniform in the gas zone and would indicate that the drainage is occurring throughout the reservoir.

Q Can you account for the differences that do appear to exist on those wells?

A Well, the higher pressure for the Mathers No. 2 can be attributed to the fact that the well has been off production for the last eight months. We haven't produced it for that period and has been shut in continuously since.

Q In your opinion as an engineer, would that indicate that drainage is occurring throughout the reservoir?

A Yes, sir, it does.

Q What is the significance of the pressure shown on the

Mathers "B" No. 1 Well?

A Well, the Mathers "B" No. 1 Well is the oil well completed in what has been called the Bagley-Upper Pennsylvanian Zone. The pressure on that well was 1959 pounds after 69 hours of shutin, which is approximately 500 pounds lower than the average pressure of the gas reservoir.

Q That is completed at approximately the same structural position as the gas well, is it not? A Yes, it is.

Q It would seem to indicate a higher pressure than the initial pressure, is that correct?

A Yes, it does. We just ran a buildup test on the well and we found that it required almost 69 hours for the well to build up to true reservoir pressure. You can note that the earlier pressure on Mathers "B" 1 had only been shutin 48 hours at the time that we ran it and didn't give us a true reservoir pressure at that date. I think too that the difference in pressure here between the Mathers "B" 1 and the other gas wells in the pool is, on further confirmation of the fact, that the well is structurally separated from the main gas pool.

Q Now, referring to what has been marked as Exhibit No. 10, will you state what that is?

A Exhibit No. 10 is a tabulation showing reservoir pressure minus 4445 datum, cumulative gas production in MCF, cumulative distillate production, total withdrawals in equivalent to MCF of

gas, and the calculated drainage area in acres.

Q That is for the Bagley-Upper Pennsylvanian?

A Yes, sir, it is.

Q How did you arrive at these pressures?

A Well, inasmuch as the early pressure points represented only a small portion of the actual reservoir, I prepared a pressure versus time decline curve for each of the other Pennsylvanian wells that we had any pressure history at all on. From these curves I went back to our pressure points where we had a pressure and calculated what the pressure would have been at the other wells in the pool at that date. These pressures were then averaged together to give what I would consider a more representative reservoir pressure.

Q Now, the final column on the exhibit shows the calculated drainage area in acres. How do you arrive at that figure?

A The last column represents a material balance calculation to determine the volumetric area of the reservoir being drained, and it is based on the pressure-production history of the reservoir. The calculations have been converted to area in acres by assuming an average reservoir porosity of 6%, a water saturation of 20%, and average pay thickness of 15 feet.

Q That then totals a calculated drainage area of 2257 acres?

A Yes, sir, it does.

Q That is the figure that you referred to in connection

with your testimony on the preceding exhibit?

A Yes, sir, it is. I believe maybe I misunderstood you then.

Q I stand corrected, you do not have an isopack on the upper zone?

A No, I don't.

Q What is the significance of the uniformity in pressures shown on the last eight points on this exhibit, Mr. Kidd?

A I would say that the uniformity of the last eight points would indicate that the data and calculations used here are reliable and that the productive area of the field is approximately 2257 acres.

Q Based on that calculation, does this indicate to you that one well completed in the Bagley-Upper Pennsylvanian Gas Pool will drain not less than 320 acres?

A Yes, sir, it does, inasmuch as three wells are all that's producing from the reservoir at the present time, and during this period where we have drainage area calculations, that would give an average drainage area per well of, oh, in excess of 700 acres.

Q Now, referring to what has been marked as Exhibit No. 11, would you state what that shows?

A Exhibit No. 11 is a graph on which bottomhole pressure has been plotted versus reservoir withdrawals. The data presented here is, was taken from part of the data in Exhibit 10. Here again the graphs show the uniformity of our last eight pressure points and is indicative of the behavior that might be expected from a

normal gas reservoir.

Q Is the behavior you have found there consistent with what you would expect from a normal gas reservoir?

A Yes, it is.

Q Does this give an indication of the future performance of the reservoir?

A Yes, it does. You could use this as a basis for determining your future reserves.

Q As I understood you, in effect you have stated that in your opinion one well would efficiently and economically drain 320 acres. Do you have any additional evidence to support that opinion?

A Yes, sir, we have. We have good interference data using shut in pressure in Caudle #7 while only Mathers #2 was producing from the reservoir. Caudle #7 declined 17 pounds from February, 1957 to October, 1957, while Mathers #2 was the only well producing from the reservoir.

Q What is the distance between those two wells?

A The Mathers #2 is located approximately 4500 feet from Caudle #7.

Q If that indicates drainage, what area will one well drain?

A I haven't calculated, but it would be approaching 2,000 acres on the 40 foot radius. We have additional information on Caudle 7, an additional drop of 271 pounds has occurred in the last eight months with Mathers #2 shut in and Texas-Pacific's well being

the only well producing from the reservoir for seven of the eight months. Texas and Pacific's well is 2500 feet away, indicating it is draining an area of at least 450 acres.

Q Now, what was the initial pressure on this State M #2 Well in this zone?

A Well, we have additional information taken from the drill stem test on our State BTM #2. It was drill stem tested in the Upper Pennsylvanian and flowed at a rate of 877 cubic feet per day. The initial shutin pressure was 2400 pounds, which is identical to the reservoir pressure in the remainder of the field. State BTM No. 2 is 3600 feet from the nearest producing well in the gas reservoir.

Q That would, in your opinion, indicate that drainage had occurred in the vicinity of the location of State "M" No. 2 Well?

A Yes, sir, it would.

Q Now, referring to what has been marked as Exhibit No. 12, will you state what that shows?

A Exhibit No. 12 is a tabulation of gas production in MCF and distillate production in barrels by months and by years for each of the wells producing from the Bagley-Lower Pennsylvanian Gas Zone.

Q Likewise attached to that exhibit are Exhibits 13, 14 and 15, is that correct?

A Yes, sir, they are all stapled to it, but have been marked with their proper exhibit numbers.

Q Would you give us a summary of the information contained on Exhibit 12?

A Yes, sir. Gas production to July 1, 1958 totaled 3,650,814 cubic feet of gas while distillate production totaled 229,876 barrels. The pool has been producing continuously since June, 1954, and there are now four producing wells in the pool.

Q Now, referring to Exhibit No. 13, would you state what that is?

A Yes, sir. Exhibit 13 is a bottom-hole pressure history of the Amerada wells in the Bagley-Lower Pennsylvanian Gas Pool. Pressures here are shown at minus 5500 foot datum, which again represents the approximation of the mid point in the producing interval.

Q Could you give us the latest pressures on that as shown by that exhibit?

A Yes, Amerada Shell State "A" No. 1, pressure shown as 6-30-58 was 2813 psig. Caudle No. 7 on 6-20-58 had a pressure of 2551 pounds. The State BTO No. 1 on 6-20-58 had a pressure of 2865 pounds.

Q In your opinion is that a fairly uniform pressure?

A Yes, sir, I believe these pressures are reasonably uniform, and here again do indicate that drainage is occurring throughout the reservoir.

Q How do you account for the difference on the Caudle No. 7

Well?

A There are two factors that could account for the factors. I don't know which one is correct. Caudle No. 7 has a dual completion tool in the hole that prevents us from running to all run depths, so we have to calculate our pressure to actual run depth. It is possible that the Caudle 7 is completed in a tighter area of the reservoir and has a lower permeability than the rest and would require a longer time to build up and actually reach true reservoir pressure.

Q On the basis of the information obtained on the pressure history, does that indicate to you that drainage is occurring throughout the reservoir?

A Yes, sir, it does. I would like to point out the pressure performance of our State BTO No. 1 Well. At completion a pressure was run on Jan. 27, 1958 and we had obtained a bottom-hole pressure of 3,030 pounds. The well was left shut in and was not produced from January until April 22nd when we went in and obtained another pressure. We got a pressure of 2917 pounds. This represents a decrease in pressure for the well of 113 pounds while it had been shut in.

The nearest producing well to our BTO was the Caudle No. 7 located approximately 1900 feet away. If you would assume a drainage area, or take a drainage area from that, it would give you a minimum drainage area for Caudle No. 7 of 260 acres.

Q Now, referring to Exhibit 14, would you state what that shows?

A Exhibit No. 14 is a pressure production summary for the Bagley-Lower Pennsylvanian Gas Pool, shows pressure at a minus 5500 feet. Shows cumulative gas production in MCF, cumulative distillate in barrels, and total withdrawals equivalent or expressed as MCF gas, and it shows the calculated drainage area in acres.

Q What are your pressure figures based on on this exhibit?

A Here again, pressure versus time curves were prepared for each well in the field that we had any pressure history on at all, and at the dates where we had pressures on say one well, why we would calculate from the graphs what the pressure would have been at the other wells in the pool and then average those pressures together to obtain what we considered a more representative or true reservoir pressure.

Q What is the significance of the drainage area calculation?

A Here again the drainage area calculation is a material balance calculation to determine the volumetric area of the reservoir that is being drained and is based on pressure production history of the reservoir. The calculations again have been converted to area in acres by using a reservoir porosity of 6%, water saturation of 20%, and an average pay thickness of 20 feet.

Q That results in a total calculated drainage area of some

1900 acres?

A Yes, it does. You might point out here that the 1900 acres compares to 2,000 acres obtained from the isopack map. We had 14,000 acre feet of the isopack map using this while we would have slightly in excess of 38,000 acre feet of gas pay.

Q Does this indicate that the wells are draining not lower than 320 acres?

A Yes. Inasmuch as four wells are now producing from the reservoir that we have defined as being productive over the 1900 acres It gives an average of 475 acres to the current well in the field.

Q Referring to Exhibit 15, would you state what that shows?

A Exhibit No. 15 is a graph of bottom-hole pressure versus reservoir withdrawals for the Bagley-Lower Pennsylvanian Gas Pool. Here again the data used on the plot was taken from Exhibit No. 14 and shows the uniformity of pressures that have been obtained over the production or producing life of the field. The behavior again is typical of what would be expected of a normal gas reservoir.

Q Does it give an indication of the future performance of this reservoir? A Yes, it does.

Q Now, referring to what has been marked as Exhibit No. 16, state, before we get to that, Mr. Kidd, I would like to ask you this question. You have indicated that in your opinion, and based on your examination, one well is draining in excess of 320 acres. Do you have any additional information to support your conclusion

on that?

A Yes, I do. We have an interference test which was reported at the previous hearing on the Bagley-Lower Pennsylvanian Gas Reservoir, and the interference test was run between our Caudle No. 7 and Shell State "A" No. 1 run in July, 1957. The Shell State "A" No. 1, after being shut in and reaching a stabilized reservoir pressure, declined a total of 26 pounds in 90 hours as a result of gas production at a rate of four million cubic feet per day from Caudle No. 7. The two wells are 2750 feet apart, indicating Caudle No. 7 was draining a minimum area of 545 acres.

I think, too, that the pressure data presented earlier pertaining to decline of State BTO while being shut in only showing a minimum drainage area of 260 is indicative that drainage can and does occur in excess of over 320 acres.

Q In connection with the previous hearings in these three cases, and the members of the Commission Staff asked for additional information, do you have any production test data available?

A Yes, sir, I do. It has been submitted as Exhibit No. 16. Exhibit No. 16 is production test of the Bagley-Pennsylvanian wells, and it has been separated to Bagley-Upper Pennsylvanian Gas Zone, Bagley State BTO Oil Zone, and the Bagley-Lower Pennsylvanian Gas Zone. Then for each well we show the date of test, oil production during test, water production in barrels, gas production in MCF producing GOr, tubing pressures where available, and gravity in

degrees API where available. The first column is oil or distillate production. We haven't made any distinction.

Q There would be in effect two oil wells shown on that exhibit?

A Yes, Mathers "B" No. 1 and State BTO No. 1. I would like to point out the performance of the wells, Mathers "B" No. 1 we have shown three tests here. I have an additional test which may be of interest, a test taken July 12, 1958, which shows the well producing 38, a trace water, 389.2 MCF gas. A GOR of 10,054, tubing pressure of 160 pounds. The way that well is performing by the test you can see it is declining in both oil and gas. However, the gravity of the oil produced by the well is 44.8 as shown, which is a typical oil gravity in the field.

Q Has the gas-oil ratio been performing as was anticipated on this well?

A Yes, sir, it is going up, but actually the performance indicates that the well will never be probably a large gas producer. Now the State BTO Well, BTO No. 1, we have three tests shown here. These tests also show that production has declined from 66 barrels per day in January of '58 to 31 barrels per day in June, 1958. Gas volume, produced gas volume from the wells is also declining, GOR therefore is declining. And here again the gravity is a typical oil gravity of 46.7.

Q Would the gas-oil ratio and the produced gas figures

indicate to you that that well is in any way connected with the Bagley-Upper Pennsylvanian Gas Zone?

A No, sir, it would not. It indicates to me that the well is producing from just a localized zone of porosity and that we are rapidly depleting the reservoir and will not recover much additional oil from the well. The only other thing I might point out here, Caudle No. 7 has a distillate gravity of 57.8 which is the lowest and considerably below the other gravities of the distillate wells in the area. We attribute the lower distillate in Caudle No. 7 to be caused by obtaining most of the gas production from the perforated interval in the well from a lower section than we're getting production in the other wells in the field. Actually the well is just as high as any other well.

Q Now, the Commission Staff likewise requested information be furnished on the Mathers "B" No. 1 Well. Do you have an exhibit showing that?

A Yes, sir, I do. Exhibit No. 17 shows production data for Mathers "B" No. 1. It's the well that is now classified as producing from the Bagley-Upper Pennsylvanian Zone. This exhibit shows monthly oil production in barrels, monthly gas production in MCF, and the producing GOR of the well by months during its producing life.

Q Has that well been produced at capacity?

A Yes, sir, it is. Production performance is poor and the

decline in oil production and the increase in GOR, well, the decline in oil production and the slight increase in GOR indicates that the well is not in communication with the gas reservoir in my opinion.

Q That would be with the Upper Bagley-Pennsylvanian gas?

A Yes.

Q It's not in your opinion --

A (Interrupting) Not in communication with the regular Bagley-Upper Pennsylvanian Gas Pool, but we are producing.

Q What do you think the situation is in regard to that well then?

A I believe the production performance substantiates the geological testimony presented earlier showing that the well is located structurally separated from the Bagley-Upper Pennsylvanian Gas Pool.

Q Now, on the last figures shown on your production data for May, 1958, you show an increase in the producing gas-oil ratio. What do you attribute that to? Could that be to gas coming out of solution?

A Well, yes, it is, although I can't really say why that we obtain such a sharp increase for that one month. It should have been increasing gradually over the period. The produced gas from this well is all metered gas and sold to Warren, so our gas figure should be reasonably correct, and we are producing at capacity, so the produced GOR should be correct.

Q Now, referring to Exhibit No. 18, would you state what that shows?

A Exhibit No. 18 shows production data of our State BTO No. 1 Well. Here again it shows monthly oil production in barrels, monthly gas production in MCF, and the producing GOR and as listed by months for the producing life of this well.

Q Does that support your conclusion previously stated that this is a small, separate reservoir?

A Yes, sir, it does. Here again we are producing at capacity and have always produced at capacity for this well. It shows a decline in produced oil. It also shows a decline in produced gas which is all sold to Warren. It shows, therefore, a decline in the producing GOR. You can actually plot the decline in oil production on graph paper and it's almost a straight line decline, indicating we are going to obtain very low ultimate recovery from the well; that is it's just, oh, very close to being depleted right now.

Q That again would support your conclusion that there is no communication between the producing oil zone and the Bagley-Upper Pennsylvanian Gas Zone?

A Yes, sir, and all the production of this zone right now just amounts to a salvage operation.

Q Have you any pressure information on BTO Well No. 1?

A Yes, sir, I do. We obtained a bottom-hole pressure in the

well of 1441 pounds, which is 950 pounds below the reservoir pressure of the Upper Pennsylvanian Gas Zone.

Q Does that indicate anything to you in connection with the communication between the two zones?

A Well, here again, it would indicate that the zone is definitely separated from the Upper Pennsylvanian Gas Zone.

Q Now, referring to what has been marked as Exhibit No. 19, would you state what that is?

A Well, Exhibit No. 19 is a marked electric log of Caudle No. 7. I think probably I should clarify something before we actually discuss the marked electric log here. It was prepared as a possible solution to handling the vertical limits situation that has come up in the pool. Now we have two suggestions as to how the vertical limit situation can be handled.

Our first suggestion is to ignore the BTO Oil Zone and actually consider it as an isolated zone of production, and it will only be defined or it is confined say to the immediate area surrounding the BTO Well. If we ignore that and consider it that way, why we can define the limit of the, on the various zones as was previously submitted to the Commission.

In other words, leave the vertical limits just as they are. Those vertical limits are minus 4250 to minus 4510 for the upper zone, minus 4600 to minus 5200 for the oil zone, and the lower zone is minus 5400 to minus 5620. The only conflict that has

come up on vertical limits is the fact that the BTO Oil Zone was productive within about five to seven feet, I believe, of the base of the lower vertical limit for the Upper Bagley-Pennsylvanian Zone. We have shown that the zone is definitely separated from the reservoir in previous testimony, but due to a structural change in the area there are points where the BTO Oil Zone will overlap what is now known as the vertical limit for the upper gas zone.

Our first suggestion would be to just ignore that the BTO oil well is an oil well and producing close to the vertical limits as defined, and treat the vertical limits as they are.

Now, our other suggestion would be to define the limits on the basis of the Caudle No. 7 electric log where we have marked here the tops and bottoms of each of the producing zones in the field. In other words, we could describe the zone not by vertical limit, but by comparison of section to what we have marked here in Caudle No. 7.

Q Now, Mr. Kidd, that producing oil zone is close to the defined vertical limit of the upper zone?

A Yes, sir, it is within ten feet of it.

Q But your actual separation amounts to approximately what?

A Oh, between 78 and 125 feet, as has been testified to.

Q Have you found any evidence whatever that the upper gas zone and the oil zone in State BTO No. 1 are connected?

A No, I have not.

Q You have found evidence to indicate to you that they are not connected?

A I have, and I have also found evidence that that zone probably will not be productive anywhere else than in the BTO well.

Q Now, in connection with these cases, have you made any further study of the economics of developing the gas zones and the oil zones involved here?

A Yes, sir, I have, but maybe I would like to enter two more recommendations that we have on handling the situation here. Now, we recommend that Mathers "B" 1, which is the oil well and is producing from the Bagley-Upper Pennsylvanian Gas Zone, be classified as a separate reservoir and continued on the schedule, or shown in the producing schedule as a wildcat well, or undesignated.

Then, two, we suggest that the BTO Zone be classified as a separate reservoir, or for purposes of prorationing, inasmuch as it's a marginal well and is rapidly declining, just be carried as a Pennsylvanian oil well on the Pennsylvanian proration schedule. That was all I had on that.

Q You have no intention of seeking any dual dedication of acreage as a result of that oil zone there, do you?

A No, we do not.

Q Now, have you made a further study of the economics of developing the gas zones and the oil zones?

A Yes, sir, I have. My findings still indicate that

development on 160 acres would be uneconomical.

Q Based upon your study of the reservoir performance and the engineering information available to you, in your opinion will one well effectively and economically drain 320 acres in the Bagley-Upper Pennsylvanian Gas Zone?

A Yes, sir, I believe it will, and I believe that the evidence we have presented here shows that.

Q Based upon the same study and information as to the Bagley-Lower Pennsylvanian Gas Zone, in your opinion will one well effectively drain and develop 320 acres?

A Yes, sir, in my opinion it will.

Q Would an order setting the spacing in the Bagley-Upper Pennsylvanian Gas Zone and the Bagley-Lower Pennsylvanian Gas Zone at 320 acres be in the interest of preventing waste?

A Yes, sir, it would, and I would recommend that a permanent order be granted, granting 320 or establishing 320 acre spacing units for both the Bagley-Upper Pennsylvanian and Bagley-Lower Pennsylvanian Gas Zones.

Q Would such an order, in your opinion, protect correlative rights?

A Yes, sir, it would.

Q In your opinion would any appreciable amount of gas remain unrecovered in the reservoir as the result of such a spacing program?

A No, sir, I feel that the loss in gas production would

only be negligible.

Q Were Exhibits 1, 2 and 7 through 19, inclusive, prepared by you or under your direction and supervision?

A Yes, sir, they were.

MR. KELLAHIN: We would like to offer in evidence Exhibits 1, 2 and 7 through 19.

MR. PORTER: Without objection they will be received.

Q Have you any other comments you would like to make, Mr. Kidd?

A No, sir.

MR. KELLAHIN: That's all the questions we have.

MR. PORTER: We will take a ten minute recess.

(Recess.)

MR. PORTER: The meeting will come to order, please.

MR. KELLAHIN: If the Commission please, I have one further point I would like to clear up of this witness.

Q Mr. Kidd, Case No. 1384 has to do with the dual completion of Amerada State BTO Well No. 1. That is a dual completion at the present time, is it not? A Yes, sir, it is.

Q In what zones is it completed?

A Our State BTO No. 1 Well is producing from what we testified to here today, or referred to, as the BTO Oil Zone, and is also producing from perforations in the Bagley-Lower Pennsylvanian Gas Zones. The well is completed with a Baker Model D Packer and two strings of two and a sixteenth inch Hydril tubing.

Q What is your recommendation in regard to status of this well?

A I recommend that the status be left as it is. In other words, the dual completion be approved, and to permit depletion of this BTO Oil Zone which we believe and have shown as a salvage operation to permit simultaneous production from the Bagley-Pennsylvanian Zones.

Q Would it be practical, in your opinion, or economical, to drill for the production of the BTO Oil Zone oil?

A No, sir, absolutely not.

Q Unless the dual completion is continued as to production from that zone, what would happen to that oil?

A It would be left in the reservoir, you couldn't afford to

attempt to recover it in any other way than the way we have done it now.

MR. KELLAHIN: That's all the questions I have now.

MR. PORTER: Anyone have a question of the witness?

MR. CAMPBELL: I have one or two.

CROSS EXAMINATION

By MR. CAMPBELL:

Q With regard to BTO No. 1 Well, are you now producing that gas by gas lift? A Yes.

Q You maintain any separate metering or record of the gas lift, gas production and the reservoir gas production?

A We do for test purposes, yes, sir.

Q And the tests that are reflected on your Exhibit No. 18 as to monthly gas production are exclusively gas production, is that correct?

A The test part would be, yes, sir. On the production that is reported, there is some calculation involved there, inasmuch as the produced gas and the gas lift gas goes to -- I stated that gas goes to Warren, but it does not, it goes into our low pressure gathering system, but we, through meters, balance out the gas in the field and actually determine how much gas goes to any one well, so that the figure we use is a reliable figure and actually would give you a true formation gas production figure.

Q You do not consider that the figures vary in any measureable

degree by the fact it is being gas lifted?

A No, sir.

Q At the original hearings in connection with this area, you had requested, as I recall, 640 acre units for the two gas zones?

A Yes, sir.

Q You are now requesting permanent order for 320 acre units for each of the gas zones?

A Yes, sir, that's right.

MR. CAMPBELL: I think that's all.

MR. PORTER: Does anyone else have a question of the witness?

MR. PORTER: Mr. Nutter.

By MR. NUTTER:

Q Mr. Kidd, would you indicate on your cross section there the top, with reference to the BTO No. 1 Well, the top and bottom of each of the three pools as defined by the Commission?

A On the BTO?

Q Yes, sir, on the BTO Well.

A I'll have to -- you mean now the vertical limits?

Q Yes, sir, the vertical limits.

A I'll have to do a little calculating here.

Q In the interest of time, Mr. Kidd, perhaps you could just give us, or indicate on the exhibit the top of the Bagley-Upper Pennsylvanian Gas Zone and the bottom of it, and the top of the oil zone.

A All right. Well, the top of it, minus 4250, will fall actually on this line right here. You won't be able to see that, that is the upper vertical limit. The lower vertical limit falls right here. Now, the top of the oil zone vertical limit is almost right at the base of the BTO oil line, and the lower would be down here.

Q Would you label those on there, please, Mr. Kidd?

A All right.

Q Now, Mr. Kidd, in other words, the section shown in brown as the upper or the oil productive zone for this BTO No. 1, which is the well that is not encountered in any other well here, is actually in between the lower limits of the upper Pennsylvanian Gas Pool and the upper limit of the oil zone, the recognized oil zone?

A It is.

Q Do you concur in the opinion of Mr. Phelps that the upper part of this oil zone is separated from the lower part of the gas zone by an impervious line member?

A Yes, sir, I do.

Q And that there is no connection between those zones?

A No, sir.

Q Do you feel there is any connection whatsoever between the bottom of this oil zone, the small oil zone and the lower main portion of the Bagley Oil Pool?

A Actually, I do not believe there is. There is shale

stringers in between here and also dense line stringers, and as you can see, just looking across here, it looks fairly uniform.

Q So you believe that this section is separated from the main body of the oil zone by the same type of impervious line with shale stringers that you have separating it from the gas zone above?

A That's right.

Q Was any oil encountered in the BTO No. 1 in the main oil zone?

A I do not believe it was, no, sir.

Q Were any drill stem tests made, or any perforations made in that section at all?

A I am not sure, I would have to check, I do not believe there was.

Q That well is presently completed as an oil-gas dual completion in this upper small oil section, and as a gas well in the Lower Bogley?

A The perforations through here, and through here. As you can see, there is very little pay in that zone compared to a good Pennsylvanian producer.

Q Well, now, Mr. Kidd, you gave us one alternative that the Commission could take, to just ignore this little pool. What was the other alternative that you suggested?

A To ignore it or to, and do away with vertical limits and actually define the zones on electric logs of a representative well

of the pool.

Q You mean for each well in the pool?

A Well, actually you would refer each well back to one log which described that zone. Now, that's done on quite a few places. In fact, that is how you actually end up correlating these things any way when you do produce. We've described on that log what we call the top of the gas zone and the bottom. And we show also the BTO Oil Zone on there, top and bottom, and the main oil zone, and then the lower gas zone defined the same way.

Q And then the vertical limits of the pool would actually fluctuate? A Yes.

Q From well to well?

A They would. Actually in a multi-zone reservoir with any structure, vertical limits most of the time wouldn't work.

Q What do you think we have here now, four separate pays?

A Yes, sir.

Q In this multi-zone pool?

A Yes, sir. You would be fortunate if you, if the condition existed where you could set up vertical limits and not have them overlap.

Q Well, now, some of these pool rules that have been established so far prohibit simultaneous dedication of acreage. Would this sytem interfere with that move in any way?

A I'm not sure, I can't see where it would, where we are

dually producing, we are dually producing gas, or oil and gas, we are not dually producing any oil and we do not anticipate any oil duals at Bagley, so there wouldn't be any simultaneous dedication of acreage in the oil zone and there isn't in the gas, I mean each well is designated for a zone and the acreage is designated for that zone.

Q Mr. Kidd, in compiling the pressure production summary on your Exhibit No. 10, and also on your Exhibit No. 14 for the upper and lower gas pool, are these the total production from all of the wells that are completed in the pool?

A Yes, sir, with the exception of Mathers "B" 1, we ignored that.

Q And in the case of the pressures that are reported, are they the average pressure of all the wells?

A They are the average of the pressures of our wells. Now, we didn't have a complete pressure history on Texas-Pacific, and didn't get any pressure information from them until right at the very last, which was too late to change this or to put it into this, but actually it went along with what we had determined, and fit in good.

Q And the pressures that they furnished you would not have changed the average pressures that you have used?

A In the case of the Bagley-Upper Pennsylvanian Gas Pool, it would have raised it some, and, which would have made it an even

better reservoir than what the calculations show it to be.

Q How are you able to determine the average pay thickness in the case of the Upper Pennsylvanian Gas Pool? Didn't you say you had some difficulty in attempting to draw an isopack map of that pool?

A I did, and what I did, I actually attempted to draw one and in the area where we had any control at all, why I simply took that area and I calculated what the average pay thickness was over that area. Now, there is an additional area where we have no control where you can't tell what the pay would be, so I simply assumed that the pay there, since it is not a structural feature, would average out approximately the same as in the area where I did have some control, even though it was erratic.

Q Even though the thickness or porosities are erratic?

A Yes.

MR. NUTTER: I believe that's all, thank you.

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

By MR. UTZ:

Q Mr. Kidd, can you tell me what well is dedicated to the south half of Section 34?

A The south half of Section 34, now in the Bagley-Upper Pennsylvanian Gas Pool the State BTK No. 1 is the producing well, and it is located in the southeast quarter of the southwest quarter of Section 34.

Now, in the Bagley-Lower Pennsylvanian Gas Pool, the unit well is our State BTO No. 1, which is located in the southwest quarter of the southeast quarter of Section 34.

MR. UTZ: Thank you.

MR. CAMPBELL: May I ask another question, please?

MR. PORTER: Mr. Campbell.

By MR. CAMPBELL:

Q Mr. Kidd, I believe one of your suggested alternatives was to treat the BTO Well No. 1 as an oil well?

A Yes, sir, for proration purposes and record purposes.

Q And that zone is the zone, the wide zone indicated in brown on that particular cross section, is it not?

A Yes, sir, it is.

Q Wouldn't that be the simplest method of handling this situation?

A I believe it would, rather than set up a separate zone for one well, why since it is a marginal well and is declining rapidly and will be depleted soon, I think the simplest would be, for proration purposes, to call it a Pennsylvanian oil well.

Q And this acreage on which it is situated is not presently dedicated to any well producing from that zone, is it?

A No, sir, it is not.

MR. CAMPBELL: I think that's all. One other question.

Q Your definition of zone is the same as they are at the present time?

A Yes, sir.

MR. PORTER: Any further questions of Mr. Kidd? The witness may be excused.

(Witness excused.)

MR. KELLAHIN: We will call as our next witness Mr. Wenger.

E. C. WENGER

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

DIRECT EXAMINATION

By MR. KELLAHIN:

Q Will you state your name, please?

A Mr. E. C. Wenger.

Q Spell that. A W-e-n-g-e-r.

Q By whom are you employed and in what position?

A Amerada Petroleum Corporation in the Tulsa Gas Department.

Q Are you a petroleum engineer or --

A (Interrupting) I am a petroleum engineer.

Q Have you ever testified before this Commission?

A I have not.

Q Will you state briefly your educational qualification and experience as a petroleum engineer?

A Graduated from Tulsa University in 1941 with a Bachelor of Science Degree in petroleum engineering; for the first two years thereafter was employed by Pan American Petroleum Corporation in

the Gasoline Department as a gas engineer. For two years following that, employed by the Cotton Valley Operators Committee, Cotton Valley, Louisiana, was in charge of gas condensate and sampling. In 1945 was employed by Amerada Petroleum Corporation as a petroleum production engineer, working on various problems in connection with the sampling and analysis of oil and gas. In 1952 I believe, I became the chief engineer of the Gas Department, I worked on various engineering problems in association with the production, selling, analyzing the gas, and continued to work on oil and gas analysis.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. PORTER: Yes, sir.

Q Now, Mr. Wenger, in connection with the previous hearings in the three cases which are now before the Commission, some questions were raised as to the fluid characteristics in the various zones involved. Have you made a study and compilation of crude oil distillation affecting these cases? A I have.

Q Referring to what has been marked as Exhibit No. 20, will you state what that shows?

A Exhibit No. 20 is a curve showing the ASBM distillation on four liquid samples from the areas involved in this case. The Exhibit No. 20 shows distillations for three oil samples and one condensate sample.

Q What wells were those samples taken from?

A The oil samples were taken from the Mathers "B" 1, the

Chambers No. 2 and the BTO No. 1, and the distillate sample was taken from the BTK No. 1.

Q Now, do you know where the Chambers No. 2 well is completed?

A Chambers No. 2 was completed in the main Pennsylvanian oil zone.

Q And, other wells?

A That have been identified previously?

Q Have been identified. The State BTK is in the upper gas zone, is it not? A That is correct.

Q Now, can you make a comparison between the Mathers fluids and the BTK fluids? The basis of your analysis.

A You said the Mathers, is that what you meant?

Q Yes, sir, the Mathers "B" 1, they are, as I understand it, from the same reservoir insofar as the vertical limits as defined by the Commission.

A That is correct, in the same zone. The Mathers "B" 1 distillation shows that it is of an oil reservoir nature whereas the distillation on the BTK, No. 1, shows that, what is commonly considered as a gas condensate reservoir.

Q Now, as to the other analysis which you made, can you make a comparison on them?

A Only to the extent that the distillations of the BTO No. 1 and the Chambers No. 2 are also in the zone which normally would be

considered as an oil reservoir, and that in general they show what you would expect from any oil distillation, that the higher gravity oils show lower distillation temperatures.

Q On the basis of the type of examination which has been made, is it possible to determine where the fluids came from, whether a gas reservoir or an oil reservoir?

A That would be impossible.

Q On the basis of that type of analysis, or examination, can you predict whether an oil well will go to gas or vice versa?

A You can not make such a prediction. The analysis of the fluids sampled from any particular well shows the characteristics that -- of the fluids that were produced by that well, but it is not possible to use that information to predict the characteristics of the fluid that you would get from any other portion of the same reservoir.

Q Now, as I understand, these are not based on a bottom-hole sample, is that correct? A They are not.

Q Would a bottomhole sample give better indications as to the character of the reservoir?

A The bottom-hole sample would simply reflect the information that is shown on this curve, instead of breaking it down in temperature implements, it would break it down by components, but you would have the same difficulty in making identification with bottom-hole samplings as you would have with these installations.

Q Was Exhibit No. 20 prepared by you or under your supervision, Mr. Wenger? A It was.

MR. KELLAHIN: At this time I would like to offer in evidence Exhibit No. 20.

MR. PORTER: Without objection it will be received.

Q Is there anything you care to add to your comments?

A I might mention this, that previous testimony has shown in this case as well as in the previous cases today that for any given reservoir you can have wide variation in oil gravities and gas variations which are not ascertainable by samples from any one well. You have to sample the various wells to determine whether you have that variation present.

Q And then you take an average of that?

A And bottom-hole samples are usually employed for the purpose of determining what that variation is and what the average is, not in trying to predict what is present in some other part of the reservoir, but trying to evaluate the total composition of a reservoir after it is defined.

MR. KELLAHIN: That's all the questions I have.

CROSS EXAMINATION

By MR. CAMPBELL:

Q Using only the testimony of reservoir fluid characteristics and ignoring the geological circumstances for the moment, would you say that your study would make it possible that the BTO No. 1 Well is,

or could be, considered as producing from the Pennsylvanian Oil Zone considering the differences that exist on your Exhibit 20, that that is a possibility?

A I would have to say that the samples themselves would not indicate that one way or the other, that the samples are similar enough so that they could come from the same reservoir, but the samples as such do not indicate it because there would be any number of samples which would come from another state.

Q Would you say it would not be unreasonable should the Commission treat that as an oil zone?

A It would not be unreasonable.

MR. PORTER: Mr. Utz.

By MR. UTZ:

Q Mr. Wenger, were these distillation curves which you have shown on Exhibit 20, changed to any degree with the depletion of the reservoir?

A With the depletion of the reservoir?

Q Yes.

A Yes, particularly the one on the BTK. It could change, depending on the type of depletion that occurred, and by type of depletion, I mean by the bottom-hole pressure history that might accompany the depletion of the reservoir. Also it could change if the production came from a different section of the reservoir such as was indicated by Mr. Kidd in Gaudle No. 7.

Q Then classifying a reservoir by distillation curve might cause it to go from gas to an oil reservoir. Do you use such a criteria? In other words, your BTK No. 1 in the later stages of depletion, would that curve show an oil reservoir rather than a gas reservoir?

A I am not exactly sure what you would define as an oil reservoir in your opinion, but I would say that in later stages of depletion if the pressure declines sufficiently that you might have a liquid phase as well as a gas phase present. However, I would not expect the reservoir to ever become 100% liquid phase, which would be my definition of an oil reservoir.

MR. UTZ: That's all.

MR. PORTER: Anyone else have a question? Mr. Nutter.

By MR. NUTTER:

Q Mr. Wenger, there were no liquids available from the Bagley-Upper Pennsylvanian Zone on the BTO No. 1 to compare with the oil produced from that small oil zone, were there?

A I do not think I understood your question exactly.

Q Are there any liquids available from the Bagley-Upper Pennsylvanian Gas Zone in the BTO No. 1?

A Are you speaking of this zone?

Q Yes, sir, the green zone, the BTO No. 1.

A The only liquids that were available from there would be from the Mathers "B" 1, is that right?

Q In other words, that oil is not perforated in that section and no liquids are available to compare with the oil in that same well?

A In that same well, no, sir.

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

MR. PORTER: Anyone else have a question?

MR. KELLAHIN: I would like to ask one.

RE-DIRECT EXAMINATION

By MR. KELLAHIN:

Q Mr. Wenger, are you familiar with the location of these wells?

A In the field.

Q Is BTK a direct offset to the BTO?

A I am not that familiar with the field.

Q I believe the exhibit will show the location of the wells.

MR. KELLAHIN: That's all I have.

MR. PORTER: If there are no further questions, the witness may be excused.

(Witness excused.)

MR. KELLAHIN: That's all we have, except I would like to make a brief statement.

If the Commission please, that completes our presentation of these three cases, Case No. 1325 is based upon a temporary order setting up a 320 acre spacing in the Bagley-Upper Pennsylvanian Gas Pool. ~~Case 1276 created temporary 320 acre spacing in the~~

Bagley-Lower Pennsylvanian Gas Zone, and at this time we urge the Commission to adopt permanent 320 acre spacing for these three pools. In that connection we have merely attempted at this hearing today to supplement the testimony which was heretofor offered in those two cases, and we urge the Commission to take into consideration that testimony with the changes and supplemental material which we have offered today.

As you will note, there was very very little in the way of economic information, feeling that it was fully covered in the preceding cases, and there is also additional testimony and exhibits in the cases showing that one well will efficiently and economically drain and develop 320 acres, and that it would be uneconomical and would result in economic waste to develop those two pools on 160 acres.

Now, Case 1384 is concerned with the dual completion of the State BTO Well No. 1. At the time of the original hearing there was some confusion and some questions raised as to just exactly where this oil was coming from, the possibility being pointed out that it might be a gas zone connected with the Pennsylvanian, Upper Pennsylvanian Gas Zone. I believe that the testimony which we have offered here today conclusively shows that there is no possibility of any connection between those two zones and that, in effect, this is a separate zone found only in the vicinity of this one well, and should be so treated. For that reason we urge a permanent order

approving the dual completion of the State BTO Well No. 1.

MR. PORTER: Anyone else have anything further in this case, in these cases?

MR. KASTLER: Bill Kastler, representing Gulf Oil Corporation. Gulf has interest in both the Bagley-Upper and the Bagley-Lower Pennsylvanian Gas Pools and, however, we have no data to present at this time, but it is our conclusion that based on the interference test and other data presented here by Amerada, that there is being a uniform withdrawal made in both gas pools, and we therefore urge that Order R-1031 and R-1091 be made permanent.

MR. PORTER: Anyone else have a statement?

MR. CAMPBELL: If the Commission please, on behalf of the Texas-Pacific Coal and Oil Company I would simply like to state that at this time we offer no objection to making it a 320 acre permanent in the upper and lower Pennsylvanian Gas Zones, nor do we object to the dual completion, but it does occur to us that the vertical limits of these various pools having once been defined in arriving at the treatment of the BTO No. 1 Well, the Commission could perhaps avoid more confusion by treating that well as an oil well in the Pennsylvanian Gas Zone inasmuch as that acreage is not dedicated to that zone and is not producing what would be a top allowable from that zone and is rapidly becoming depleted. To redefine the zones on the basis of that single situation, it might seem to us further confusing, in an already somewhat confusing

situation in this area, and we can't see how anybody could be hurt by simply describing that well on the schedule as a Pennsylvanian Oil Well.

MR. KELLAHIN: I understood you to say that it should be described as a well completed in the Pennsylvanian Gas.

MR. CAMPBELL: Oil zone, whatever they call that big brown wide strip.

MR. PORTER: In other words, it should remain in the Bagley-Pennsylvanian Oil Pool. Does anyone have anything further? We will take the case under advisement.

C E R T I F I C A T E

STATE OF NEW MEXICO)
: SS
COUNTY OF BERNALILLO)

WE, ADA DEARNLEY AND JOSEPH A. TRUJILLO, Court Reporters, 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 our knowledge, skill and ability.

IN WITNESS WHEREOF we have affixed our hand and notarial seal this 31st day of July, 1958.

Ada Dearnley
Notary Public-Court Reporter

Joseph A. Trujillo
Notary Public-Court Reporter

My Commission expires:

June 19, 1959.

My Commission expires:

Oct. 5, 1960

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. 1276
Order No. R-1031-A

APPLICATION OF AMERADA PETROLEUM
CORPORATION TO MAKE PERMANENT THE
SPECIAL RULES AND REGULATIONS FOR
THE BAGLEY-LOWER PENNSYLVANIAN GAS
POOL, LEA COUNTY, NEW MEXICO, AS
SET FORTH IN ORDER NO. R-1031.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on July 17, 1957, and again on July 16, 1958, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 6th day of August, 1958, 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 the preponderance of the evidence presented in this case indicates that one well will efficiently and economically drain 320 acres in the Bagley-Lower Pennsylvanian Gas Pool, Lea County, New Mexico.

(3) That the Special Rules and Regulations for the Bagley-Lower Pennsylvanian Gas Pool as set forth in Order No. R-1031 should be continued in effect until further order of the Commission.

IT IS THEREFORE ORDERED:

(1) That the Special Rules and Regulations for the Bagley-Lower Pennsylvanian Gas Pool, Lea County, New Mexico, as set forth in Order No. R-1031, be and the same are hereby continued in effect until further order of the Commission.

(2) That this order shall become effective September 1, 1958.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

EDWIN L. MECHEM, Chairman

MURRAY E. MORGAN, Member

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

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