CASE 1124: Sunray Mid-Continent application for extending Lane-Wolfcamp Pool, establishing Lane-Pennsylvanian Pool, providing uniform 80 acre spacing & authorizing oil-oil

Case No.

1125

Application, Transcript,
Small Exhibits, Etc.

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

August 15, 1956

IN THE MATTER OF:

CASE NO. 1125

TRANSCRIPT OF PROCEEDINGS

DEARNLEY-MEIER AND ASSOCIATES
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605 SIMMS BUILDING
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ALBUQUERQUE, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
August 15, 1956

IN THE MATTER OF:

Application of Sunray Mid-Continent Oil Company for an order extending the Lane-Wolfcamp Pool and establishing the Lane-Pennsylvanian Pool in Lea County, New Mexico, and providing for uniform 80 acre spacing for said pools and providing further for a blanket authorization of oil-oil dual completions in said pools in accordance with Rule 112 (a) of the New Mexico Oil Conservation Commission Statewide Rules and Regulations. Applicant, in the above-styled cause, seeks an order extending the Lane-Wolfcamp Pool and establishing the Lane-Pennsylvanian Pool, Lea County, New Mexico, both to be delineated as follows: Case 1125

TOWNSHIP 9 SOUTH, RANGE 33 EAST, NMPM
Section 26: SE/4
Section 25: S/2
Section 35: E/2
Section 36: All
TOWNSHIP 9 SOUTH, RANGE 34 EAST, NMPM
Section 30: SW/4
Section 31: W/2
TOWNSHIP 10 SOUTH, RANGE 33 EAST, NMPM
Section 2: E/2
Section 1: All
Section 11: NE/4
Section 12: N/2
TOWNSHIP 10 SOUTH, RANGE 34 EAST, NMPM
Section 6: W/2
Section 7: NW/4

Applicant also seeks the establishment of uniform 80 acre spacing in both of the above-described pools and suggests that each quarter section be divided into two north-south rectangles and that the approved well locations be in the area within a 150 foot radius of the center of the northwest and southeast 40 acre sub-divisions of each quarter section. Applicant further seeks blanket authorization, subject to objection by the Oil Conservation Commission or offset operators, for parallel tubing string oil-oil dual completions in the above-delineated pools.

DEARNLEY-MEIER & ASSOCIATES
INCORPORATED
GENERAL LAW REPORTERS
ALBUQUERQUE - SANTA FE
3-6691 2-1869

BEFORE: Honorable John P. Simms, Jr.
Mr. J. S. (Johnny) Walker
Mr. A. L. Porter, Jr.

TRANSCRIPT OF HEARING

MR. PORTER: The meeting will come to order, please. The next case is No. 1125.

(Mr. Jack Gurley, Attorney for the Oil Conservation Commission read the title of the within case.)

(Exhibits 1 to 15 inclusive marked for identification by the reporter.)

MR. WHITE: If the Commission please, Charles White of Gilbert, White & Gilbert, Santa Fe, New Mexico, one of counsel for the applicant, Sunray Mid-Continent Oil Company. At this time I would like to introduce another attorney representing the applicant. This is his first appearance before the Commission and he will conduct the hearing and put on the evidence. It gives me pleasure to introduce Burns H. Errebo of Tulsa, Oklahoma.

MR. PORTER: Thank you Mr. White. Mr. Errebo, how many witnesses will you have?

MR. ERREBO: We have four witnesses.

MR. PORTER: We would like to swear them all at this time.

(The witnesses were sworn by Mr. Walker.)

MR. PORTER: You may proceed, Mr. Errebo.

MR. ERREBO: If the Commission please, I would like to call Mr. Clarence Symes.

C L A R E N C E S Y M E S

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

DIRECT EXAMINATION

By MR. ERREBO:

Q Mr. Symes, will you state your full name, occupation, and by whom you are employed?

A Clarence Symes, Jr,, District Geologist for Sunray Mid-Continent, Roswell District.

Q Have you read the applications of Sunray Mid-Continent in this matter?

A Yes

Q Are you familiar with the geology of the Lane-Wolfcamp and Lane- Pennsylvanian Pools?

A Yes, I have worked the geology in this area in the Permian Basin for the last 10 years.

Q Have you previously testified before this Commission?

A Yes, sir.

MR. ERREBO: Are his qualifications acceptable to the Commission?

MR. PORTER: They are.

Q Mr. Symes, where, geographically speaking, is the Lane field located?

A The Lane Field is in Lea County, New Mexico, approximately 19 miles north and west of Tatum, New Mexico.

Q Is this field located near any other oil field?

A This field is located about 9½ miles north and east of the Bagley Field which produces from the Devonian and Wolfcamp formations.

Q Do you have an area map showing the location of the Lane Field?

A Yes.

Q Is that the map there on the wall?

A Yes, the first map on the left.

Q Now the Commission has marked this as Exhibit 1. Was this map prepared by you or under your supervision?

A Yes.

Q Will you please state what this map shows.

A This map is located in the general area of the Lane Field and has outlined in red the area covered by the application. The producing wells are circled in red and are the wells which have penetrated the Wolfcamp and Devonian zones. The wells circled in green are drilling wells, or wells which have not been completed to date.

Q Will you identify the wells shown on that map by name and by location and by whether or not they are producing wells or drilling wells?

A As I have mentioned before, the wells shown in red are the producing wells at present in the Lane Field. This well, the Humble #1 State A is located in the center of the northeast quarter of the northeast quarter of Section 11. The Sunray State #1 F is located in the center of the southeast quarter of the northeast quarter of Section 1. The Sunray Mid-Continent State #1 F2 is located in the northeast quarter of the northwest quarter of Section 1, all in Township 10 South, Range 33 East. The other well shown to be producing is the Sunray No. 1-A, located in the center of the southeast quarter of the southwest quarter of

Section 36, Township 9 South, Range 39 East.

Q Will you describe the identity of and the location of the drilling wells shown in green?

A The wells shown in green are the leased State well in Section 2 which is located in the southeast quarter of the northeast quarter and two wells located in the southwest quarter of Section 1 which are the Mid-State wells, and the Sunray well located in the center of the northwest quarter of the southeast quarter of Section 36.

Q Now, Mr. Symes, how far and in what direction from the Lane Field is the nearest Wolfcamp or Pennsylvanian production?

A About 8½ miles south and west in the Mescalero Field.

Q Do you have structural maps drawn on the top of the Wolfcamp pay zone and the Pennsylvanian?

A Yes.

Q Will you indicate them on the map?

(The witness stepped to the maps which were on the wall.)

A The first map, the Wolfcamp Pay Zone, that's Exhibit 2. Exhibit 3 would be the Pennsylvanian.

Q All right. Do you have a cross-section showing the Wolfcamp and the Pennsylvanian?

A Yes

Q Would you just show that?

(Witness complied.)

Q The Commission has identified that as Exhibit 4?

A Yes, sir.

Q Were these two structural maps and the cross-sections prepared by you or under your supervision?

A Yes.

Q Is the information shown thereon correct?

A Yes to the best of my knowledge.

Q Now, Mr. Symes, referring to the two structural maps which have been identified as Exhibits 2 and 3, will you explain what is shown by each?

A Exhibit 2 is a structural map contoured on top of the Wolfcamp Pay Zone. This map is based on the completed wells in the area which are shown in red, and this completed well here (indicating). It is contoured on 20 foot intervals. As you can see by this map the control to the south is fairly good. The control to the north is weak due to lack of well control. However, we have incorporated some of the thinkings of the seismic maps in that area.

Q Is the seismic information which you have confirmed by the information you have to the south?

A Yes. Our structural top is located in this general area and shows a strong dip in this area. This is based on the lower Pennsylvanian formation.

Q Since this information is substantially confirmed by development to the south, you have reason to believe the map is reasonably correct as to the structure to the north, is that correct?

A Yes.

Q And also as to the east, is that correct?

A That's right.

Q Now then on the other map, Exhibit 3, is a structural map contoured on top of the Pennsylvanian. We are using contour intervals here of 20 feet and the structure is pretty much the same

as the Wolfcamp based on the same information. I should point out here that we have one well in this field that is producing from the Pennsylvanian zone and this is shown in red. I also should have pointed out in this map on top of the Wolfcamp pay zone that there are three presently producing wells shown in red from the Wolfcamp zones.

Q Mr. Symes, the elevation shown on those contours, are those sub-sea elevations?

A Yes, sir.

Q. Now with regard to your cross-section, how was that identified, if you will turn that over please, how was the cross-section prepared and what does it show?

A This cross-section--first, I would like to state here, this is a cross-section starting with the Humble well in Section 11 continuing to the north through the 1-F Well, the 2-F State Well, and the 1-I Well.

Q Is this a south-to-north cross-section then?

A Yes.

Q That is using all the available information that you have?

A All available information to date. This cross-section is based on gamma ray neutron logs and all information available on the field to date. In this cross-section we show the name of the well, the elevation, the drillstem tests, the perforations of the initial production. Also shown on the cross-section is the top of the Wolfcamp pay zone, the producing zone, as shown in red. Next is the top of the Wolfcamp water zone which was established by drillstem tests in these wells, shown as water, shown in green. The next line would be the top of the Pennsylvanian and then the

top of the Pennsylvanian pay zone as shown in blue on the cross-section. Here you will see that there has been water established between the two producing zones which indicates separate reservoirs.

Q Was water also found in any of the perforations or on any of Sunray's wells which were later squeezed off?

A Yes in the No. 1 State F Well which was the discovery well, the one right here, we had three sets of perforations in that well in which we produced water, squeezed those off, and perforated at the top of the Wolfcamp zone and completed a water-free well.

Q I notice in the Pennsylvanian zone which you have identified in blue on that Exhibit, that the blue zone is not shown to be continuous to the left, over to the Humble well. Why is that?

A Well, according to our information, this well was not tested in this Cisco zone. Therefore, we don't know whether it is oil-water, or what, so we actually block it off here to show there is no information and we don't know.

Q Does your log information, shown on there which you have examined, indicate the Pennsylvanian is present there?

A Yes. And from the looks of the log, I would say it is porous, or has porosity.

Q Now when the discovery well, which is the New Mexico State F No. 1, was first drilled, how did you distinguish between the Wolfcamp and the Pennsylvanian zones?

A We obtained fossil information from the paleontological laboratory at Midland, Texas which established the age of the Wolfcamp and Pennsylvanian zones which was the actual depth of the well or in the well, and from that information in correlating our

electric and gamma ray neutron logs, we can pr[illegible]t a distinct break in all these wells which are correlative.

Q On the State [illegible] No. 1 Well, the discovery well, you, as geologist, could not definitely identify the Wolfcamp and Pennsylvanian zones as such from the kicks on the log or from sample information while they were being drilled?

A No.

Q Was the separation of these zones apparent to you without paleontology information?

A Yes, because water was established between them.

Q Once paleontological formation is established, is a geologist able to assemble the other information in the field?

A Yes normally, in this case yes.

Q And that is done by correlating the kicks?

A That is right.

Q Is use of a paleontologist generally necessary in this part of New Mexico to identify geologic formations in wildcat wells?

A In my opinion it is necessary in the Wolfcamp and Pennsylvanian zones.

Q Based on your study in your opinion, are the Wolfcamp and Pennsylvanian formations separate sources of supply with respect to each other and with respect to any other pool in the area?

A Yes since we do have a water zone between them, it indicates the reservoirs are separate. And since the producing wells in the general area are several miles from this field, and in the general area we have some dry holes, we definitely believe we are on a separate structure.

Q With regard to the depth of the Wolfcamp and the Pennsyl-

vanian, what are the approximate drilled depths at which they are found?

A The top of the Wolfcamp pay zone is approximately 9,650, depending on whether you are on structure or plains, and the top of the Pennsylvanian producing zone would be around 9,780 or 9,800.

Q Based on your study, in your opinion, are the Wolfcamp and Pennsylvanian formations probably producing through an area designated in the application and outlined in red on Applicant's Exhibit 1?

A Yes. It is my opinion with the information we have available at this time that we could reasonably expect production in the limits shown on our application.

MR. ERREBO: Thank you. If the commission please we would like to offer Exhibits 1 to 4 in evidence.

MR. PORTER: Without objection they will be admitted.

MR. ERREBO: Also, our next witness is a paleontologist and he will be available for any detailed questions.

MR. PORTER: Does anyone have any questions of Mr. Symes?

CROSS EXAMINATION

By MR. MANKIN:

Q Mr. Symes, I am Warren Mankin of the Oil Conservation Commission. It was indicated on your Exhibits 2 and 3 the producing wells at the present time are shown in red. Is that correct?

A The producing wells at the present time, if we could go back to Exhibit 1, yes they are shown in red. These in Exhibit 2 and 3 are distinguished between the Wolfcamp pay zones and the Cisco pay zone wells.

Q Mr. Symes, I call your attention to Sunray's State F2

which you designate as a Pennsylvanian completion. Is that correct?

A That is correct.

Q Is that well not presently carried in the Lane-Wolfcamp Pool?

A I believe--I am not sure of that.

Q In other words there is no Lane-Pennsylvanian Pool at the present time and in lieu of that for proration purposes it is carried in Lane-Wolfcamp Pool.

A Yes it is.

Q Would it be your recommendation that it be changed and put in the pool you requested by name, the Lane-Pennsylvanian, that is the State F 2 Well?

A Yes.

Q The area which you have delineated in both the Wolfcamp and the Pennsylvanian is a fairly large area involving about, between 5 and 6 sections in areal extent. Is that correct?

A Yes.

Q That's shown on Exhibit 1?

A Yes, shown on Exhibit 1.

Q At the present time the Lane-Wolfcamp Pool is only delineated by the west half of Section 1 and the northeast quarter of Section 11. Is that correct?

A And the south half of Section 36.

Q And the south half of Section 36 is presently delineated by the Commission?

A It is producing.

Q But it is not presently delineated by the Commission by nomenclature hearings, is it?

A I couldn't answer that. I am not familiar with that.

Q I believe that only the west half of Section 1 and the northeast quarter of Section 11 are presently delineated by Commission orders. Then you are suggesting a very large delineation of 5 or 6 sections as compared to three-quarters section by delineating the Wolfcamp and the Pennsylvanian. Is that right?

A Yes, sir.

Q As shown by your structural map you feel that would be productive?

A I feel with the information we have it is reasonable to assume that we could expect production in that area.

Q Even though some of the area you have suggested in Sections 7 and 12 and 11 are outside your closed contours on Exhibits 2 and 3?

A Section 7--

Q And 12 and 11.

A And 12 and 11--

Q A portion of that area is outside of your closed contours, is that correct?

A Correct.

Q Do you feel that possibly because the contours might be further expanded in that area, that area might not be productive?

A I believe oil would be encountered, whether economically, I don't know, because this well here is actually producing water and oil.

Q You mean the Humble Well?

A Yes sir.

Q And it is producing from the Wolfcamp?

A Yes sir.

Q How much separation have you found at the present time between the producing interval of the Wolfcamp and the Pennsylvanian, what is the interval between the two?

A I believe around 100 feet.

Q What have you found between the two intervals?

A We have found a water zone between the two intervals.

Q And you have completed one well in both the Pennsylvanian and the Cisco, which is the State I#1, is that correct?

A The State I#1 is the Wolfcamp producer and the State W#2F is the Pennsylvanian.

Q No, the State I#1, would it not encounter both zones, was it not completed in both zones with oil production from both?

A It is my understanding it was.

Q That is the only well completed in that manner?

A Yes, sir.

Q Some of them encountered both the Pennsylvanian and the Wolfcamp in the same camp, but they are only single completions, is that correct?

A Yes sir, that is correct.

Q I note from your Exhibit 1 that there are locations shown for the State I#3 and the State F#3. Have those locations been made and the wells started yet?

A The only well that is drilling in this particular area by Sunray is #2 State I, which is shown in green. These are locations.

Q Locations which have not been submitted to the Commission as yet?

A I am sure that is correct.

Q Do you have knowledge whether the two wells in Section 1 which is the Midstates-Phillips-Lincoln Unit 1 and 2, are presently drilling or are just locations?

A I am under the impression that these are drilling.

MR. ERREBO: I believe there may be a Midstates representative here to day.

MR. STALLINGS: Mr. Stallings, Midland, Texas, Midstates Phillips #1 Lincoln and #2 Lincoln are presently drilling.

MR. PORTER: Thank you, Mr. Stallings.

Q I have one other question, Mr. Symes: Have you been able to determine any information from the Aztec well that is drilling, has it penetrated Wolfcamp/or Pennsylvanian pay?

A I obtained or saw an electric log on that well last night and I haven't been able to go through it fully, but I understand both zones have been drilled through, the Wolfcamp and the Pennsylvanian, and tests have been made and right now I understand the pipe has been set and they are in the process of completing the well.

Q You don't know what zone they are attempting to complete?

A I believe one of their representatives is here.

Q But as yet you have no information as to the tops which would change your picture shown on Exhibits 2 and 3.

A I would say this, in quick calculations made on this well and 1-F, it looked like this well would encounter the Wolfcamp pay zone approximately 15 feet lower than the 1-F here and the Cisco zone would be approximately 20 feet lower. We show on our contours here that it would be approximately, maybe 25 feet lower, and it is actually 15, we missed it by 10 feet.

Q So it is a fairly close interpretation?

A Over here on the Pennsylvanian I believe it looks like about 20 feet lower and I show it here to be about maybe 40 feet, we missed that about 20 feet.

Q So that it is within the ballpark?

A Yes, and it looks like you would expect it to come out, a little flatter than what we show.

Q So it will be a higher structure than you show?

A Yes, sir.

Q Which would make it look even better, is that right?

A Yes, sir.

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

MR CAMPBELL: Jack Campbell of Campbell and Russell, Roswell New Mexico. I would like to enter an appearance on behalf of F. J. Danglade, who owns a leasehold interest under the southwest quarter of Section 30, Township 9 South, Range 34 East and J. E. Simmons who owns a leasehold interest under the southwest quarter and the east half of the northwest quarter of Section 31, Township 9 South, Range 34 East, and Mrs. Valleye Hardin who owns a 3% overriding royalty interest under the Simmons lease, and J. C. Ainsworth who owns royalty under the southeast quarter of Section 26, the northeast quarter of Section 35, in Township 9 South, Range 34 East. I would like to ask Mr. Symes if he knows the answer to these questions. I don't know whether they have another witness on the spacing aspects or not or if he is acquainted with the application insofar as it regards spacing. Is he the proper witness to answer those questions?

MR. ERREBO: We have two other witnesses who will testify as to the spacing and the desirability and feasibility of what we

propose here today.

MR. CAMPBELL: Can this witness or you state what you are proposing insofar as the spacing aspects?

MR. ERREBO: Yes, sir, I can state what we are proposing. It is as shown in our application as filed and copies of which were furnished to Mr. Danglade and Mr. Simmons. Our application covers 80 acre spacing for each of the Wolfcamp and Pennsylvanian formations within the areas in red on Exhibit 1 and proposes that each governmental quarter section will be divided by running a north-south line through the center thereof and locating the well for each unit in the northwest and southeast 40 acres of each quarter section with the usual 150 foot tolerance.

MR. CAMPBELL: And you are at the same time requesting exceptions for the locations presently existing?

MR. ERREBO: We are requesting exceptions for those locations on which wells are presently drilled or have been drilling.

MR. CAMPBELL: Thank you.

MR. PORTER: Any further questions, Mr. Campbell?

MR. CAMPBELL: Yes.

CROSS EXAMINATION

By MR. CAMPBELL:

Q I note on Exhibit 1 an area which is delineated by diagonal lines. Will you state what that area is?

A I presume you are talking about the lines within Section 36 and the north half of Section 1?

Q Yes sir.

A This is an area in which a drilling unit was set up for the purpose of drilling the #1-F State in which Sunray Mid-Continent, along with Seaboard and Lion, share in the area in the cost of the drilling.

Q Was that for the original well or all the

wells?

A All of the wells in this area.

Q And Sunray is the operator under the operating agreement?

A Yes.

Q Do you know whether or not Sunray Mid-Continent presently, as operator, has the discretion of the location of the wells within that particular area?

A Would you state that again?

Q Do you know whether under the terms of the operating agreement the operator, Sunray Mid-Continent, is permitted and authorized to establish the locations of the wells within the area?

A I can't answer that definitely, but I think this is what happens, the location is approved by the other two members within the unit.

Q Are you able to give a statement as to the average thickness of the two pay sections and the two zones shown on the cross-section?

MR. ERREBO: Mr. Campbell, I am able to give you this but if you want a complete analysis of the information, our third witness will be able to go into that in as detailed a manner as you wish.

MR. CAMPBELL: I believe that is satisfactory. I have no further questions.

CROSS EXAMINATION

By MR. NUTTER: Dan Nutter of the Oil Conservation Commission. Mr. Symes, what is your contour map at the top of the Wolfcamp and Pennsylvanian based on?

A The top of the Wolfcamp pay zone, I can show you better by this cross-section, is based on the lime bed within the pay section at the top of the Wolfcamp producing zone. Do I make myself clear?

Q In other words, the whole contour is based on wells drilled through that bed.

A The completed wells to date, yes sir.

Q And all the wells are either the three clustered there together a half-mile apart or the Humble--

A (Interrupting) it is based on all of them.

Q And those are all that you have information on?

A That is right.

Q What is the contour in the north half of your map of the two pools based on?

A Exhibit 3?

Q Exhibits 2 and 3.

A Exhibit 2 is based on top of the Wolfcamp pay zone in which I showed on the cross-section where we call our correlations and Exhibit 3 is based on the top of the Pennsylvanian.

Q How did you derive the contour in the north half of the pool?

A Up in this direction (Indicating)?

Q Yes, sir.

A I believe in this testimony I mentioned the fact that you would not have well control to the north but with this well control from the south and in the field plus the incorporating of our geophysical information in that area, we show this trend with the high in this particular direction, dipping on the northern direction.

Q In other words you do have a seismographic picture of this area.

A Yes, sir, but we haven't presented it at the hearing.

Q Do you plan to?

A We can, we can prepare one--pardon me, on the seismic picture, these maps show the wells are producing within the, we will say, within 1000 feet of the top of the Fusse or the Wolfcamp pay. The seismic picture is based on the basal Pennsylvanian marks, which are probably two or three thousand feet deeper and quite a bit thinner of course, but it has pretty much the same picture as this with a strong dip in this direction, your contour is high in this direction and dipping in the north again.

Q Your original well was based on the seismic picture?

A Yes sir, and was a Devonian well.

Q Has this Pennsylvanian encountered water pay?

A No sir, no water has been tested to date that I know of unless the well that is in process of completion now may have taken a drillstem test lower than we have here.

Q Where is the bottom of the Wolfcamp?

A The base of the Wolfcamp and the top of the Pennsylvanian occur--I don't have the exact depth here, but the estimated depth is at approximately, oh probably 9,770.

Q In other words, probably the lower level of this green portion on your cross-section is the bottom of the Wolfcamp?

A That's right.

MR. NUTTER: I believe that is all.

MR. PORTER: Does anyone else have any questions?

By MR. MANKIN: Mr. Symes, on your Exhibit 3 which shows the top of the Wolfcamp water zone, that is your oil-water contact essentially then?

A Not necessarily. I believe there is a small interval between this water here and the--well we show maybe it could be 20 feet

or so-- before you could get into the producing horizon of the Pennsylvanian.

Q Then there is an area of the Pennsylvanian that would not be particularly porous and would not be perforated and there would not be a direct contact between the oil and water?

A We had one drillstem test covering that area and it flowed off--in #2 State F--the logs would indicate very little permeability in this section.

Q Which section is that?

A Between the base of the water zone in the Wolfcamp and probably the top of the Pennsylvanian.

Q Which is the white area--

A Shown on the map.

Q --between the blue and green on Exhibit 3?

A That is correct.

Q I have one other question: The question was asked you in regard to this unit between the Seaboard and the Lion and Sunray. It involves two separate leases. Was permission obtained from the State of New Mexico for putting those two leases together?

A I am sure it was. I can't answer the question because I don't have the agreement in front of me.

Q Do you have knowledge of whether any witness here has that information?

A I believe I can get that from my files, I brought them with me, and I will be glad to show them to you.

Q Thank you. That's all.

MR. GURLEY: Mr. Symes, would it be possible for you to submit copies of the agreement to the Commission?

A Surely.

MR. ERREBO: One further question for the sake of the transcript: Mr. Symes, you have used terms Cisco and Pennsylvanian somewhat interchangably during your testimony. Do those terms refer actually to the same formation?

A They do in this case, yes.

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

CROSS EXAMINATION

By Mr. Nutter: Mr. Symes, I note here on your cross-section that you have a dotted line running from a point about 5 inches to the right of the Humble well over to the well. What does that represent there?

A This is the line I believe you have in question, here?

Q Yes, sir.

A A dipped line in the red portion of the Wolfcamp pay zone, since this well was completed with oil and water, apparently your water-oil contact is in here somewhere. We don't know, we were just showing the water in this particular pay zone is up in there somewhere and I don't know where it is.

Q Do you believe that any well might be drilled in this area as outlined on Exhibit 1 by the red line which might be off the structure and penetrating the water zone?

A Yes, from the information on the Humble well, wells that would be drilled below this particular rising would probably encounter water unless there is a tilted water table.

Q Do you indicate that the water table in the Wolfcamp is tilted?

A I don't know.

Q However, the top of the water is higher than the top in another cross-section?

A Well, on a sub-sea basis it would not be so.

Q This cross-section--

A (interrupting) You see, it's on a sub-sea of a "-5300". It was made on that basis.

MR. NUTTER: I believe that's all.

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

MR. ERREBO: With regard to the water which might be present within the areas under consideration in this application, is it not so, or let me state it this way: Is it your opinion Mr. Symes, that oil might reasonably be expected to be found in some quantity throughout the area even though around the edges there might not be enough to justify a commercial well?

A Yes, that is true in this case. This well actually is lower than the countours shown, but it actually is a producing well in the Wolfcamp zone.

MR. MANKIN: I have one final question; in speaking of the Cisco or Pennsylvanian, is it not true that Sunray found gas production in this area from the Pennsylvanian?

A Yes, sir.

MR. MANKIN: And that may be the subject of further development and a further hearing in the future, or at least there is an indication that it will be delineated in the gas production in the Strawn portion of the Pennsylvanian?

A Yes, sir.

MR. MANKIN: That's all.

MR. PORTER: Any further questions of Mr. Symes? If not,

he may be excused. The next witness is Mr. R. V. Hollingsworth.

R. V. HOLLINGSWORTH,

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

DIRECT EXAMINATION

By Mr. ERREBO:

Q Will you state your name and occupation.

A R. V. Hollingsworth, owner and operator of the Paleontological Laboratory at Midland, Texas.

Q Are you a paleontologist?

A Yes.

Q What is a paleontologist?

A A paleontologist is one who works with or studies fossils, the remains of plants and animals, for the purpose of determining a geological age of rocks which I encounter. The fossils are the ultimate basis, the definite criteria by which geological ages are extablished.

Q Have you previously testified before this Commission?

A No.

Q Will you describe your background and education and experience?

A I have a Bachelor of Science in Geology with major work in paleontology, a Master of Science in geology with major work in paleontology, two periods of post-graduate work and ten years experience as a stratigrapher and paleontologist with a major oil company, twelve years in the present connection. I have had about fourteen years experience in southeastern New Mexico and western Texas, geologically.

MR. PORTER: Are there any objections to this witness' qualifications? If not they are acceptable to the Commission.

Q Mr. Hollingsworth, have you made a study of the Sunray Mid-Continent Oil Company New Mexico State #F-1, which has been described as the discovery well in this field?

A Yes, we made an intensive paleontological study of the discovery well in this field.

Q As a result of your study of the State F-1, have you made a report?

A Yes, we made a paleontological report to our client, Sunray Mid-Continent Oil Company.

Q I hand you an Exhibit identified by the Commission as Exhibit 5. Is that your report?

A Yes, this is our report which we made to Sunray Mid-Continent Oil Company.

Q What does this report cover?

A This report covers the age of the formations ranging in age from Wolfcamp down to pre-Pennsylvanian formations. In other words, the Wolfcamp and Pennsylvanian and pre-Pennsylvanian formations.

Q What fossil information did you find pertaining to the Wolfcamp and Pennsylvanian in this well?

A Without detailing the names found in the zone indicated in Exhibit 4 with red, we found an abundance of Wolfcamp-age fossils in this zone. We also found Wolfcamp-age fossils in the zone indicated with green, which is the water zone. In the zone indicated in blue on the same exhibit, the Pennsylvanian pay zone, we found fossils of the Pennsylvanian age.

Q Now with regard to the range chart which is attached to and

made a part of Exhibit 5, does that chart show thereon, have you indicated on that chart, the fossils which are found solely in the Wolfcamp and identified the Wolfcamp as such, and are there shown thereon the fossils which are solely in the Pennsylvanian and indicated as such?

A With reference to the range chart in Exhibit 5, the scientific names of the fossils are given on the left-hand side arranged in alphabetical order. Because of particular interest in this specific instance, in the study of the Sunray Mid-Continent State F-1, we drop down to the "F's", the genus Schwagerina, which occurs only in the Wolfcamp and is not present in the Pennsylvanian. As a matter of fact, the definition of the Wolfcamp in geological time is the base of the range of the genus Schwagerina, that is the world-wide definition of the term Wolfcamp as far as age is concerned. In the "O's" there is the genus Oketaella, which occurs only in the Wolfcamp and we found it in this particular well. I don't know the correct pronunciation of the word either. The genus under D, Dunbarinella, in the Pennsylvanian; the genus Triticites was in the Pennsylvanian and in the Wolfcamp. These two names, as the others do, define groups and in order to delineate the Pennsylvanian from the Wolfcamp by use of these particular ones, one must get down to the type or kind, and in the State F-1 the kind, type or specie of Dunbarinella there was a Pennsylvanian age, was Triticites--those also were of Pennsylvanian age.

Q At this point, if the Commission please, we would like to offer in evidence Exhibit 5.

MR. WALKER: Without objection it will be received.

Q. Then Mr. Hollingsworth, will you state your conclusions

based on the results of this study?

A Based on the results of this study, it is our definite conclusion that the zones indicated hereon in red as the Wolfcamp age pay zone and the zone indicated at the Pennsylvanian age pay zone are separate and distinct ages, one being Pennsylvanian in age, and the other Permean Wolfcamp in age. They are very separate and distinct zones.

MR. ARREBO: That is all we have.

MR. PORTER: Does anyone else have a question?

CROSS EXAMINATION

By MR. NUTTER:

Q Mr. Hollingsworth, these samples taken from this State well--

A Yes sir.

Q And the calculations for these--are correlated with the others in the electric log?

A That is correct.

Q I think you indicated that the Schwagerina was a good marker for the Wolfcamp?

A Yes.

Q Do you have a marker for the upper part of the Pennsylvanian?

A There is no one fossil commonly found which in itself is a good marker for the upper Pennsylvanian which would be indicated by the generic name, so that one would have to get into the specie or type of name in order to indicate those which are confined to the upper Pennsylvanian. The Dunbarinella on the range chart is known only in the upper Pennsylvanian and the lower Wolfcamp.

Q That Dunbarinella extends into the Wolfcamp?

A It does, but from practical experience its occurrence in the

Wolfcamp in the permean pool is very rare. Its occurance in the Pennsylvanian is fairly common.

Q In other words it is pretty easy to fix the bottom of the Wolfcamp and hard to pick the top of the Pennsylvanian?

A Yes sir.

Q Where did they get the "Thrifty" type of fossil in the Pennsylvanian?

A Thrifty is a group name for rock in central Texas of the uppermost Cisco age. It was named from the little Post Office in Thrifty, Texas, in western Brown County, and I think there is still a little store and Post Office there.

Q I can understand some of the goofey names but "Thrifty" I couldn't see.

By MR. MANKIN:

Q Just one question, was all your analysis based on samples, or were there some cores examined also.

A There were cores examined at a depth from 9,750 to 9,766 in the Pennsylvanian section and we felt the cores gave extremely good material upon which to make an analysis of the Pennsylvanian age for that portion of that well.

Q Most of it however was in the form of samples?

A Yes, sir.

MR. PORTER: Anyone else?

MR. MONTGOMERY: R. F. Montgomery of the Oil Conservation Commission. Due to the orageny going on in this area, what is the possibility that the fossils are transports, that is fossils laid down in this area?

A The rocks indicate no orageny and there is no evidence from

cuttings or corings that any transporting is involved in this particular field.

MR. PORTER: If there are no further questions, the witness may be excused. The next witness is Mr. W. N. Kellog.

W. N. K E L L O G

Called as a witness, having bee first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. ERREBO:

Q Will you please state your name, occupation, and by whom you are employed?

A My name is Walter N. Kellog; I am a petroleum reservoir engineer employed by Sunray Mid-Continent Oil Company.

Q Have you ever testified before this Commission?

A No, sir.

Q Please state your background of education and experience.

A In 1948, petroleum engineer graduate of Oklahoma University. I have been employed by Sunray as a reservoir engineer for approximately 6½ years. Presently I am chief reservoir engineer. I am a registered professional engineer in the State of Oklahoma.

Q Have you ever testified before any other state regulatory bodies?

A Yes sir, the Oklahoma, Texas, Louisiana, and Arkansas.

Q Have you made a study of the Lane field involved in this application?

A Yes sir.

MR. PORTER: The Commission considers his qualifications acceptable.

Q Were you present during the testimony of Mr. Symes this morning?

A Yes sir.

Q Based on your studies of this field, do you agree with the testimony which he has given?

A Yes sir.

Q What study have you made or caused to be made of the Wolfcamp and Pennsylvanian reservoirs?

A The studies of the Lane field we have made consisted of individual well drainage calculations and material balance calculations and expected future performance of these two reservoirs under solution drive mechanisms.

Q Mr. Symes has previously testified that the Wolfcamp and Pennsylvanian constitute separate reservoirs by virtue of the water which was found between them. Do you have further evidence of the existence of water in this interval?

A Yes sir, based upon the calculations made from electrical and radio activity logs, the porous intervals in the Wolfcamp formation carry water saturation 20 to 30% higher than the pay section of the Wolfcamp. Also, in view of the core analysis in the porous intervals, it indicates a similar elevated water saturation of 20 to 30%. I interpret these data to further indicate that the two producing horizons are separated by porous intervals that are water producing.

Q Those are the ones you are testifying to now?

A Yes sir.

Q Do calculations of production from these logs show the presence of water as indicated on the drillstem testing to which Mr.

Symes testified?

A Yes sir.

Q And are the calculations from the electrical logs and radio activity logs usually reliable in distinguishing between water and oil-bearing formations?

A As far as I know.

Q These logs are commonly used to aid in distinguishing between oil and water-bearing formations?

A Yes, sir.

Q Do you have a tabulation of data representing the average reservoir characteristics of the Wolfcamp and Pennsylvanian formations which have been marked as Exhibit 6?

A Yes sir.

Q Was that prepared by you or under your supervision?

A Yes sir.

Q Will you please state and explain what is shown on this Exhibit?

A This exhibit is a tabulation of all the known factual data on the individual reservoirs and crude being produced. Probably the most important data shown on this exhibit pertains to the reservoir characteristics. The zones of production, being the Wolfcamp and the Pennsylvanian reservoirs, are quite different as evidenced by the differences in the porosity, permeability, and connate water and original stock tank oil in place.

Q What does this exhibit show as to the differences, what are the exact figures shown there.

A The Wolfcamp reservoir from core analysis has a porosity of 10.5% and the Pennsylvanian reservoir has a porosity of 4.9%; the

Wolfcamp permeability was 273 millidarcies, whereas the Pennsylvanian permeability was 7.7 millidarcies. The connate water calculations made from electric logs indicate the Wolfcamp to have a connate of 20%, whereas the Pennsylvanian has 30%. The original stock tank oil in place, barrels per acre-foot, based on these data, are indicated for the Wolfcamp to be 370 barrels per acre-foot, whereas the Pennsylvanian reservoir has 146 original stock tank barrels of oil per acre-foot.

Q Thank you Mr. Kellogg. Now will you please refer to the exhibit marked No. 7 and identify it?

A This exhibit, Exhibit 7, is a tabulation of the well tests that have been taken in the field.

Q Was this prepared by you or under your supervision?

A Yes sir.

Q Will you please explain what has been shown on that exhibit?

A This exhibit shows the number of completions by reservoirs and testing of the individual wells that has been made. The significant things indicated on this exhibit are the relatively high potentials, the high gas-oil ratio of the one well, Humble Oil & Refining New Mexico State AM #1, completed on the flank of the Wolfcamp structure, making appreciable volumes of water.

Q Will you please refer to Exhibit 8 and identify it?

A Exhibit 8 is a tabulation of the bottom hole pressure data obtained from the Wolfcamp and Pennsylvanian reservoirs in the Lane Field.

Q Was it prepared by you or under your supervision?

A Yes, sir.

Q Will you please explain what is shown by that exhibit?

A This tabulation indicates all of the bottom hole pressure data that has been compiled from the field. You will notice in the right-hand column of this exhibit that there are some bottom hole pressures dated and underlined. I would like to point out that these bottom hole pressures were obtained through the services of a different company than all the bottom hole pressures previously obtained. You will notice in particular that the New Mexico State F #1 Well under test date of August 8th, reported nearly original bottom hole pressures as did the New Mexico State I #1, surveyed July 11 to August 2nd.

Q What was that original bottom hole pressure and in what well was it found?

A The original bottom hole pressure we have found was 3,516 pounds per square inch gauge obtained September 21, 1955, in Sunray Mid-Continent's New Mexico State F Well #1. In the analysis of these later pressure surveys, I believe the differences, or the elevated bottom hole pressure in the New Mexico State F #1 is due to a mechanical difference existing in the bottom hole pressure bombs of the two companies. I cannot conceive how it could build up with continued production. This problem has been encountered in similar conditions in other fields. I believe the only thing to be concluded in the comparisons of these last bottom hole pressures with the previous bottom hole pressures is that the wells were completed in common reservoirs and are of the same or nearly the same bottom hole pressure, and the only thing in doubt at this date is just exactly what is the bottom hole pressure in the Wolfcamp and Pennsylvanian. There appears to be a difference in magnitude of something

over 1%. We intend to obtain additional information to verify the differentiation in the calibration. The measured pressure drop was 37 pounds per square inch, or approximately 1% in the Wolfcamp, whereas in the Pennsylvanian to July 1, 1956, the measured pressure drop was 149 pounds per square inch or approximately 4%. These pressure drops are recorded under State F Well #1 for the Wolfcamp reservoir and the New Mexican State F #2 in the Pennsylvanian reservoir.

Q Mr. Kellogg, you say that the original bottom hole pressure for each of the two reservoirs was nearly the same, or the same, and this Exhibit 8 shows that the Pennsylvanian has slightly the higher pressure.

A Yes, that is normal.

Q It can be expected?

A It is normally higher, yes sir.

Q Now, Mr. Kellogg, will you please refer to Applicant's Exhibit 9 and identify it?

A Exhibit No. 9 is a core graph indicating the core analysis results of the Sunray Mid-Continent Oil Company State of New Mexico F Well #2.

Q By whom has this core analysis been prepared?

A By Core Laboratories, Inc., Midland, Texas.

Q Will you please explain the results of this core analysis as shown in this exhibit?

A This is the reported whole core analysis--by that I mean the total core recovered during the operation was correlated rather than analyzing small plugs. The interval core analysis in this State Well #2 was from 9,620 to 9,805 feet. This analysis indicates

four separate porous wells.

Q How is that indicated on the Exhibit?

A These porous streaks are colored in compatibility with the cross-section. The top porous streak is colored in red and is found from 9,632 to 9,646. This is the horizon of the Wolfcamp interval. The next interval is colored in green from 9,683 to 9,694 feet. Also colored in green is the interval from 9,721 to 9,730 feet, approximately. The bottom porous reservoirs are from 9,771 feet to 9,798 feet, the productive pay interval of the Pennsylvanian. As previously mentioned, the uppermost porous interval and the bottom porous interval are the two productive sections. The center intervals are colored in green and are water bearing as established from drill-stem testing. And it is interesting to point out that they are separated by several feet of dense lime, the Wolfcamp interval was from 9,632 feet to 9,646 feet and has an average porosity of 10.5% and an average permeability of 373 milidarcies.

Q Is that a productive section?

A It is in the Pennsylvanian from 9,771 to 9,798 feet and the average porosity is 4.9% and average permeability 8.7 milidarcies.

Q Mr. Kellogg, I believe Mr. Campbell previously inquired as to the thickness of the pay zones. Would you state what is the average gross and net thickness of each of the pay zones?

A The gross interval of the Wolfcamp is approximately 15 feet of the porous section as shown by core analysis which indicates only a gross interval of 13 feet with a net pay being only 13 feet. The Pennsylvanian section gross interval is approximately 25 feet, is fairly consistent throughout the developed portion of the reser-

voir with a net feet of pay being 18 feet. In the State of New Mexico Well F #2,--we have interpreted--go ahead.

Q Do you have any further testimony in that regard?

A Not in regard to this Exhibit, no sir.

Q Let me ask you one additional question then: Is this core analysis fairly typical of the core analyses you have seen from other wells in this field?

A Yes sir.

Q Then in your opinion based upon your study of this well, other core analyses, the Pennsylvanian and Wolfcamp are separate reservoirs, is that correct?

A Yes, sir.

Q Will you please refer to Exhibit 10 and Exhibit 11 and identify them?

A Exhibits 10 and 11 are performance curves for the performance of the reservoirs of the Wolfcamp and the Pennsylvanian reservoirs for the pressures below the bubble point.

Q Does Exhibit 10, that is, the Wolfcamp Exhibit, and Exhibit No. 11 is the Pennsylvanian,--

A (interrupting) Excuse me--that is correct, yes sir.

Q Were these prepared by you or under your supervision?

A Yes, sir.

Q Will you please explain the meaning of them?

A On these exhibits are the plots of the bottom hole pressures and gas-oil ratio vs. cumulative oil recovery and per cent of recovery for an average well on 80-acre spacing. The bottom hole pressure is indicated on each by an orange line. The gas-oil is indic te on the exhibit by a green line and the estimated reservoir

backed pressure is 200 pounds as indicated across the bottom of the page in a red line. These curves were obtained by solution drive material balance calculations. For purposes of these calculations an 80 acre block was used of average pay thickness of 11.5 feet for the Wolfcamp and 15.5 feet for the Pennsylvanian reservoir. These curves were calculated by assuming a production volume and solving by trial and error the material balance equation for the bottom hole pressure and gas-oil ratios. These curves show the expected oil recovery for the Wolfcamp to be slightly in excess of 70,000 stock tank barrels of oil with a recovery percentage of 20.8% of the original stock tank oil in place. The calculated recovery for the Pennsylvanian is slightly in excess of 40,000 stock tank barrels of oil with 22.5% of the original stock tank oil in place. This shows as would be expected from an analysis, that the Pennsylvanian is the least productive of the two reservoirs and has a smaller reserve.

Q Mr. Kellogg, have you made a study of the economic drilling and developing of the Lane Field?

A Yes sir.

Q Will you please refer to Applicant's Exhibit 12 and identify it?

A Exhibit 12 is the tabulation of the economics of developing the Lane Field on several assumed spacing patterns, both single and dual completions.

Q Was this exhibit prepared by you or under your supervision?

A Yes sir.

Q Will you please explain the significance of the exhibit and what the exhibit shows?

A This is the tabulation of the economics of an average

single completion, assuming an average 40 and 80 acres development in the Wolfcamp and Pennsylvanian reservoirs, and also assuming dual completions between the two reservoirs and development on 40 and 80 acre spacing. For each of these conditions we have calculated the average net operating profit or loss to the operator of the well. This calculation and the results of the calculation are based on the previously introduced factual data as carried in the first two columns under the Wolfcamp and Pennsylvanian reservoirs, the prices used and the results of the calculations are indicated in the fourth line from the bottom of the page. These calculations show that if the Wolfcamp was developed by single completion on 40 acre spacing, probably the net operating loss would be $86,816 per well. If the Wolfcamp were developed on 80 acre spacing an average operating profit of $5,441 would be realized per well. With regard to the Pennsylvanian reservoir, also assuming a single completion, a net operating loss of $123,787 and $71,512 would be realized per well for 40 and 80 acre spacing respectively. Assuming however dual completions between the two reservoirs and development on 40 acre spacing, the average loss is reduced to $55,822 per well. The extreme right-hand column on Exhibit 12 shows that 80 acre development with dual completions will return an average net operating profit of $87,304 per well.

Q Mr. Kellogg, with regard to the net profit and loss to the operator for single completion development in the Pennsylvanian for 40 and 80 acres, I believe you stated that was a profit--that is a mistake isn't it?

A In the Pennsylvanian?

Q Yes, will you repeat that as it should be?

A Well, development by dual--

Q (interrupting) by single completion of the 40 and 80 acres in the Pennsylvanian.

A The 40 acre well by single completion on the Pennsylvanian should read $123,787 and $71,512 respectively for 40 and 80 acre spacing, loss per well.

Q That is what the Exhibit shows?

A Exhibit 12 does show that.

Q That is based on the economic study?

A Yes.

Q Did you consider the Pennsylvanian to be a marginal zone?

A Yes, sir.

Q Also based on the economic study, the only way an operator can afford to develop his property in this field is by drilling on 80 acre spacing and dually completing his wells. Is that correct?

A Yes, sir.

Q Have you made a study of this field to determine the amount of acreage being drained by the present wells?

A Yes, sir.

Q Please refer to Exhibits 13, 14 and 15 respectively and identify each of them.

A Exhibit 13 shows two equations which were used in calculating the area drained by a well where a reservoir is above the bubble point. Exhibit 14 shows the actual area being drained effectively by the New Mexico State F Well #1 completed in the Wolfcamp reservoir, and Exhibit 15 shows the actual area being effectively drained by the New Mexico State F Well #2 completed in the Pennsylvanian.

Q Was each of these exhibits prepared by you or under your supervision?

A Yes, sir.

Q Would you describe what your study of this drainage consists of, what it is based upon, and what the exhibits show in that regard?

A The study consisted of an analysis of the New Mexico State F #1 completed in the Wolfcamp reservoir and the New Mexico State F #2 well completed in the Pennsylvanian. Both of these wells have sufficient production and pressure data to permit such analysis. The basis of the study is the normal pressure behavior of an undersaturated crude or the study of a rewervoir, of the pressure and production performance of a reservoir before the bubble point. In order to construct these exhibits, the equation on Exhibit 13 was used--

Q (Interrupting) You mean in Exhibits 14 and 15?

A Yes, sir. In order to construct Exhibits 14 and 15, the equations on Exhibit 13 were used. The area of drainage for the normal expansion of this under-saturated crude was assumed to be increments of 40, 80, 160, 320, 640 and the pressure performance with production was computed. Superimposed upon these calculated performances for incremental drainage is the actual pressure and cumulative production performance of the State F Well No. 1 in the Wolfcamp Horizon and on Exhibit 15 is the plot by use of a heavy line showing the performance of the New Mexico State F No. 2 in the Pennsylvanian reservoir.

Q Then, referring to Exhibit 14, this exhibit then shows the actual performance of the State F No. 1 which is completed in Wolfcamp, is that correct?

A Yes, sir.

Q And the solid lines on the exhibit show the State F No. 1 is actually drained in excess of 2,560 acres, is that correct?

A Yes, sir.

Q On Exhibit 15, the solid lines represents the performance of the State F No. 2 Well completed in the Pennsylvanian, is that correct?

A Yes, sir.

Q Does this line show the State F Well No. 2 is effectively draining 640 acres in the Pennsylvanian?

A Yes, sir.

Q How accurate are the performance curves?

A Based on laboratory and production data, and bottom hole pressure data, in my opinion these calculations are at least 95% correct.

Q At least 95%? A Yes, sir.

Q Does it therefore follow from this testimony that one well on 80 acres will recover as much oil as two wells on 80 acres?

A Yes, sir.

Q And will unnecessary wells be drilled if 40-acre spacing is adopted for a Wolfcamp and Pennsylvanian?

A Yes, sir.

Q How many?

A I reviewed the exhibits 2 and 3 and estimate the minimum of twenty-five unncessary wells would have to be drilled to develop these two wells on 40-acre spacing, assuming dual-completions. If single completions were permitted to be done, it would be something like twice that, or fifty unnecessary wells. Based on the estimate of twenty-five unncessary wells, it appears the cost of the operator would be approximately $5,000,000.

Q That is under dual-completion?

A Dual-completion, and twice that for single completion.

Q Or in the neighborhood of nine to ten million dollars, you figure?

A That is correct.

Q Is your estimate of the minimum number of unnecessary wells which would have to be drilled, that's a pretty conservative estimate, isn't it?

A It would be conservative by using the maps that we have as exhibits.

Q In other words, you wouldn't count the wells out toward the very edge of the structure?

A No, sir, I wouldn't go into that.

Q Then, is it your opinion that economic waste would occur if 40-acre spacing is adopted?

A Yes, sir.

Q Based upon your studies, is it your opinion that 80-acre spacing will constitute an area which will be economically and efficiently drained by one well?

A Yes, sir.

Q Is it your opinion that a 40-acre spacing pattern will unnecessarily increase the production costto all the operators in the area?

A That is correct.

Q What is the average capacity of the Wolfcamp formation as compared to the Pennsylvanian - - capacity to produce?

A The average capacity of the Wolfcamp reservoir from the core analysis indicates the Wolfcamp average capacity of 5,110 millidarcy feet. The Pennsylvanian reservoir appears to have an 87 milli-

harey feet average. This means the Wolfcamp has approximately fifty-nine times the capacity produced as the Pennsylvanian reservoir.

Q If dual-completion is not permitted and if both zones are commingled, would you expect a pressure differential to exist between the two zones?

A Yes, sir. Under commingling with the Wolfcamp reservoir having a much higher capacity, the pressure would be expected to fall faster due to higher ability to produce and would reach an earlier stage of depletion sooner. The earlier stage would in turn subject the Pennsylvanian to greater and larger pressure differential and would cause gas to come out of solution inefficiently and there would not be an efficient displacement medium to the Pennsylvanian oil.

Q By that,you mean that this gas which comes out of place inefficiently would not be properly used to move the oil out of the formation?

A That is correct.

Q Therefore, at least a part of that oil would be left in the formation and not recovered in the primary depletion, is that right?

A Yes, sir.

Q If gas is inefficiently produced from the Pennsylvanian,does that mean oil would be left in the Pennsylvanian which would be otherwise recovered if those zones were separated by dual-completions?

A Yes, sir.

Q Therefore, in [illegible] opinion that waste will be prevented if dual completions are permitted?

A Yes, sir.

Q What effect will dual completions have on existing correlative rights?

A No effect whatsoever as they would be protected.

Q What effect will the commingling of these zones have on correlative rights?

A Under certain conditions commingling could cause correlative rights not to be protected.

Q Under what circumstances might correlative rights not be protected?

A As an example, we could assume that one operator on an adjacent lease, or on a lease, had only one horizon. The off-set operator possibly in an adjacent well could have two producing horizons with the wells both having the same allowable, the operator having only one horizon could deplete his reservoir faster and cause a bottom hole pressure sink to develop around the well.

Q It would deplete faster because he would have fewer reserves because of the one formation?

A Yes, sir, whereas the operator on an offset lease would have two horizons and no reserves and with the same allowable and the operator with the two reservoirs would be subjected to drainage due to the faster depletion of the offset operator's leases and the

pressure sink created by the offset operator.

Q Is it possible that Pennsylvanian oil under the well which had both zones present, and which was open to both zones, is it possible that Pennsylvanian oil could be produced through that zone, through the Wolfcamp formation and then produced by the adjoining operator who never had that oil under his lease?

A It would be an extra possibility, it is not likely. A more likely possibility would be that the Pennsylvanian oil in that instance would change the Wolfcamp oil and displace the Wolfcamp oil to an offset operator.

Q Have you made a study to determine whether or not pressure maintenance by water or gas injection into these reservoirs would be feasible?

A No, sir, but we are in process of collecting data on each of the individual reservoirs to make such a study and intend to keep these reservoirs under continuous observation.

Q Is it necessary that these reservoirs be kept separate if a study of pressure maintenance is to be made?

A Yes, sir, it is most important that they be kept separate for the purpose that additional data has to be gathered on each of these separate reservoirs.

Q Based on your general knowledge of pressure maintenance in other fields and on your knowledge of this field, do you think there is any possibility that these reservoirs might be susceptible to

pressure by maintenance after all the data is in?

A I think there is a good possibility, personally. We haven't evaluated the wells.

Q What spacing do you recommend for the Wolfcamp and Pennsylvanian formations?

A I recommend 80-acre spacing for both the Wolfcamp and Pennsylvanian reservoirs with two rectangular units to be formed by a line running north and south through the center of each quarter section with the permitted wells located in the center of the northwest and southeast 40 acres of each quarter section with a 150 foot tolerance towards the center of the unit.

Q Are there any wells drilled or drilling at the present time which are off pattern - - you can refer to the maps on the board if you wish.

A Yes, there are two wells in the Wolfcamp reservoir - - the Humble well, and the presently drilling Midstates Phillips well. The Humble well is located in the center of the NE¼ NE¼, Section 11, and the Midstates-Phillips in the center of the NE¼SW¼ of Section 1. In the Pennsylvanian reservoir there are two wells, one of which is off pattern. It is the Sunray-Midcontinent State of New Mexico F No. 2, - - it is colored in red, and again the same Midstates-Phillips well is located in the NE and SW quarters of Section 1.

Q Is it your opinion that the development of the Wolfcamp and Pennsylvanian on 80-acre spacing and the drilling of dual com-

pletion will prevent waste of oil and gas, prevent the drilling of unnecessary wells, recover the greatest amount of oil and gas, and protect correlative rights?

A Yes, sir.

MR. ERREBO: At this time, I would like to offer Exhibits 6 to 16 in evidence.

MR. PORTER: Without objection, they will be admitted.

MR. ERREBO: That concludes our testimony.

MR. PORTER: We will recess the hearing until 1:30 this afternoon.

(The hearing was recessed at 12 o'clock noon, and reconvened at 1:30 P. M. before Mr. Porter and Mr. Walker).

MR. PORTER: The meeting will come to order, please. Mr. Errebo, are you through with direct examination?

MR. ERREBO: Yes, sir.

Q Does anyone have any questions of Mr. Kellogg?

CROSS-EXAMINATION

BY MR. MANKIN:

Q Mr. Kellogg, is there an established p.t.d. analysis of the Wolfcamp oil, and of the Pennsylvanian oil in this field?

A No, sir. A bottom hole sample was obtained and the results indicated under the Wolfcamp on Exhibit 6 from the Sunray State of New Mexico AF Well No. 1 in the Wolfcamp horizon and the similarity

in the gravities of the crude in the original gas-oil ratio, we just used the characteristics for the Wolfcamp for the Pennsylvanian oil.

Q Then, actually you had no bottom hole pressure for the Pennsylvanian?

A Actually, no.

Q That was my question, since apparently the bubble point you assume was the same on both as shown by Exhibit 6, is that correct?

A Yes, sir.

Q And the same is true with the solutions of gas-oil ratios of 1,638?

A Yes, sir.

Q So there were several items where you had no bottom hole sample on the Pennsylvanian where you used some of the data from the Wolfcamp?

A That is correct.

Q Do you feel that it would be true, or do you feel maybe if you got a sample there might be somewhat of a difference?

A I believe it would be slightly different. I don't believe there would be an appreciable difference between the two oils.

Q On your Exhibit 9, you showed from the core graph the Wolfcamp shown in red and you showed at the bottom in blue the Pennsylvanian - - were those the two water zones in the Wolfcamp horizon?

A Yes, sir, in the Wolfcamp horizon.

Q I believe you made a recommendation, did you not, for 80-acre

spacing in both the Wolfcamp and Pennsylvanian pools?

A Yes, sir, that is correct.

Q And you recommended that the wells be drilled in the NW and SE¼'s of the excepted quarter section?

A Yes, sir, with the 150 foot tolerance.

Q Would you be agreeable to having some provision in the order for administrative approval where the Commission might grant that, where the tolerance might necessarily be more than 150 feet, if all the operators could be notified, rather than having another hearing?

A I would be agreeable to that.

Q Also, I believe you made a recommendation that the E½ and the W½ of each quarter section would be the 80-acre unit assigned to a well, is that correct?

A That is correct, yes, sir.

Q If you will note in Exhibits 1, 2,and 3, in the S½ of the area to be leased, there are several leases, particularly Phillips, British Empire, all in the N½ of Section 12, and units that would be either in the N½ or the S½ of the quarter section - - do you feel a hearing would be necessary for that operator to develop his properties so he wouldn't have to communitize?

A I would prefer that, Mr. Mankin, for the reason that it is better to have a uniform spacing and a uniform orientation of your developing units rather than leave it to the selection of the operator.

Q Could not the unit be drilled in the NE and SW's and still assign the north or south half of the section, and still have a proper pattern?

A That would be one way to do it.

Q But that would be your selection, if properly drilled - - it's not too important whether the north or south half - - do you think that would be satisfactory if the operator finds himself in that position, rather than having another hearing, by similarly notifying the other operators in the field, similar to the tolerances that I have mentioned?

A I think so, yes, sir.

Q Likewise there has been an area outlined on Exhibit 1 which was to be spaced, which would cover portions of about five of six sections?

A Yes, sir.

Q If the Commission saw fit, because of a structural interpretation, to cut the area down slightly to meet more fully the area actually covered, do you feel that would be proper, to be cut down slightly around the corners, to be more in line with the actual productive area that might be encompassed?

A I don't see - -

Q (Interrupting) I might point out that was similarly done in the Dean-Devonian-Pennsylvanian Pools - - I just wondered if you would be agreeable to something similar to that, if the Commission

saw fit?

A I personally, at this time, don't see anything wrong with that at all, Mr. Kendrick.

Q Ordinarily the spacing of an area -- is not ordinarily the spacing and nomenclature set up on the basis of actual wells drilled?

A That is correct.

Q Then you would be agreeable to a slight reduction if it were deemed necessary?

A Yes.

Q And, at some future date it could be extended if the situation were changed?

A Yes, sir.

Q I believe you also recommended that wells currently drilled or completed that were off pattern should be given an exception?

A Yes, sir.

Q And I believe to relate those again, it was the Humble Well in the Wolfcamp, is that correct?

A Yes, sir, the well located in Section 14.

Q And you also mentioned Midstates Phillips Lane Unit No. 1 as a possible Wolfcamp exception. Was not that particular well designated to go to the Strawn which might be an exception to either the Pennsylvanian or the Wolfcamp?

A I am not familiar with the anticipated total depth, but it would be an exception if it was completed in either reservoir.

Q I believe you spoke of only one well as an exception, because No. 1 was on the pattern, is that correct?

A Yes, that would be the southernmost well of the Midstates, the No. 2.

Q Yes. I wanted to get straight again what you thought the gross net pay of the Wolfcamp and the Pennsylvanian is. Did I understand the gross pay of the Pennsylvanian is 15 feet and 13 feet of net pay, or is that based on one well?

A That is in this Exhibit 9, but the gross and net pay of the Wolfcamp appear to be very close. The gross section is fairly consistent and the net pay does vary, of course, between the various wells. The gross section which is fairly consistent for the Pennsylvanian reservoir is approximately 25 feet, but again the net pay tends to vary between the wells.

Q I believe you indicated there was about 18 feet net pay in the Pennsylvanian, and at least 25 feet gross, is that correct?

A Yes, sir.

Q Let me ask you, what the consistency is of the pay sections over the field as now known in regard to the Wolfcamp. Has it been rather consistent in the development over the field insofar as - - is there good development so far in all the wells drilled, except possibly the Humble Well?

A The net pays as we have picked them for all of the development for the Wolfcamp have been for the Humble AM Well No. 1. We

have picked 9 feet of net pay for the Wolfcamp; the Sunray-Midcontinent FW No. 1, we have picked 10 feet of net pay; the Sunray-Midcontinent F No. 2 in the Wolfcamp, we have picked 12 feet of net pay - -

Q (Interrupting) Before you go on, the 12 feet pay is behind the pipe at the present time?

A That is correct.

Q Go ahead.

A -- and in the New Mexico State I Well No. 1 completed in the Wolfcamp, we have picked 14 feet of net pay. These were net pays picked from the primary electric laterals, and the primary logs.

Q Would you indicate the net pay of the Pennsylvanian?

A Yes, sir, the net pay of the Pennsylvanian reservoir, we have an estimate of 11 feet of porous section for the Humble AM Well No. 1, located in Section 11, with Sunray-Midcontinent F No. 1, we have picked 15 feet of net pay, and in the Sunray-Midcontinent F No. 2, we have picked 18 feet of net pay, and Sunray-Midcontinent I No. 1 Well, we have picked 20 feet of net pay.

MR. MANKIN: Thank you.

MR. PORTER: Does anyone else have a question?

CROSS-EXAMINATION

BY MR. NUTTER:

Q I would like to ask a question or two. Mr. Kellogg, I

note on Exhibit 1, your plat of the area in general, that your State F No. 1 well has 5½ inch casing, your No. 2 has 7 inch casing, and the State 1 No. 1 has 7 inch casing.

A I believe that is correct, yes, sir.

Q What provision did you make for dual completion with parallel strings of tubing in the State F No. 1 with 5 inch casing?

A I don't believe we would attempt to do a dual completion.

Q You don't think it could be dually completed?

A No, sir, not under the request that we have made to the Commission. If it were, it would have to be small tubing strings, and it seems unlikely that that request would ever be made.

Q On your Exhibit 6, you indicate that the porosity for the Wolfcamp is 10.5%, and for the Pennsylvanian 4.9%. How many wells are those porosities based upon?

A The porosity for the Wolfcamp was based on the core analysis shown as Exhibit 9, and the porosity for the Pennsylvanian reservoir is based upon the porosity indicated in Exhibit 9, and also a core analysis for the New Mexico State F Well No. 1.

Q Do you know what the individual porosities were on those two wells?

A Yes, sir. The porosity for the State of New Mexico F Well No. 2 in the Pennsylvanian reservoir was 4.5% for a section of 20.7 feet in length that was analyzed. That is net feet of length that was analyzed. And for 6.3 feet of permeability section in F No. 1,

we had a porosity of 8.1%.

Q I presume that your permeability is based on the same wells?

A It is based on the same two wells.

Q What is the permeability for the individual wells?

A The permeability for the New Mexico State F No. 2 is 4.33 millidarcies and for the short interval of F. No. 1, that was recovered and analyzed, it is 23.6 millidarcies.

MR. NUTTER: I believe that's all.

CROSS-EXAMINATION

BY MR. CAMPBELL:

Q Mr. Kellogg, the questions I would like to ask relate only to your proposed fixed spacing pattern, and not to the dual aspects of the case. When was the first well completed in either field, is that your No. 1 on December 12th, 1951?

A That is correct. It was in December, but as to the date -

Q (Interrupting) That is on your Exhibit 1. You don't show the completion date on the No. 2 Well. Could you give me that on the No. 2 Well in the NW¼ of Section 1?

A The completion date of the New Mexico State F Well No. 2 is carried on the well completion report of April 3, 1956.

Q Can you tell me why you didn't choose to locate that well in the NW¼ NW¼ of Section 1?

A I have no explanation for that. The location was staked

and we were drilling prior to any evaulation that was made of those reservoirs. That well, as I recall, t. rig moved off the No. 1 Well to the No. 2, and the production and engineering department ha not had time - -

Q (Interrupting) Do you think that you did not locate in the NW¼ of Section 1 because of the structural position?

A I am sure in the case of the Sunray Midcontinent, we had enough data to know, but as to why Midstates chose their location, I couldn't venture a guess.

Q The entire production history of the field has taken place since December 12, 1955?

A Yes, sir.

Q A period of some seven or eight months?

A That is correct.

Q The accumulated oil production from the Wolfcamp, 50,000 barrels, and the Pennsylvanian, 17,000 barrels, according to Exhibit 6?

A Yes, sir.

Q And you have taken, , as I understand only one core analysis in the Wolfcamp, is that correct?

A That is correct.

Q And do you believe that based upon that relatively short history and the fact that you have taken only one core for analysis purposes, and only produced 50,000 barrels in the Wolfcamp, and 17,000

in the Pennsylvanian that you have sufficient data on which to base your calculations and conclusions that you have made here today?

A Yes, sir, everything that I believe we have done has been accepted industry standards. Our solution drive calculations, we have analyzed the logs in comparison to the Wolfcamp to determine, in the matter of porosities, we find a fairly good agreement of the unilateral logs and porosity in the other two wells, and I believe the conclusions we have stated are logical and reasonable.

Q The original reservoir pressure you show as 3,930 pounds in the Wolfcamp, what is the present reservoir pressure?

A That question, I attempted to cover this morning in the statement that I am not exactly sure what it is, the resevoir pressure at this time.

Q I realize you have some differential, but what is your opinion as to the present reservoir pressure - - which of those figures do you feel is correct?

A There is about 1% differential between them, and I personally believe that the former pressures, those not underlined, are probably the ones that are going to be correct.

Q You consider that, considering the amount of production you have had, that the reduction of pressure is alarming at all?

A With the production we have had in the Wolfcamp reservoir, and not considering the New Mexico State I Well, the performance has been rather normal, that is we have to make one basic assumption,

that the Pennsylvanian oil has near the same bubble point as the Wolfcamp. And the only energy in the under saturated crude is the latent possibility of that oil, the associated connate water and rock, and it is unknown at this time.

Q With regard to that bubble point pressure at 3405, and the reservoir pressure in the Wolfcamp, that is 3405?

A Yes, sir.

Q Do you think you have enough drainage to make the calculations you have made with reference to the reservoirs and drainage area, and so forth?

A Yes, sir.

Q Have any interference tests been conducted?

A No, sir, not to my knowledge.

Q With regard to the permeability and porosity you indicate on your Exhibit 6, those are, of course, averages from the information you have available, is that correct?

A That is correct.

Q Could you give us from Exhibit 9 some indication of the range of permeability in the Wolfcamp reservoir?

A I believe on Exhibit 9, the lowest permeability I believe is 15 feet at 9636.6 to 9638.1, 15 millidarcies. The highest permeability indicated is at 9639 feet to 9641 feet, of 1,390 millidarcies.

Q Is that a considerable range of permeability or not?

A Yes, sir, it would be a considerable range.

Q With regard to the Pennsylvanian formation, it appears from your Exhibit 9 that the permeability in certain portions of that Pennsylvanian zone is very low, doesn't it?

A Yes, sir.

Q If that condition of low permeability in the Pennsylvanian and the wide range in the Wolfcamp is general throughout the reservoir, might it not have some effect on your conclusions as to the number of wells it might be necessary to drill to eventually drain this reservoir?

A Would you state that again?

Q With the wide range of permeability in the Pennsylvanian and the Wolfcamp, if it is as low or lower in other areas than appears to be on this particular analysis, would that not have some bearing upon the general conclusion as to the number of wells required to efficiently drain the reservoirs?

A It would have some bearing on it. As I pointed out, generally speaking, it has some permeability function and porosity, and even though we have two court houses, the porosity calculations on the full wells that have penetrated the reservoir to this time don't vary too widely with any individual reservoir.

Q With regard to your economic study of this reservoir, I note that you have used a figure for average net pay thickness that is

less than you gave us in your general testimony. How did you arrive at these thicknesses used in your economic study?

A That thickness for the economic study was arrived at in order to get a semi volumetric with the limited data we had just scaled the distance from the lowest net sand to the Humble well, and in both the Wolfcamp and Pennsylvanian reservoirs, and in both cases, the thickest net pay was in the Sunray Midcontinent I No.1 Well. We attempted to weigh it volumetrically.

Q With regard to your recovery factor of oil in place, how did you arrive at the figures 20.8 and 22.5?

A That was arrived at from the solution drive computations and material balance computation shown on exhibits 10 and 11. You will notice across the bottom of the page of Exhibits 10 and 11, where the red line intersects the horizontal line, the bottom hole pressure line, that was what we considered.

Q Would the rate of production have an effect on that?

A It could have if there was not any proration, or anything like that.

Q What rate of production do you propose to recommend in the event 80-acre spacing is approved?

A I believe in our discussion of that the more or less practical 80-acre spacing allowable.

Q The Statewide 80-acre allowable?

A Yes, sir.

Q It would be more or less one 40-acre unit in excess of the normal allowable, the well's are now producing, is that correct?

A Excuse me?

Q The present wells provide that you are given one allowable with one deep well factor and to that is added the one 40-acre, the deep well factor.

A I'm not familiar with that. I believe the norm would be one 40 for this depth, plus a fraction of - -

Q (Interrupting) Yes, you would have a one-third increase in the production.

A Yes, sir.

Q Based on your study of this reservoir and the possibility of the well's recovery factor, do you believe this field can be efficiently drained and efficiently produced at a rate in excess of the present rate of production?

A I don't believe the rate is that critical.

Q Do you believe again, do you have enough information in this reservoir to make that conclusion?

A Well, that has been the conclusion from my studies, yes, sir.

Q Just a few questions about the fixed pattern you are proposing. You understand, I assume, that if the arrangement outlined in red on Exhibit 1 is determined to be the pool for the purpose of this order and fixed pattern spacing is established as you recommend, that not only one of the wells drilled in that area but within a mile

of the boundaries of that area would be on a fixed pattern. Do you feel that is proper or fair to the other operators?

MR. SELINGER: If the Commission please, I hate to object but it is a general rule of the state, the whether operators are agreeable or not, it is the general rule. The rules require that all wells within a mile have to be in accordance with those rules.

MR. CAMPBELL: I know that. I'm asking what he thinks about the effect of this, if you have a fixed pattern and are within a mile of the area delineated there?

A I fail to see how that would materially affect an operator, particularly, I could see no effect outside of the boundary as that would probably have to be on some other structure if our geological structure is correct, and I don't believe any serious hardship would be caused to anyone.

Q As the field development stands now then, you will have two exceptions in the Wolfcamp, and two in the Pennsylvanian?

A That is correct.

Q That is at the outset? A Yes, sir.

Q Are you aware that there has been a permit to drill issued in the SW¼ of the SW¼ of Section 31, Township 9, Range 34 E?

A No, I'm not aware of that.

Q With regard to your general field picture, and referring you to the area in the NE corner of your contour in this Section 3 area, if your contour is correct, and perhaps modified by the Aztec

Well, as indicated this morning, it is apparent is it not, that the person owning a lease in the NW¼ of Section 30 is going to be hard pressed to comply with the 40-acre spacing pattern and still get a well, even though he might get a well in the SW¼.

A That would require the location to be in the NW of the S½ of the SW.

Q Your pattern would? A Yes.

Q I presume you would just require him to come in and ask for an exception?

A Yes, sir.

MR. CAMPBELL: No further questions.

CROSS-EXAMINATION

BY MR. MANKIN:

Q Mr. Cambell asked you a question in regard to the location in the SW¼ of the SW¼ of Section 31. If there has been a well started there, and drilling as of this date, would it be additional exception over what you have already listed?

A Yes, sir. I was not aware of it, I believe that is the general way.

Q If it was actually drilling on this date?

A Yes, sir.

MR. CAMPBELL: If the Commission please, no order has been issued in this case and if no order has been issued, I presume

[illegible]

[illegible] of [illegible]

[illegible]

[illegible] -- who has issued it?

MR. CAMPBELL: The U.S.G.S., it's a Federal lease.

MR. ERREBO: Has permission been asked of the Oil Conservation Commission?

MR. CAMPBELL: Well, the Oil Conservation Commission normally is not asked about those things. They get a copy of it. It is on Federal Government acreage and they pretty well call the shots. It is 330 feet from the west line and 660 from the south. I assume they have commenced drilling.

MR. PORTER: But you say the location has been approved?

MR. CAMPBELL: Yes, sir.

CROSS EXAMINATION

By MR. NUTTER:

Q Mr. Kellogg, due to the wide difference in the permeability of these two zones in the Wolfcamp and the Pennsylvanian, in the event the Commission should not be convinced that 80 acre spacing is appropriate for both, would it be helpful if you got 80 acres for one and 40 for the other?

A I would have to do a little figuring on that, if you please, sir. Right off hand I would venture a guess that it wouldn't help very much, I just don't believe it would help a great deal. I believe -- well, we could look at this economically -- No, sir, it wouldn't help. We would be applying $5,000.00 profit against $71,000.00 loss.

Q And you wouldn't get any relief, then?

A No, sir.

MR. NUTTER: That's all.

CROSS EXAMINATION

By MR. MANKIN:

Q I might ask, Mr. Errebo, will the other witnesses discuss the dual completion facilities?

MR. ERREBO: Yes, sir.

Q I have just one question: Have you found in the development of the Pennsylvanian over the area that has been developed, that the Wolfcamp is pretty good in development, too, in other words, is it too erratic from a porosity and permeability and producing standpoint?

A It is quite good from the standpoint of permeability. We

have only one courthouse for porosity, but it is quite uniform.

Q Would you say the same thing for the Pennsylvanian, that it is quite uniform?

A The porosity is not quite as uniform as I recall, but, I believe, generally stating, it is as nearly uniform as the porosity in the Wolfcamp.

Q So in this particular area you have a little different problem than in an area not too far from this, which is the Dean-Devonian-Pennsylvanian, and the Wolfcamp, which it was suggested they be thrown together, and it was very erratic?

A Yes, sir.

Q But in this case you have a pretty good development in essentially the same well from both zones?

A The individual reservoirs appear to be uniform between themselves. The comparasion between the two, they are erratic as between them.

Q So the development is pretty good between them as you know it now?

A Yes, sir.

Q One other question, on the Exhibits No. "10" and No. "11", which are your performance curves on the Wolfcamp and Pennsylvanian, did you develop this performance curve from material balance or did you have, -- or was this likewise developed from samples by analysis?

A This was a material balance calculation in which the production rate was assumed. Incorporated in the calculation was the available bottom hole sample analysis.

Q You had a bottom hole sample on the Wolfcamp?

A Yes.

Q But you have none on the Pennsylvanian. Was the Wolfcamp used as a guide -- I mean the Pennsylvanian, was it made up from the Wolfcamp?

A The bottom hole data was corrected in regard to pressure and used as is for the Wolfcamp with the minor change in the formation volume factor due to a slight increase.

Q But no actual sample was available?

A That is correct.

CROSS EXAMINATION

By MR. GURLEY:

Q Concerning the spacing pattern about which you testified this morning, you recommend 150 foot tolerance for topographical conditions on your well?

A Yes, sir, I believe it was part of my recommendation, it would be more than satisfactory.

CROSS EXAMINATION

By MR. SELINGER:

MR. SELINGER: G. W. Selinger of Skelly Oil Company, Tulsa, Oklahoma.

Q Mr. Kellogg, at the present time every well can be assigned 80 acres, is that correct?

A Yes, sir.

Q In other words, the density of every area is one well to every 80 acres?

A That is correct.

Q Calling your attention to the W/2 of Section 1 wherein each of those government quarter sections has two wells either drilled or drilling, did you note that on your maps?

A Yes, sir.

Q Hasn't the point been reached now in development where it is necessary for not only the Commission but the operators to know and determine what the density is because you cannot have any additional development on the west half of one on the basis of 80 acres, or if you drill an additional well in the west half, you have broken the density of your 40 acres?

A That is correct.

Q So regardless of whether you have complete data, the development program has reached the stage that it is necessary to know what the development program is right now for drilling purposes?

A Yes, the decision has to be reached.

Q And as I understood your testimony, the red outline on Exhibit "1" which is the area sought to be spaced, followed the contouring of Exhibits "2" and "3", is that right?

A To the best of my knowledge the structural maps were used as a basis for arriving at this area to be spaced.

Q And you stated it was your intention to have the same spacing and the same density covering the Wolfcamp and Pennsylvanian whether they fall within the red line of One or fall without the red line of the other -- your intention is to cover the entire reservoir, is that correct?

A That is correct.

Q Should you contact the red line then, you would have a

spacing program for part of a reservoir and a spacing program of the same reservoir on a different basis?

A Yes, sir.

Q Except for the fact that the general rules now state that regardless of where your red line is all operations within a mile of production are to follow the pattern established by that designated field?

A Yes, sir.

Q Wouldn't that general rule apply to both sides of Sections 25 and 36, Township 9 South, Range 33 East; and on both sides of Sections 1 and 12, Township 10 South, Range 33 East, where it lies within the red line?

A Yes, sir.

MR. SELINGER: I believe that is all.

MR. PORTER: Does anyone else have a question?

CROSS EXAMINATION

By MR. MANKIN:

Q I believe there was some questioning going on at the present time regarding whether or not this area should be contacted. I ask you, would you look again and superimpose the red line on Exhibits "2" and "3" off Exhibit "1" -- I think you will find the NW/4 of Section 7 is within the delineated area but outside of the area -- in other words the structural contour interpretation, is that correct on both Exhibits "2" and "3"?

A That is correct, although there is no attempt to establish oil-water contact on these maps as we haven't sufficient data to establish it and I believe that is the reasoning that was followed

in the area of the NW/4 of Section 7.

Q And that would be likewise true for the other sections such as the SE/4 of Section 26?

A Yes.

Q And a portion of the SW/4 of Section 30?

A Yes, sir.

Q And also essentially the entire N/2 of Section 12?

A Yes, sir

Q So this question as to whether or not the area should be contacted, I think since you are basing it on a structural interpretation, it would appear to be more realistic to possibly contact this rather than taking in the scenery, as well, do you agree to that?

A I can see nothing wrong with that as long as we remain cognizant of the fact that the actual extent of the reservoir has not been interpreted.

Q One other question -- it was brought up that in Section 1 in the W/2 there was a complete line of four wells in the E/2 of the W/2?

A That is true.

Q And also it was intimated that there would be no development in the W/2 of the W/2 but is it not true that some of those wells can not be or will not be dually completed and therefore there will have to be development in the W/2 of the W/2 as alternate wells?

A I believe in the case of the State of New Mexico F Well No. 2, that does have small casing, 5 inch casing, and it might possibly

require a well be drilled to take care of a portion of that unit if dual completion were permitted.

MR. MANKIN: That's all.

MR. PORTER: Does anyone else have a question of Mr. Kellogg, if not Mr. Kellogg will be excused.

MR. D. E. HALL

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

DIRECT EXAMINATION

By MR. ERREBO:

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

A D. E. Hall, Petroleum Engineer, employed by Sunray Mid-Continent Oil Company.

Q Mr. Hall, what is your educational and experience background?

A I am a graduate of the University of Oklahoma with a Bachelor of Science in Petroleum Engineering, I have approximately seven years experience in the Permian Basin and three years in the Gulf Coast as Petroleum Engineer.

Q Are you familiar with the drilling, completion, and operational work in the Lane Field?

A Yes, I have actively supervised and participated in drilling and completion of all the Sunray Mid-Continent Wells.

Q Have you previously testified before this Commission?

A Yes.

MR. PORTER: The witness' qualifications are acceptable to the Commission.

Q Have you made a study of the feasibility of dual completion of the Wolfcamp and Pennsylvanian in this field?

A Yes.

Q Based upon your study, do you believe that dual completion of the Wolfcamp and Pennsylvanian is feasible?

A Yes, sir.

Q What conditions must be met to make a dual completion feasible?

A Well, the first condition, there must be effective separation between the zones. The second, reservoir fluids from each zone must be independently produced and measured. Third, each zone much be separately tested, including taking such tests as gas-oil ratios, bottom hole pressures, indices, and other such tests. Of course, each zone must be produced to the same state of depletion as twin wells, and each completed in a different zone.

Q Do you believe that these conditions will be met if the Commission sees fit to permit dual completions in this field?

A Yes, I do.

Q In regard to the separation of the two zones, is equipment available which will permit effective separation of these zones and at the same time allow them to be separately measured and stored and produced?

A Yes, and we intend to install such equipment.

Q Will the Wolfcamp and Pennsylvanian be in communication between the casing and the bore hole?

A No, they will be separated by cement.

Q How do you propose to dually complete wells in this field?

A We intend to install two strings of tubing with a packer between the two zones and produce one zone through each string of tubing.

Q What differential pressure exists between the Wolfcamp and the Pennsylvanian?

A The initial pressure differential was 25 pounds per square inch. Certainly we wouldn't expect it to ever exceed 2,000 pounds per square inch.

Q What pressure differential will the packer which you propose to install, stand?

A In excess of 10,000 pounds per square inch.

Q Will you refer to Exhibit "16", and I ask you to identify it?

A This is a schematic drawing showing the proposed oil-oil dual completion of the Wolfcamp and Pensylvanian 's formations with both zones flowing.

Q Was the Exhibit prepared by you or under your supervision?

A Yes.

Q Will you continue on with your explanation of that diagram, please?

A The separation of the two zones is accomplished by setting a Baker retainer, production retainer between the formations, and the installation of two strings of tubing, the long string of tubing is set in the packer through which the Pennsylvanian is produced. The short string of tubing is hung through the packer through which the well fluid from the Wolfcamp is produced. The blue indicates the fluid flowing from the Pennsylvanian and the red indicates the

fluid flowing from the Wolfcamp.

Q Isn't it possible at some stage in the depletion of this field that it might be necessary to concurrently pump one zone and flow the other?

A Yes.

Q Will you please refer to Exhibit "17" --and was this Exhibit prepared by you under/or your direction?

A Yes, sir.

Q Will you please explain it or identify it?

A This is a schematic drawing, showing the proposed oil-oil dual completion with the Wolfcamp flowing and the Pennsylvanian pumping. The drawing shows a pump which has been run in a long string of tubing and is pumping from the Pennsylvanian. The Wolfcamp is flowing through the short string.

Q Mechanically speaking, could you expect a similar or the same performance by pumping the Wolfcamp and flowing the Pennsylanian?

A Yes.

Q Is it possible that sometime in the life of this field, it might be necessary to concurrently pump both zones?

A Yes, sir.

Q Will you then refer to Exhibit "18" and identify it?

A This is a schematic diagram showing the proposed oil-oil dual completion with both zones being pumped. The drawing is the same as in Exhibit "17" with the addition of a pump in the short string of tubing. We propose to pump each zone with individual pumping units.

Q Was this Exhibit prepared by you or under your supervision?

A Yes.

Q Have you calculated the anticipated pumping capacity for zones located at the depth encountered in the Lane field?

A Yes, at this depth we can produce in excess of 280 barrels of fluid per day.

Q What is the estimate based upon?

A That is from each zone, that estimate is based upon pumping a dead load of water with 80 per cent pump efficiency.

Q Do you know what the current allowable is for wells in this area?

A The August allowable is currently 148 barrels per day.

Q And I believe you were here when it was testified earlier in this hearing that the 80 acre allowable would be expected to be in the neighborhood of 180 barrels per day?

A Yes, the pump capacity should be able to pump at least 100 barrels in excess of the 80 acres allowable, approximately 100 barrels in excess of the 80 acre allowable.

Q Under the three sets of conditions you have described, both zones flowing, one zone flowing and one pumping, and both zones pumping, could each zone be tested separately in each instance?

A Yes, since they are producing through individual strings of tubing, and have individual well head control, have individual flow lines, and will produce in individual lines.

Q In your opinion can they be produced to the same state of depletion as twin single completions in separate zones?

A Yes.

Q Do you expect any corrosion problems due to hydrogen sulphide causing corrosion?

A No, the analysis of gas and oil have shown no hydrogen sulphide to be present and we would not expect that corrosion would be a problem.

MR. ERREBO: We offer Exhibits 16, 17 and 18 in evidence.

MR. PORTER: Without objection they will be admitted.

MR. ERREBO: That concludes our testimony.

MR. MANKIN: Mr. Errebo, do you have copies of those Exhibits?

MR. ERREBO: Yes, sir, we do.

CROSS EXAMINATION

By MR. MANKIN:

Q Mr. Hall, you indicated the possibility of the Pennsylvanian going on a pump fairly soon, or did you make that statement?

A No, I just indicated it might be necessary to pump the Pennsylvanian.

Q What do you think in regard to the Pennsylvanian, will it go in the pump before the Wolfcamp will?

A Well, I don't know, I would say the bottom hole pressure is increasing more rapidly than the Wolfcamp, but I do not know what is going to happen so far as the flowing characteristics.

Q What are the fluid levels in the Pennsylvanian, are they fairly high at the present time, are most of them flowing or what is the situation?

A The one well being produced from the Pennsylvanian that we have is flowing. It's tubing pressure, I believe, is approximately 700 pounds, that figure is not exact.

Q That well you mentioned, the State Sunray Mid-Continent F No. 2, is that the one?

A That is correct.

Q The State I No. 1 is being produced at the present time, is it not?

A From the Wolfcamp.

Q So that the only one is being produced at the present from the Pennsylvanian although it is carried as a Wolfcamp?

A That is right.

Q Did you make any recommendation as to the casing programs or cementing programs that would be instituted in these wells in this area?

A We have made recommendations to our company on using 7 inch casing. The cementing program that we are following would not necessarily, I don't believe we would necessarily want to require other companies to follow it, but we are attempting to get a good cement job between the two zones and we are planning to squeeze cement between the two zones. We would do that in either case whether it was a single or dual completion, to squeeze off the water.

Q Would you be agreeable to cementing to at least 500 feet above the top of the Wolfcamp in dual completions?

A I am sure we would want to cement at least 500 feet above the Wolfcamp.

Q Would you be agreeable if such order was granted administratively, if all operators in the field were first notified, prior to actual administrative approval of dual completions?

A You mean we would notify them?

MR. MANKIN: Yes, while you are requesting actual permission, you are requesting blanket permission here, are you not?

A Yes.

Q But rather than requesting a blanket request, would you be willing that all operators be notified in both fields as distinguished from the area you are requesting?

A We know of no reason why not.

Q For example, the other field that we have granted -- the Dean-Devonian-Pennsylvanian?

A Yes, sir.

Q Likewise would you be agreeable to setting pipe on the bottom of all the zones which have been penetrated to production, including the Strawn-Pennsylvanian and Wolfcamp -- including to 500 feet above the top of the Wolfcamp and to determine the top of the cement by a temperature survey which would be submitted to the Commission?

A In my opinion, we would hesitate to require the other companies to squeeze cement providing they thought they would have good cement jobs without squeezing, but we would certainly want to set pipe through any productive zones, and would be agreeable to run a temperature survey to locate the top of the cement.

Q I didn't mean that you would tell the other operators what to do but would you be agreeable that the rule specifies that?

A Yes, sir.

Q And probably a 20 day waiting period prior to approval of administrative orders, providing they meet these specifications?

A Yes.

Q Rather than a 10 day period because some of the companies are large companies and it would necessitate more paper work?

A Yes.

CROSS EXAMINATION

By MR. NUTTER:

Q Mr. Hall, how would you determine whether you had communication across the packer if the thing started leaking?

A With a packer leakage test where the pressure recording device was installed on both sets of -- well, on the well heads of both zones -- with a sufficient draw down in pressure from one zone it would show that there is no communication to the other zone if the other zone would not draw down.

Q You are talking there about determining communication with a packer leakage test, what I am talking about is how would you know without running a test, in order to decide to run the test, in other words, what clues would you have with the flow characteristics of the reservoirs which would indicate communication?

A Any indication such as a change in tubing pressures or in rate of flow.

Q Is there enough pressure difference between these two reservoirs for the communication to show up in flowing tubing pressures?

A Yes, there is approximately 700 pounds in the Pennsylvanian tubing pressure now and I believe about 1300 on the Wolfcamp that is within 150 pounds either way on the Wolfcamp. Since we have two wells producing from the Wolfcamp, they vary some, but there is a

pressure differential right now in the tubing pressure of around 500 pounds.

Q Is there enough difference in the G.O.R.'s to be effective?

A There is very little difference in the G.O.R.'s that I know of.

MR. NUTTER: I believe that is all.

RECROSS EXAMINATION

By MR. MANKIN:

Q Do you have -- what is the gravity of the Pennsylvanian oil and the Wolfcamp oil, is there any considerable difference between the two?

A No, I am not positive of just what the gravity is. I believe it is slightly over -- I was going to say over 49 -- here it shows the Wolfcamp gravity being 48 per cent a.p.i. and the Pennsylvanian 49 percent a.p.i., but they are very similiar.

Q And that would likewise not be an indication that there was any considerable difference. Was there any characteristic of the producing gas -- that it was one sour and one sweet or were they essentially the same?

A They are both sweet gas. I don't have the exact constitutents of the gas here, but I am sure they are close together. I have seen the analysis run on them.

MR. PORTER: Does anyone else have a question?

CROSS EXAMINATION

By MR. CAMPBELL:

Q Are you selling gas from these wells?

A No, there is no gas connection there, -- I take that back

-- we are selling gas to some of the rigs in the field, they are using our gas.

Q That has been calculated in your economic study?

A No, and I am not sure what price, or if we are charging for it, but they are using gas from there.

MR. ERREBO: Mr, Campbell, the sale of gas was included in the economic study but not the incidental sales as he is testifying to.

MR. PORTER: Does anyone else have a question? If not, Mr. Hall may be excused.

MR. ERREBO: That concludes our case.

MR. GURLEY: If the Commission please, I have two statements, I have a telegram and a letter which I would like to read. First, I would like to ask if anybody from Gulf is here?

(No response from the audience.)

I will read the telegram received by the Commission, it was sent August 14, 1956, addressed to the New Mexico Oil Conservation Commission, State Capitol Building, Santa Fe, New Mexico, and it states: " Re Case 1125 Sunray Mid-Continent Oil Company's application concerning delineation 80 acre units well spacing and dual completion. Gulf is agreeable to request contained in Sunray Mid-Continent's application with the exception of proposed well spacing within 80 acre units. Gulf Oil Corporation favors sufficient flexibility in the well location requirement to permit an operator to drill on either end of an 80 acre unit." That is signed by H. N. Bayer, Gulf Oil Corporation. Next, is a statement which was asked to be read into the record by H. N. Wade, of the Texas

Company: "The Texas Company believes that the testimony presented by Sunray Mid-Continent indicates that dual completions between the Wolfcamp and Pennsylvanian formations, and development of these formations on 80 acre spacing, are justified in the Lane Field. Therefore, The Texas Company concurs with Sunray Mid-Continent in requesting dual completion privileges and 80 acre development in this field."

And, I have another letter from the Seaboard Oil Company which I would like to read into the record. It is dated August 10, 1956, and directed to the New Mexico Oil Conservation Commission. "Gentlemen: Seaboard Oil Company is a working interest owner in the leases operated by Sunray Mid-Continent Oil Company in the Lane Field, which may be described as all of Section 36 with the exception of the E/2 of the NW/4, Township 9 South, Range 33 East, and the N/2 of Section 1, Township 10 South, Range 33 East, Lea County, New Mexico. Seaboard Oil Company concurs with Sunray Mid-Continent Oil Company's application to develop the Wolfcamp formation on 80 acre spacing, to develop the Cisco formation on 80 acre spacing, and to dually complete the wells by means of twin strings of tubing. Seaboard Oil Company believes this to be the most feasible method to develop these two reservoirs and strongly urges the Commission to establish such rules as will be applicable to grant Sunray Mid-Continent's applications at the hearing on August 15, 1956." and it is signed by Seaboard Oil Company by Ebb White, Manager of the Production Department. I would like to have these introduced into the record for what they are worth.

MR. PORTER: Are there any other statements to be made?

MR. STALLINGS: Mr. Stallings of Mid-States Oil Corporation, Midland, Texas. Mid-States Oil concurs with the recommendations and requests set forth by Sunray Mid-Continent and respectfully requests an exception to the spacing rule by the drilling of the Mid-States Phillips No. 1, Lane Unit, located in the NE/4 of SW/4 of Section 1, Township 10 South, Range 33 East, in Lea County.

MR. PORTER: Thank you, Mr. Stallings. Anyone else?

MR. HARBEN: N. J. Harben of Sinclair Oil and Gas Company, Fort Worth, Texas: I am representing Sinclair Oil and Gas Company and while Sinclair does not own any producing well in the area sought to be spaced, it does own oil and gas leases embracing acreage within and adjoining the area. Sinclair concurs in the testimony offered by Sunray in support of its application and recommends that the application be granted.

MR. PORTER: Does anyone else have any statements?

MR. WOOD: A. W. Wood, of Midland, Texas. Manzano owns a one sixth interest in Sunray Mid-Continent's operations in the area under discussion in this hearing. According to studies made by our engineers, we believe that the problem in the spacing in the Pennsylvanian and Permian zones in this area should be 160 acres, that is from the standpoint of efficient drainage and economics. Sunray Mid-Continent is the operator of our interest and we think they are a prudent operator so Manzano states concurrence in their application for 80 acre spacing in the Wolfcamp and Pennsylvanian and all oil-oil completions in each reservoir, and urges the Commission to establish rules and regulations that will be applicable to grant the Sunray application in this hearing.

MR. LUCCHI: Harold J. Lucchi representing Cities Service Oil Company, Hobbs, New Mexico. I have a letter addressed the Oil Conservation Commission stating the position of Cities Service Oil in this case: "Gentlemen: We are in receipt of copies of the applications filed in the above captioned matter, and Docket No. 27-56 setting it for hearing on August 15, 1956. Cities Service Oil Company has a leasehold interest within the proposed delineated area for the Lane-Wolfcamp and Lane-Pensylvanian Pools.

It is our opinion, based on the data available to us and our experience with similiar type production in other areas, that a development program of one well to 80 acres will adequately and efficiently drain these respective pools. However, in the interests of greatest ultimate recovery we do not subscribe to a frozen development pattern. Experience has proven that more oil can ultimately be produced when more latitude is permitted in the selection of drilling sites so that structural features can be taken advantage of to a greater extent. In this connection we recommend that 80-acre drilling and spacing units be established by dividing quarter sections into either North and South or East and West halves, at the option of the operator, and that the location of the permitted well for each unit be restricted only to a distance not nearer than 330 feet to the unit boundary line. The incorporation of such a rule would also tend to expedite development, and eliminate unnecessary spacing exception hearings.

The policy of this company with respect to the dual completion of wells is the same throughout its entire area of operations. We believe that in almost all fields comprising more than one oil

producing reservoir, oil-oil dual completions are feasible and practical. In our judgment this is true in the instant case. As one of the companies who have pioneered dual completion practices, we have had occasion to field test many types of equipment required for these installations. As a result of this experience, and our observations of other operations, we know that wells can be dually equipped and efficiently produced with no commingling of fluids either with the use of one or two tubing strings. This is true regardless of whether the wells are flowing or produced by articifial lift.

It is our recommendation that a field wide dual completion rule be adopted for the Lane-Wolfcamp and Lane-Pennsylvanian Pools but that the type of such installation be left discretionary with the operator as long as it is in conformity with good engineering principles and practices that have been generally accepted and approved by the industry and other state regulatory agencies. We do not believe that the regimentation of dual completions can be justified as a sound conservation policy." And the letter is signed by J. A. Cleverley, Vice President of the Company.

MR. SELINGER: W. A. Selinger, of Shelly Oil Company, Tulsa. I first wish to concur in Sunray Midcontinent's application as requested herein. I want to elaborate a little bit about the 80 acre spacing, density program. You will recall from the exhibits that the cost was in the neighborhood of a hundred and seventy and some odd thousand dollars. Most regulatory bodies in other states have come to the realization that wide spacing is a necessity and we hope that this body comes to that realization, also. Because of the deeper drilling, the necessity for the wide spacing, aside from the economics, is the difficulty in finding oil. Those two factors alone, on their face, just like proration has been a factor, are good for the industry, generally. The industry has reached the point - - it is quibbling to say put five inch casing in the hole and therefore the operator can go on another part of the 80 acres and drill to the other formation, but you know as far as that is concerned, the operator is faced with whether he should drill on that 80 acres to that formation, or on another 80. Particularlyon the west side, the problem is what it should be. If you wait until the outline is determined, or the geological and engineering factors are evaluated, you will never have spacing. Spacing is to prevent unnecessary wells. If every 40 acres is drilled, you have nothing but 40 acres. Obviously, if you have to wait to evaluate all of those, the operators will not know what sort of program to develop. Therefore, it is almost incumbent to have a development program

from the inception, and it would be to the best interests of the industry, generally, immediately upon the drilling of the first well, that this Commission establish temporary spacing as wide as possible and set the matter a year hence in which additional development is had and you have had time to evaluate it. Then, if the spacing is too wide, you have the right and privilege to come back and do further drilling. We have a declining field now, and I think now is the time for the Lane field to start such a program.

MR. PORTER: Anyone else?

MR. CAMPBELL: I would like to first say the people for whom I have entered an appearance have no objection to the dual completion features of this application; as a matter of fact, they are all for them. We do object to the fixed pattern of 80-acre spacing at this time. It is quiteobvious from the contour, if it turns out to be correct, that Danglade and Simmons are both on the east edge of the field with acreage which may be partially productive or not productive at all. They don't feel they should be compelled to come before the Commission on an exception where an exception will become the rule and ask for authority to drill on their property. If this well that Simmons has is a good well and will pay on 40 acres, he would like to drill another. If he doesn't think it will pay out, I am sure he won't drill it and I am confident that Sunray won't drill any that they know in advance won't pay out, and I don't know of anything compelling them to do so, particularly within that area, and if the other operators agree to eighty acres, I can't

see what prevents their drilling on 80 or 160, or 2500, or whatever they want to do. As far as we are concerned, we want a chance to locate our wells where we think there is a good chance of getting production and we are not called upon to establish a dry hole as in the case of 80-acre spacing in New Mexico.

MR. PORTER: Does anyone else have anything? If not, the case will be taken under advisement. We will now take a little recess.

* * * *** * * *

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

I, DOROTHY B. MYERS, a Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the Oil Conservation Commission for the State of New Mexico, was reported by me in shorthand and reduced to typewritten transcript by me, or under my personal supervision, and that the same is a true and correct transcript to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal, this, the 11th day of September, 1956, in the City of Santa Fe, County of Santa Fe, State of New Mexico.

Dorothy B. Myers
Notary Public

My Commission Expires: 8-3-60

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

October 10, 1956

COPY

Mr. Jack M. Campbell
Campbell & Russell
P.O. Box 721
Roswell, New Mexico

Dear Sir:

On behalf of your clients, we enclose two copies of Order R-895 issued October 10, 1956, by the Oil Conservation Commission in Case 1125, which was heard on August 15th.

Very truly yours,

A. L. Porter, Jr.
Secretary - Director

brp
Encls.

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

October 10, 1956

COPY

Mr. Burns H. Errebo
Sunray Mid-Continent Oil Corp.
P.O. Box 2039
Tulsa, Oklahoma

Dear Sir:

We enclose a copy of Order R-895 issued October 10, 1956, by the Oil Conservation Commission in Case 1125, which was heard on August 15, 1956.

Very truly yours,

A. L. Porter, Jr.
Secretary - Director

brp
Encl.

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 1125
Order No. R-893

THE APPLICATION OF SUNRAY MID-CONTINENT OIL COMPANY FOR AN ORDER EXTENDING THE LANE-WOLFCAMP POOL AND CREATING THE LANE-PENNSYLVANIAN POOL, FOR AN ORDER ESTABLISHING 80-ACRE SPACING UNITS IN SAID LANE-WOLFCAMP AND LANE-PENNSYLVANIAN POOLS AND FOR AN ORDER PERMITTING THE DUAL COMPLETION OF WELLS IN THE LANE-WOLFCAMP AND LANE-PENNSYLVANIAN POOLS, ALL IN LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9:00 o'clock a.m. on August 15, 1956, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 10th day of October, 1956, the Commission, a quorum being present, having considered the record herein and the evidence and testimony 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 a common source of supply for the production of oil in the Wolfcamp formation was discovered by the Sunray Mid-Continent Oil Company's State "F" Well No. 1, located in the SE/4 of the NW/4 of Section 1, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico. It was completed December 10, 1955. The top of the perforations is at 9648 feet.

(3) That the Commission on February 15, 1956, heard Case No. 1018 and entered Order R-763 which was an order creating the Lane-Wolfcamp Pool in Lea County, New Mexico, and again in Case No. 1055 extended the pool by Order R-800.

(4) That there is need for the creation of a new pool in Lea County, New Mexico, for the production of oil from the Pennsylvanian formation, said pool to bear the designation Lane-Pennsylvanian Pool. Said Lane-Pennsylvanian Pool was discovered

by Sunray Mid-Continent Oil Company's State "F" Well No. 2, located in the NE/4 of the NW/4 of Section 3, Township 10 South, Range 33 East, NMPM. It was completed April 9, 1956. The top of perforations is at 9855 feet.

(5) That evidence presented indicates that the horizontal limits of both the Lane-Wolfcamp and Lane-Pennsylvanian Pools should be somewhat different from the horizontal limits of the pools as set forth in applicant's application.

(6) That geological and engineering data presented to the Commission indicate that one well will drain 80 acres in both the Lane-Wolfcamp and Lane-Pennsylvanian Pools and said pools should be developed on 80-acre proration units.

(7) That applicant has shown that the dual completion of wells within the Lane-Wolfcamp common source of supply and the Lane-Pennsylvanian common source of supply in the subject area should be permitted under certain conditions.

(8) That applicant, Sunray Mid-Continent Oil Company, has shown that there is reasonable assurance that wells completed in said Wolfcamp or Pennsylvanian formations in the subject area will adequately drain 80 acres. Applicant requested fixed spacing and fixed proration units, but this fixed pattern would not be in the best interest of conservation. The Commission finds that all wells drilled to and completed in the Wolfcamp or Pennsylvanian formations in the area should be located on 80-acre units embracing two adjacent governmental quarter-quarter sections or lots within a single governmental section, which units should run either North and South or East and West; further, that wells drilled to and completed in the Wolfcamp or the Pennsylvanian formations in said area should be located on either quarter-quarter section or lot comprising the 80-acre units, and should not be closer than 330 feet from the lines of such quarter-quarter section; further, that all wells so located on such 80-acre units should have allowables assigned thereto in accordance with the 80-acre proportional factor for a depth range of 9,000 to 10,000 feet, and with the other provisions of Rule 505 of the Rules and Regulations of the Commission.

(9) That any well which was drilled or was drilling as of October 10, 1956, and which is located within the horizontal limits of the Lane-Wolfcamp or Lane-Pennsylvanian Pool as herein defined should be granted an exception to the 80-acre spacing requirements of this order; further, that any such excepted well should be assigned an allowable which is in the same proportion to the standard 80-acre allowable that the well's dedicated acreage is to 80 acres; further, that the allowable for any such excepted well should be increased to that of a standard unit upon receipt by the Commission of proper evidence that such well has 80 acres dedicated thereto.

IT IS THEREFORE ORDERED:

(1) That the application of Sunray Mid-Continent Oil Company for an order extending the Lane-Wolfcamp Pool and creating the Lane-Pennsylvanian Pool, and for an order establishing 80-acre spacing in the Lane-Wolfcamp and Lane-Pennsylvanian Pools be and the same is hereby approved.

(2) That the vertical limits of the Lane-Wolfcamp Pool shall be the Wolfcamp formation, and the horizontal limits of said Lane-Wolfcamp Pool shall be that area described in Exhibit "A" attached hereto and made a part hereof.

(3) That the vertical limits of the Lane-Pennsylvanian Pool shall consist of the Pennsylvanian formation, and the horizontal limits of said Lane-Pennsylvanian Pool shall be that area described in Exhibit "A" attached hereto and made a part hereof.

IT IS FURTHER ORDERED:

That special pool rules applicable to the Lane-Wolfcamp and Lane-Pennsylvanian Pools be and the same are hereby promulgated as follows:

SPECIAL RULES AND REGULATIONS FOR THE LANE-WOLFCAMP AND LANE-PENNSYLVANIAN POOLS

IT IS ORDERED:

(1) That 80-acre proration units be and the same are hereby established for the Lane-Wolfcamp and Lane-Pennsylvanian Pools; further, that all wells drilled to and completed in said Lane-Wolfcamp or Lane-Pennsylvanian Pool shall be located on 80-acre proration units embracing two adjacent governmental quarter-quarter sections or lots within a single governmental section; further, that the aforesaid 80-acre proration units shall run either North and South or East and West. The well thereon may be located on either quarter-quarter section or lot comprising the 80-acre unit, but shall not be closer than 330 feet from the boundaries of such quarter-quarter section or lot.

(2) That Form C-128 shall be filed in conformance with Rule 1104 and shall outline the acreage dedicated to any projected well.

(3) That individual well allowables for wells drilled in conformity with the 80-acre spacing rules herein provided for the Lane-Wolfcamp and Lane-Pennsylvanian Pools shall be established in accordance with the 80-acre proportional factor for a depth range of 9,000 to 10,000 feet, and with the other provisions of Rule 505 of the Rules and Regulations of the Commission. Provided, however, that the date of assignment of an allowable to a newly

completed well shall be governed by the provisions of Rule 503 (c) and the date of receipt by the Commission of the Commission's Affidavit of Communitization Agreement, if applicable.

(4) That each well which was drilled or was drilling as of October 16th, 1956, and which is located within the limits of the Lane-Wolfcamp or Lane-Pennsylvanian Pool as herein defined, is hereby granted an exception to the 80-acre spacing requirements of this order; further, that any such excepted well shall be assigned an allowable, effective at 7 o'clock a.m., Mountain Standard Time, November 1, 1956, which is in the same proportion to the standard 80-acre allowable that the well's dedicated acreage is to 80 acres. Provided, however, that the allowable for any such excepted well may be increased to that of a standard unit effective on the date of receipt by the Commission of Commission Form C-128, Well Location and/or Gas Proration Plat, indicating that sufficient additional acreage has been dedicated to the excepted well to form a standard proration unit as defined in Paragraph (1) above, or on the date of receipt by the Commission of the Commission's Affidavit of Communitization Agreement, if applicable, whichever date is later. Provided however, that no well shall have its allowable increased to that of a standard unit prior to November 1, 1956.

(5) The allowable for any well completed in the Lane-Wolfcamp or Lane-Pennsylvanian Pool and to which is assigned any governmental quarter-quarter section or lot containing less than 39 1/2 acres or more than 40 1/2 acres shall have its allowable decreased or increased in the proportion that the total number of acres assigned to the well bears to 80 acres.

(6) That the application of Sunray Mid-Continent Oil Company for an order promulgating special pool rules for the Lane-Wolfcamp common source of supply and the Lane-Pennsylvanian common source of supply permitting the dual completion of a well within the horizontal and the vertical limits of the subject pools, after individual approval as hereinafter provided, be and the same is hereby approved.

(7) (a) That the dual completion of any well within the horizontal and vertical limits of the subject pools may be permitted only by order of the Commission after due notice and hearing, except as noted by Paragraph 7 (c) below.

(b) The application for such hearing shall be submitted in triplicate and shall include an exhibit showing the location of all wells in both pools and a diagrammatic sketch of the proposed dual completion and shall set forth all material facts on the common sources of supply involved, and the manner and method of completion proposed.

(c) The Secretary of the Commission shall have authority to grant administratively an exception to the requirements of Paragraph (a) above without notice and hearing where application

for administrative approval has been filed in due form and includes an exhibit showing the location of all wells in the subject pools and a diagrammatic sketch of the proposed dual completion, and has set forth all material facts on the common sources of supply involved, and the manner and method of dual completion proposed, and

(1) applicant proposes to dually complete a well in the Lane-Wolfcamp common source of supply and the Lane-Pennsylvanian common source of supply and the well is located within the horizontal limits of both of the pools or within one-half mile of the horizontal limits thereof, and

(2) applicant proposes to complete and equip the well in such a manner that the Lane-Wolfcamp common source of supply and the Lane-Pennsylvanian common source of supply shall be completely segregated from each other by setting the production casing string at total depth and circulating cement from total depth to a point at least 500 feet above the uppermost perforation, and by utilizing parallel strings of tubing, one string to each of the common sources of supply, and a permanent retainer-type production packer.

Applicants shall also furnish all operators who own leases within the horizontal limits of either or both pools a copy of the application and a diagrammatic sketch of the proposed dual completion and a plat showing the location of all wells in the subject pools. Applicant shall include with his application to the Commission a written stipulation that all such operators have been properly notified. The Secretary of the Commission shall wait at least 20 days before approving any such dual completion, and shall approve such dual completion only in the absence of objection from any such operator owning acreage in either or both of the pools. In the event an operator objects to the dual completion, the Commission shall consider the matter only after proper notice and hearing.

The Commission may waive the 20-day waiting period requirements if the applicant furnishes the Commission with the written consent to the dual completion by all of the aforesaid operators involved.

(8) That any well so dually completed shall be completed and thereafter produced in such a manner that there will be no commingling within the well-bore, either within or outside the

casing, of gas, oil and gas, or oil produced from either or both of the separate strata.

(9) That upon the actual dual completion of any such well, the operator shall submit to the District Office of the Commission at Hobbs, New Mexico, copies of Oil Conservation Commission Form C-103, Form C-104, and Form C-110 outlining the information required on those forms by existing Rules and Regulations, packer-setting affidavit form, and two copies of the electric log of the well. Operator shall also submit in duplicate evidence indicating that the cement behind the production casing string was circulated from total depth to a point at least 500 feet above the uppermost perforation.

(10) That any well so dually completed shall be equipped in such a way that reservoir pressures may be determined separately for each of the two specified strata, and further, be equipped with all necessary connections required to permit recording meters to be installed and used, at any time, as may be required by the Commission or its representatives, in order that natural gas, oil, or oil and gas from each separate stratum may be accurately measured and the gas-oil ratio thereof determined.

(11) That the operator shall be required to make any and all tests, including segregation tests, but not excluding other tests and/or determinations at any convenient time and in such manner as deemed necessary by the Commission; the original and all subsequent tests shall be witnessed by representatives of the Commission and by representatives of offset operators, if any there be, at their election, and the results of each test properly attested to by the operator and all witnesses, and shall be filed with the Commission within 15 days after completion of such test.

(12) That upon the actual dual completion of any such well, operator shall submit to the Commission a diagrammatic sketch of the mechanical installation which was actually used to complete and produce the seal between the strata, and a special report of production, gas-oil ratio, and reservoir pressure determination of each producing zone or stratum immediately following completion.

(13) That upon actual dual completion of any well, operator shall within 15 days commence a segregation test, and shall conduct and report the results of said test in accordance with the instructions pertaining to and a part of the Commission's "Packer Leakage Test" form. Such segregation tests shall also be conducted at six-months intervals from the date of initial dual completion and at such other times as may be deemed necessary by the Commission.

IT IS FURTHER ORDERED:

That jurisdiction of this cause is hereby retained by the Commission for such further order or orders as may seem necessary

or convenient for the prevention of waste and/or the protection of correlative rights; upon failure of any operator to comply with any requirement of this order, after proper notice and hearing the Commission may terminate the authority granted and require, in the interests of conservation, the operator or its successors and assigns to limit its activities to regular single-zone production insofar as the well wherein the failure to comply be concerned.

EXHIBIT "A"

Horizontal limits of the Lane-Wolfcamp and Lane-Pennsylvanian Pool:

TOWNSHIP 9 SOUTH, RANGE 33 EAST, NMPM
Section 25; S/2
Section 35; E/2
All Section 36;

TOWNSHIP 9 SOUTH, RANGE 34 EAST, NMPM
Section 31; W/2

TOWNSHIP 10 SOUTH, RANGE 33 EAST, NMPM
Section 1; All
Section 2; E/2
Section 11; NE/4
Section 12; N/2

TOWNSHIP 10 SOUTH, RANGE 34 EAST, NMPM
Section 6; W/2

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN F. SIMMS, Chairman

E. S. WALKER, Member

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

ir/

SINCLAIR OIL & GAS COMPANY
P. O. Box 1470
Midland, Texas

OIL RESERVES & ECONOMICS

PENNSYLVANIAN ZONE

I. Factors used in computing Pennsylvanian Reserves:

3.4%

a. Porosity of 5.03% (weighted average of core analysis on eight wells)

1.3%

b. Effective pay thickness of 37.7 feet (from electric-micro-radio active logs and/or core analysis on 15 wells.)

c. Formation volume factor of 2.315 barrels reservoir oil per barrel of Stock Tank Oil (BK sample analysis Sinclair State 735 #1.)

d. Connate water of 16%.

e. Oil recovery of 20%.

II. Pennsylvanian Oil in place equals 5350 ST barrels per acre.

III. Pennsylvanian Stock Tank Oil reserves:

a. Gross barrels per acre equals	1,070	1200
b. Gross barrels for 40 acres equals	42,800	48000
c. Gross barrels for 80 acres equals	85,600	96,000

IV. Price of Stock Tank Oil equals $2.83 per barrel.

V. Economics of Pennsylvanian Well:

	40 acre	80 acre
a. Gross value of recoverable STO	$ 121,124	$ 242,248
b. Charges against well		
Royalty	$ 15,140	$ 30,280
Direct tax	6,056	12,112
Operating expense	28,800	30,000
Cost of well	221,076	221,076
Total charges	$ 271,072	$ 293,468
c. Net loss to Operator	($ 149,948)	($ 51,220)

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
SINCLAIR EXHIBIT NO. 6
CASE 1102

SINCLAIR OIL & GAS COMPANY
P. O. Box 1470
Midland, Texas

OIL RESERVES & ECONOMICS
WOLFCAMP ZONE
DEAN AREA, LEA COUNTY, N.M.

I. Factors used in computing Wolfcamp reserves:

a. Porosity of 5.3% /core analysis, Magnolia Ozona #1)

b. Effective pay thickness of 11.4 ft. (electric-micro-radio active logs and/or core analysis on 13 wells)

c. Formation volume factor of 1.680 barrels reservoir oil per barrel stock tank oil.

d. Connate water of 27%.

e. Oil Recovery of 20%.

II. Wolfcamp oil-in-place equals 1820 ST barrels per acre.

III. Wolfcamp Stock Tank Oil Reserves:

a.	Gross barrels per acre equals	364
b.	Gross barrels per 40 acres equals	14,560
c.	Gross barrels per 80 acres equals	29,120

IV. Price of Stock Tank Oil equals $2.83 per barrel.

V. Economics of Wolfcamp well (80 acre)

		Wolfcamp Single Well	Pennsylvanian Wolfcamp Dual Completion
a.	Gross value of recoverable STO	$ 82,410	$ 82,410
b.	Charges against well		
	Royalty	10,301	10,301
	Direct taxes	4,120	4,120
	Operating expense	17,800	17,800
	Cost of developing	202,314	49,905
	Total charges	$ 234,535	$ 82,126
c.	Net profit (or loss) to Operator	($ 152,125)	$ 284

Sinclair
1102

SINCLAIR OIL & GAS COMPANY
P. O. BOX 1470
Midland, Texas

ECONOMICS OF THE PROPOSED
PERMO-PENNSYLVANIAN POOL

I. Total recoverable reserves:

a. Pennsylvanian Zone equals 1070 ST barrels/acre

b. Wolfcamp Zone equals 364 ST barrels/acre

Total equals 1434 ST barrels/acre

II. Permo-Pennsylvanian Stock Tank Reserves:

a. Gross barrels for 40 acres equals 57,360

b. Gross barrels for 80 acres equals 114,720

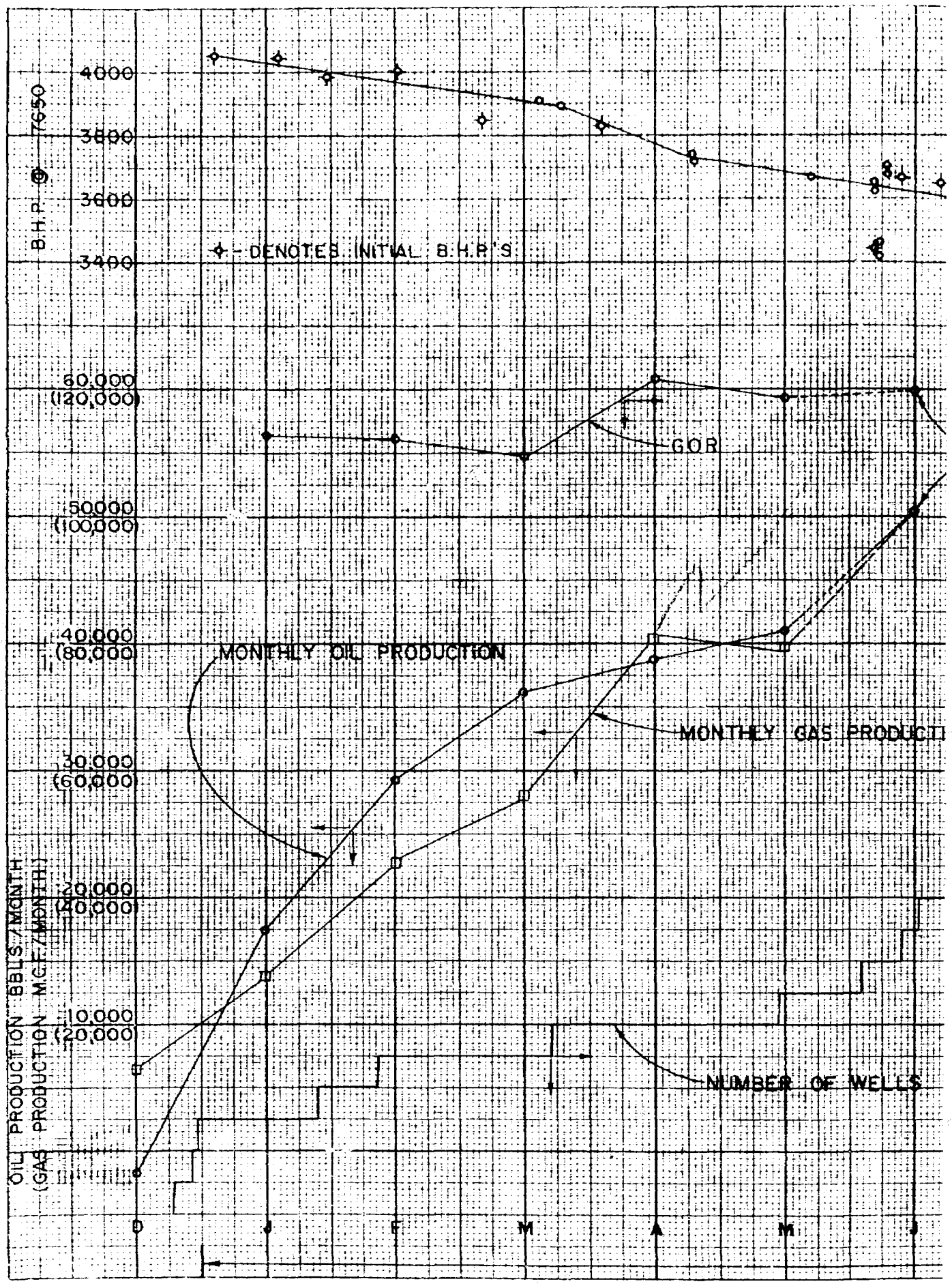
III. Price of Stock Tank Oil equals $2.83 per barrel.

IV. Economics of single Permo-Pennsylvanian Well:

	40 acre	80 acre
a. Gross value of recoverable STO	$ 162,329	$ 324,658
b. Charges against well		
Royalty	$ 20,291	$ 40,582
Direct tax	8,116	16,232
Operating expense	33,800	35,000
Cost of well	221,076	221,076
Total Charges	$ 283,283	$ 312,890
c. Net profit (or loss) to Operator	($ 120,954)	$ 11,768

have not shown economics of duals w/ Dev.

Sinclair 8
1107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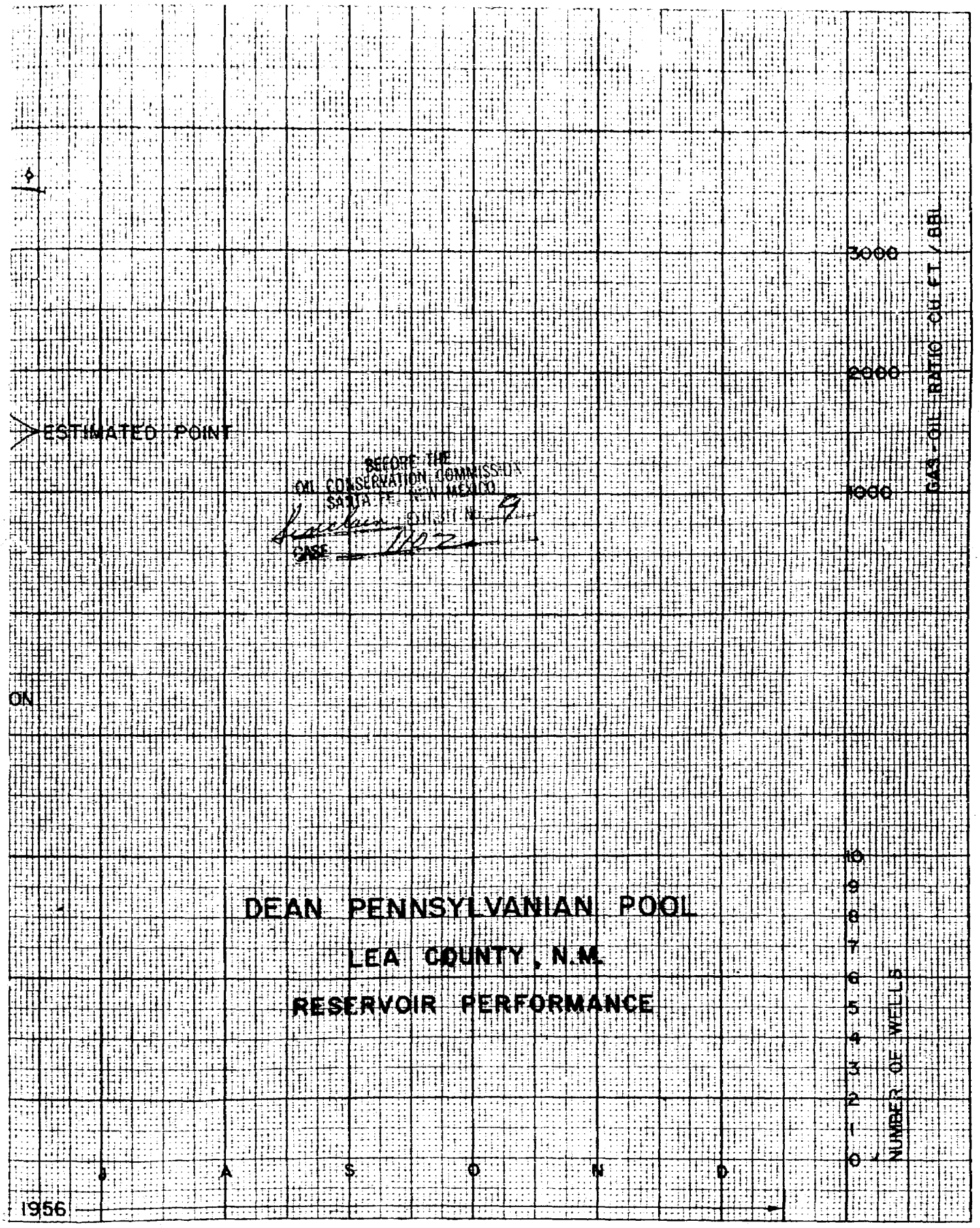

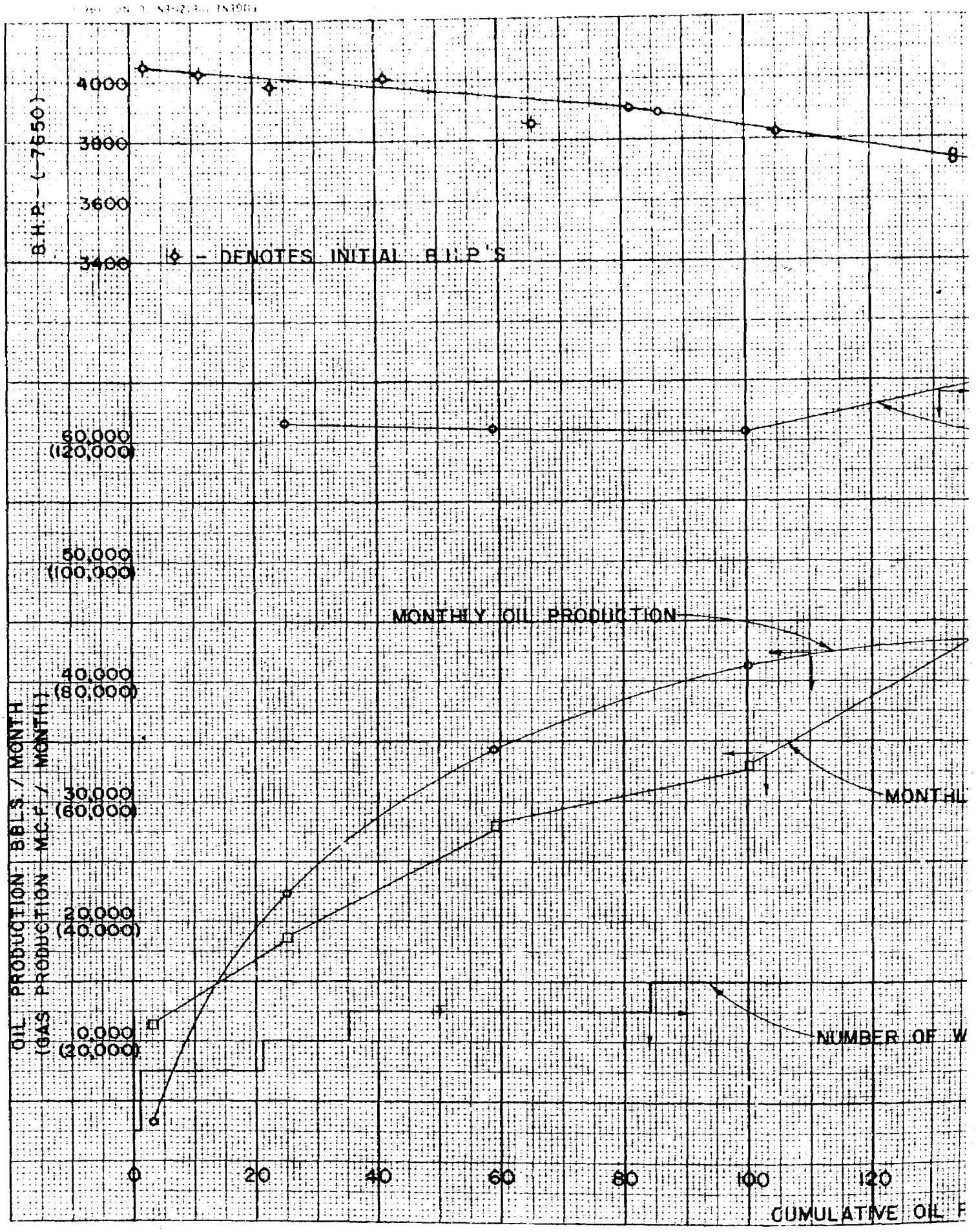
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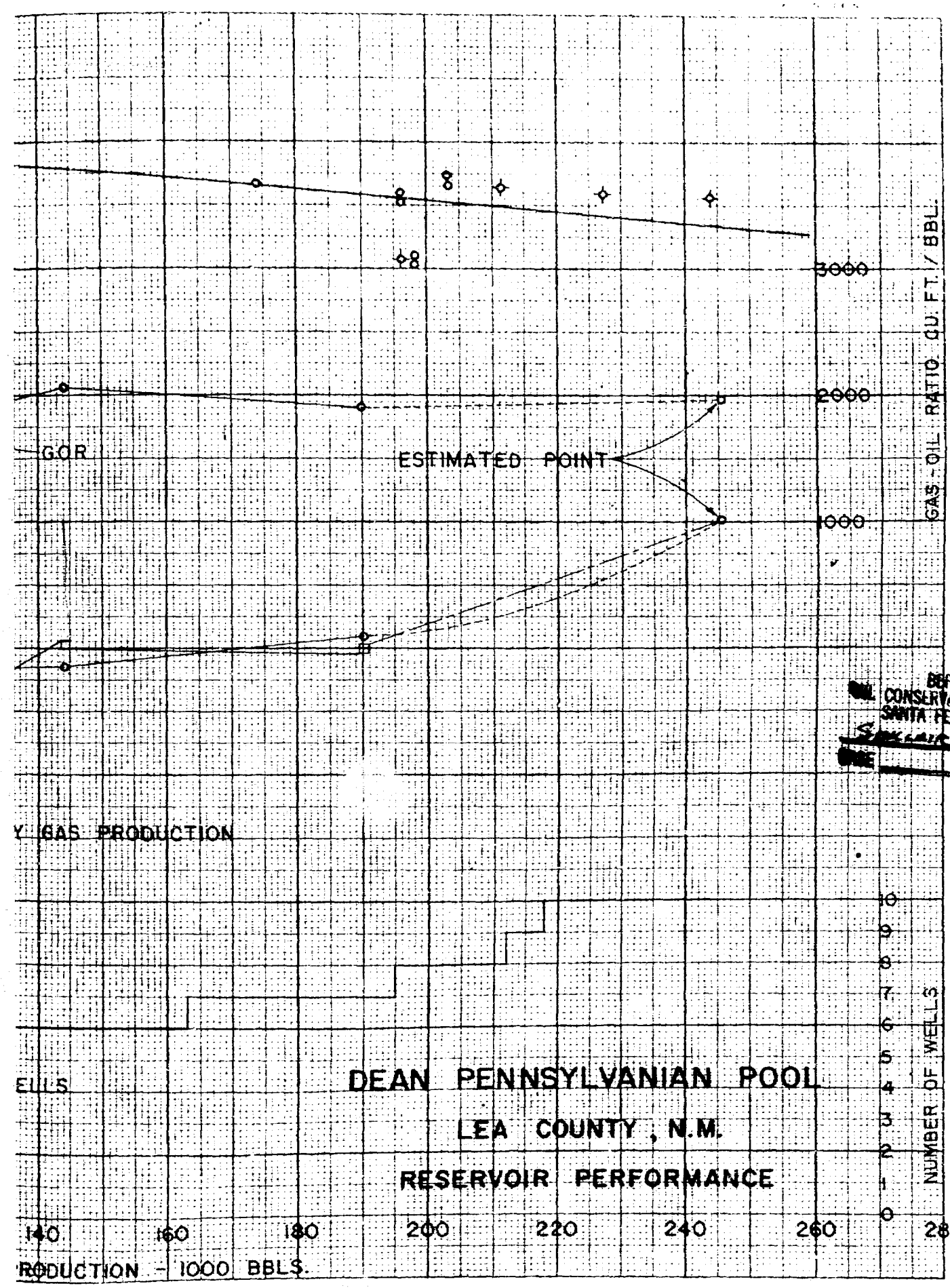
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GOR
ESTIMATED POINT
GAS - OIL RATIO CU. FT. / BBL.
BEFORE THE
CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 10
1102
Y GAS PRODUCTION
10
9
8
7
6
5
4
3
2
1
0
NUMBER OF WELLS
ELLS
DEAN PENNSYLVANIAN POOL
LEA COUNTY, N.M.
RESERVOIR PERFORMANCE
140
160
180
200
220
240
260
280
RODUCTION - 1000 BBLS.

Company Lease & Well No.	Completion Date	Date	MCP psig @ 7650	Shut In Hours	Bottom Hole Gradient lbs./ft.
Humble State "AJ" #1	12-29-55	1-3-56	3956*	58	.270
Magnolia Anderson Est. #1	12-30-55	1-28-56	3845	48	.267
Sinclair State 735 #1	12-24-55	1-29-56	3921*	48	.300
State 758 #1	1-27-56	2-26-56	4000*	48	.270
Atlantic Fed. Dow #1	2-11-56	3-5-56	3856*	93	.300
Humble State "AJ" #1		3-19-56	3911	91	.260
Sinclair State 758 #1		3-23-56	3890	48	.275
Humble State "AJ" #2	3-22-56	4-3-56	3835*	72	.260
State "AJ" #1		4-24-56	3729	50	.280
State "AJ" #2		4-24-56	3724	50	.270
State "AJ" #2		5-21-56	3670	50	.280
Magnolia Barbara Owens #1	5-14-56	6-4-56	3840*	48	.268
Humble State "AJ" #2		6-4-56	3822	75	.270
State "AJ" #1		6-4-56	3842	73	.290
Magnolia Anderson Est #1		6-5-56	3824	48	.262
Atlantic Fed. Dow #1		6-5-56	3847	216	.339
Sinclair State 735 #1		6-8-56	3698	72	.270
State 758 #1		6-8-56	3701	72	.279
Tide Water State "AB" #1	6-3-56	6-18-56	3669*	72	.304
Humble State "AF" #1	6-13-56	6-21-56	3612	72	.360

* Indicates Initial MCP Run on Well

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 1102

TRANSCRIPT OF PROCEEDINGS

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

November 13, 1956

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
November 13, 1956

IN THE MATTER OF:

(Rehearing) Application of the Ohio Oil Company for rehearing in Case 1102, Order R-892, which established pool rules for the Dean Permo-Pennsylvania and Dean-Devonian Pools, Lea County, New Mexico. Applicant, in above-styled cause, seeks reconsideration by the Commission of the spacing and allowable provisions for the Dean Permo-Pennsylvanian Pool with particular attention to the allowable for existing wells on 40-acre tracts. Applicant contends that such wells should retain the normal 40-acre allowable rather than one-half of the normal 80-acre allowable as established by Order R-892.

BEFORE:

Mr. A. L. Porter
Mr. E. S. (Johnny) Walker

TRANSCRIPT OF PROCEEDINGS

MR. PORTER: We will consider next, Case 1102.

MR. GURLEY: Application of the Ohio Oil Company for rehearing in Case 1102, Order R-892 which established pool rules for the Dean Permo-Pennsylvania and Dean-Devonian Pools, Lea County, New Mexico.

MR. PORTER: Mr. Couch.

MR. COUCH: Terrell Couch for the Ohio Oil Company. I would like to make a statement at this time, if I may, please, sir.

MR. PORTER: You may proceed.

MR. COUCH: The undisputed facts are that the Ohio's A. C. Dean Well No. 1 was commenced on 3-31-56 projected to the Pennsylvanian and Devonian formations on a leasehold tract of 200 acres. The well site is of course the NW/4 of the NW/4 of Section 35 and the NE/4 of Section 34 being the adjoining quarter section to the west is the remainder of the 200 acre tract.

On June 20, 1956, a drill stem test was run in the Strawn. At the hearing approximately one month later I requested that the well be recognized as an exception to the spacing provisions of the order proposed by Sinclair Oil and Gas Company. I also requested that the allowable of the well be permitted to remain at the allowable determined under statewide rules applicable at the time it was drilled. The Ohio did not at that time request a full 80 acre allowable - we requested only that the allowable not be cut by the application of the proposed rules.

As we all know, it appears doubtful whether a Permo-Penn well will pay for itself even under 80 acre spacing with only a normal 80 acre allowable. It is certain then that a well cannot return the invested capital if the allowable is limited to 1/2 of such an 80 acre allowable. That is the cut Order R-892 would place on the Ohio's well.

It has come to my attention that some of the operators have

obtained the impression The Ohio favors 40 acre spacing in the Dean Permo Pennsylvanian Pool. We do not. On the basis of all available information to date, The Ohio's management definitely advocates 80 acre spacing as the proper method of developing the pool. If it is desired to avoid any exception to 80 acre spacing insofar as the Ohio's acreage is concerned, that can readily be accomplished by recognizing a full 80 acre unit out of Ohio's own 200 acre tract. I repeat, The Ohio approves 80 acre spacing.

That brings us almost up to date. Early last evening Sinclair Oil and Gas Company and The Ohio arrived at what appeared to be an acceptable basis for forming an 80 acre unit within Section 35. The Ohio's leasehold is not state acreage. Our 200 acre tract is covered by three undivided interest leases containing no pooling provision. Royalty owners interests must be taken into account. With these facts in mind The Ohio suggested to Sinclair a continuance of the case to the regular December Hearing, with an interim order continuing The Ohio's allowable in effect until that date. It is my understanding that Sinclair has no objection to the continuance of the case, but as of last night Sinclair insisted that the cut in allowable must be effective December 1st, 1956.

In my opinion, if Sinclair desires to work out an agreement on the basis discussed last night there is every reason to believe the entire transaction including a satisfactory arrangement with

our royalty owners can be worked out prior to the December Hearing. I have attempted to consider carefully all aspects of the problem. I have concluded that a continuance of this case will be in the best interest of attempting to work out an 80 acre unit within the standards and limitations of the order. The cause of 80 acre spacing in New Mexico will, in my opinion, be better served by continuing this case at this time to permit a good faith effort to comply with the provisions of Order R-892. I therefore request that the case be continued until the regular December Hearing and in fairness to The Ohio, I request the Commission enter it's interim order continuing the allowable of The Ohio's well in effect until the regular December Hearing.

MR. HARBEN: May I make a statement?

MR. PORTER: Mr. Harben, I presume that your statement would be limited to the motion of Mr. Couch at this time.

MR. HARBEN: Yes, sir.

MR. PORTER: You may proceed.

MR. HARBEN: If the Commission please, Sinclair Oil and Gas Company does not object to continuing this case until the next term, or the next hearing date, but we do vigorously object to the well, the Ohio's well producing its present allowable after December 1st.

Now, the 40 acres which we have on the east of their 40 acres is state land. If the well continues to produce its present

allowable from December 1st until this hearing comes up on December 15th, it will be draining considerable oil from our lease. It would be depriving the State of New Mexico and the school system of royalties which would rightfully belong to them. Now, we think that this well should be brought within this Commission's order which was entered into October 4th, and that on December 1st, the allowable be reduced in accordance with that order.

Now, as Mr. Couch says, some negotiations have been conducted between Sinclair and Ohio. I believe myself that there be no question but what the 80 acre unit would be for. Perhaps before December 1st, I understand from Mr. Couch that his problem may be with his royalty owners, but it seems to me that he has two and a half weeks before December 1st. Possibly all of his royalty owners can be contacted before that time and the 80 acre unit formed before December 1st, and then if that happens, why, of course, it would take its regular 80 acre unit allowable, but I don't know, I have no control over his royalty owners. Maybe that might not be possible, to get their consent and maybe something might come up on December 15th where this case wouldn't be heard. In the meantime, this well would be producing, what is it, 90 barrels per day or more than it would be allowed under the order entered by the Commission on October 4th. Therefore, we are perfectly willing and recommend that the case be passed until, I believe it

is the December 15th Hearing, the 13th, but that well be brought within the order of this Commission, and of course, I assure the Commission, as far as Sinclair is concerned, why we will use every effort in trying to work out the 80 acre spacing before December the 1st. As a matter of fact, we have made our definite offer, and it is, I believe, as to whether or not he can get his royalty owners signed up.

MR. PORTER: Mr. Gregg.

MR. GREGG: Gregg with Humble Oil, and I would normally oppose the continuance of the allowable to Ohio on this well. However, I think, under the circumstances, we have no objection to the continuance of it as Mr. Couch indicated. We might suggest that a possibility of a way out would be an understanding that if nothing is arranged by the December Hearing, that the allowable could be retroactive to December 1st at that time or whatever time it comes out, and make the over production at some later period, which they would make during the interval.

MR. HARBEN: If the Commission please, may I say one more thing?

MR. PORTER: Mr. Harben.

MR. HARBEN: It seems to me that the Ohio be protected by permitting this allowable to reduce December 1st under this Commission's order, and then in the event that this 80 acre unit is

not formed, and in the event that they ultimately win in their application, then this Commission could grant them their back allowable which they lost during that period of time.

MR. PORTER: Mr. Thomlinson.

MR. THOMLINSON: W. P. Thomlinson for Atlantic Oil Company. We have no objection to having the case continued. We have no objection to Ohio receiving the larger allowable until the case is settled, provided that the same advantage is extended to other wells in the field that have proration units less than 80 acres.

MR. PORTER: You heard Mr. Thomlinson. Did you have any reference to any specific unit?

MR. THOMLINSON: Yes, sir, we have one in the same site.

MR. PORTER: How many acres does that unit contain?

MR. THOMLINSON: That is a 52 acre unit, 52, I believe, and some fraction, and we do support 80 acre spacing and hope that it can be established in the pool, but we believe that if an advantage is to be offered to one well in the pool, if it has a proration unit of less than 80 acres, it should be the same as for any other.

MR. PORTER: Have you estimated or computed the allowable that would be granted to a 53 acre unit?

MR. THOMLINSON: Under what circumstances, 80 acre or 40 acre?

MR. PORTER: Using a 40 acre formula.

MR. THOMLINSON: I think our allowable would be about, some two hundred and eighty some barrels a day.

MR. PORTER: Does anyone else have a statement with reference to Mr. Couch's motion?

The Commission has ruled that it is willing to continue the case until the December Hearing, but that the allowable provision of Order R-892 will go into effect on December 1st.

MR. COUCH: I would like to state at this time, if the Commission please, that Ohio feels that the provision of the allowable is not in compliance with the statute or the rules that apply to Ohio's well. I want also to assure the Commission that we will do everything we can to work out this agreement we have discussed with Sinclair. If we are unable to do it by December 1st, I want to state frankly now that I will be before this Commission prior to December 1st for a request to continue the case status quo of Ohio's well until such time as the December Hearing.

MR. PORTER: The Commission has ruled that Case 1102 will be re-continued to the regular December Hearing which I believe is on the 13th, but that the allowable provisions of Order R-892 will go into effect on the scheduled date.

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 Hearing before the New Mexico Oil Conservation Commission was reported by me in Stenotype and reduced to typewritten transcript by me; and that same is a true and correct record to the best of my knowledge, skill, and ability.

WITNESS my Hand and Seal, this, the 26th day of November, 1956, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

J. A. Trujillo
NOTARY PUBLIC

My Commission Expires:

October 5, 1960

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

July 18, 1956

IN THE MATTER OF:

CASE NO. 1102

TRANSCRIPT OF PROCEEDINGS

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

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 18, 1956

IN THE MATTER OF:

Application of Sinclair Oil and Gas Company for an order establishing 80 acre spacing in the Dean-Permo Pennsylvanian Pool; for an order amending Order R-757 which created the Dean-Pennsylvanian Pool and in which applicant proposes to rename it as the Dean-Permo-Pennsylvanian Pool and to amend Order R-799 which permitted dual completions in the Dean-Pennsylvanian Pool and Dean-Devonian Pool to allow dual complations in the Dean-Permo-Pennsylvanian and the Dean-Devonian Pool, all in Lea County, New Mexico.

Case No. 1102

Applicant in the above-styled cause, seeks an order establishing 80 acre spacing for the area presently known as the Dean-Pennsylvanian Pool and which they desire to establish as the Dean-Permo-Pennsylvanian. Applicant further seeks an order to add the Wolfcamp formation to the presently designated Dean-Pennsylvanian Pool and to be known as the Dean-Permo-Pennsylvanian Pool. Applicant desires that the pool area now presently defined as the Dean-Pennsylvanian be further defined as the Dean-Permo-Pennsylvanian. Applicant seeks an order to allow the Wolfcamp formation to be included with the Pennsylvanian formation and dualled with the Devonian formation for oil-oil dual completions in what would be known as the Dean-Permo-Pennsylvanian Pool and Dean-Devonian Pool.

BEFORE:

Honorable John F. Simms
Mr. E. S. (Johnny) Walker
Mr. A. L. Porter, Jr.

TRANSCRIPT OF HEARING

MR. PORTER: The meeting will come to order, please. Mr. Gurley, are you ready to proceed?

(Mr. John Gurley, Attorney for the Oil Conservation Commission read the title of the within case.)

MR. PORTER: Is the applicant ready?

MR. HARBEN: Sinclair is ready.

GOVERNOR SIMMS: Ask your witnesses to stand and be sworn.

(The witnesses in the case were then sworn by Mr. Walker.)

MR. HARBEN: I would like to enter appearance of the attorneys; our names are: Nat J. Harben and Layton Webb, attorneys for Sinclair Oil and Gas Company. If the Commission please, before we start our testimony, I would like to make this statement. The Commission will recall that on March 14, 1956 in Case No. 1017, Order R-757 was entered wherein the Commission defined the Dean-Pennsylvania field in Lea County, New Mexico. On April 27, 1956, in Case No. 1016, the Commission entered Order 799 authorizing and permitting dual completion in the Devonian formation and the Pennsylvanian pool as the Commission had theretofore defined. Now, we are here today asking the Commission for three things: First, we are asking that the Commission enter an order combining the Dean-Pennsylvanian Pool and the Wolfcamp formation and designating such combination as the Permo-Pennsylvanian Pool. We are asking that as our evidence will show because it appears that the probable productive zones of the Wolfcamp would be uneconomical to develop as a separate pool.

Number 2, we are asking for an order establishing the spacing pattern of 80 acres for wells completed in the Dean-Permo-Pennsylvanian pool, and that the 80 acres units embrace center Government quarter sections of the lots within a single governmental

section; that the units run north and south or east and west, but that any well which may be drilled on the unit shall not be drilled closer than 300 feet from the line at the quarter-quarter section.

And three, we are asking for an order amending order No. 799, that is the dual completion order, so as to authorize or permit dual completion of wells in the Dean-Devonian Pool and in the Dean-Permo-Pennsylvanian Pool. I would like to call as our first witness, Mr. Merrill.

H. A. MERRILL,

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

DIRECT EXAMINATION

BY MR. HARBEN:

Q What is your name, please?

A H. A. Merrill.

Q Where do you reside? A Roswell, New Mexico.

Q By whom are you employed?

A Sinclair Oil and Gas Company.

Q In what capacity are you employed?

A As District Geologist.

Q How long have you been District Geologist, Mr. Merrill?

A Three years.

Q Are you acquainted with the area around the Dean-Devonian and Dean-Pennsylvanian Pools?

A I am

Q --in Lea County? A Yes.

Q Have you heretofore qualified and testified before this Commission?

A I have.

Q --as an expert witness. Are the qualifications of the witness satisfactory?

MR. WALKER: They are.

Q Have you made a study of the geological formations in and around the Dean-Pennsylvanian Pool?

A Yes, I have.

Q Are you acquainted with the Wolfcamp formation in that area?

A Yes.

Q I hand you an exhibit No. 1, and Exhibit No. 2. Are you familiar with Exhibits 1 and 2, Mr. Merrill?

A Yes, I am

Q Were those exhibits prepared by you or under your supervision?

A That is correct.

Q And is the information which the Exhibits purport to reflect true and correct information?

A I believe it is.

Q Will you tell the Commission just what information is reflected by Exhibit 1?

A Exhibit 1--

Q (Int.) Just a minute, let me ask you this question before you go to the board. You will notice on the board some cross-sections. Are those the same, do they reflect the same information as Exhibits 1 and 2--they are just enlarged exhibits, is that correct?

A They are enlarged copies of Exhibits 1 and 2.

Q All right. Now go ahead with your explanation of Exhibits 1 and 2.

A All right. Exhibit 1 is a south to north electrical log cross-section. It commences on the south with the Atlantic Federal Dow #1 on one end and terminates on the north with Sinclair at State #735; the cross-section exhibits the presence of the Wolfcamp throughout the pool. Exhibit 2 is the west to east cross-section through the Dean pool commencing on the west with Magnolia Harkrider #1 and ending on the east with Sinclair's State 758 #1.

Q Let's take Exhibit 1--I notice Exhibit 1 has four lines on it running from left to right. Will you state what those lines represent?

A These lines indicate the top of the various formations we have outlined. The uppermost line is the top of the Wolfcamp; the second line from the top is the top of the Pennsylvanian line, and the third horizontal line is the top of the Strawn line. The lower line here is the top of the Mississippi line and the base of the Pennsylvanian.

Q Will you point out on that exhibit the vertical limits of the Dean-Pennsylvanian Pool as it is now defined?

A The very top of the Pennsylvanian formation occurs at the approximate depth here of 10,658 feet, the second horizontal line from the top; and the lowermost point of the Pennsylvanian occurs at a depth of approximately 12,700 feet at the lowermost line.

Q Does that include the Strawn line?

A It includes the entire Pennsylvanian of which the Strawn is a part.

Q How many feet are in that section?

A Approximately 21,000.

Q Did you test the depth of the Mississippi formation?

A Yes, it's approximately 12,700 feet.

Q Now, will you point out on that cross-section the Wolfcamp formation?

A The Wolfcamp is the uppermost line, which occurs at a depth of approximately 9650 feet. The base of the Wolfcamp is the same as the top of the Pennsylvania which is the second line from the top, with a gross thickness of approximately 1,000 feet.

Q Now, will you point out to the Commission the productive zones in the Pennsylvanian formation?

A At the present time the Pennsylvanian produces only from the Strawn line zone; it is designated by the third line from the from the top, and I believe there are twelve producers.

Q The 12 wells that are producing are in the Strawn formation?

A Yes, sir.

Q And what is the gross thickness of that productive zone?

A The productive zone gross thickness is approximately 100 feet across the field.

Q What is the approximate depth of that formation?

A Well, the formation is defined at approximately, 11,500 feet throughout the field.

Q Would you point out in this first well shown on the Exhibit

the productive formation in the Strawn line.

A The producing interval is immediately below the top of the Strawn line throughout the field.

Q And is that shown on all those exhibits?

A I believe it is.

Q I mean is it shown on all the logs shown on the exhibit?

A Yes, it is.

Q Now, will you point out the productive formation at the top of the Pennsylvanian formation?

A At the present time there are no producers in the upper Pennsylvania, but the uppermost approximately 40 feet of the formation has indicated possible production in several ways.

Q Can you point those wells out?

A The Sinclair Oil and Gas Company No. 3, State 396, developed flowing oil in the uppermost Pennsylvanian, as did Cities Service No. 2, State AW.

Q And that flow is based on a drill stem test?

A Both of them.

Q What is the gross thickness of the upper Pennsylvanian Zone which appears to indicate production?

A It appears to be approximately 40 feet thick.

Q I believe you stated that no wells have been completed in that formation?

A At the present time that is correct.

Q Now, will you point out on the Exhibit the productive zones or apparently productive zones of the Wolfcamp formation?

A At the present time I believe the only indication of

probable production would be the lower Wolfcamp in the zone occurring at approximately 10,400 feet throughout the field. We haven't indicated the zone, but it is signified by a horizontal line roughly 200 feet above the top of the Pennsylvanian line.

Q Have any wells been completed in that formation?

A No, there have been none.

Q You have testified about three possible productive zones in the Pennsylvania and Wolfcamp formations. Are there any other zones or sections which would appear to be productive of oil or gas?

A At the present time I don't believe any drill stem tests or interpretation of these electrical logs would indicate probable oil production.

Q Did you testify as to the approximate depth of the Wolfcamp formation which appears to be productive?

A It has an approximate depth of 10,400 feet.

Q Now, that is from the producing zone. All right. Now I hand you Exhibits 3, 4 and 5. Are you familiar with Exhibits 3, 4 and 5?

A Yes, I am.

Q And will you state whether or not those Exhibits were prepared by you or under your supervision?

A They were prepared under my supervision.

Q Will you state whether or not the information the Exhibits purport to reflect is true and correct?

A I believe they are true.

Q All right. Now, will you tell the Commission just what Exhibit 3 reflects and exhibit it to them, please sir?

A Exhibit 3 is a structural map of the Dean Pool contoured on the top of the Strawn line. Indicated in green are the present horizontal limits of the Dean-Pennsylvanian Pool.

Q Do you have water-oil contact indicated on that Exhibit?

A Our estimated oil-water contact is indicated by dashed red lines surrounding the pool.

Q Does it indicate there might be probable production over an area greater than the filed as has been defined?

A I believe it indicates probable production where sufficient porosity and permeability are indicated.

Q Are the wells which are producing from the Devonian and Pennsylvanian formations indicated on the exhibit?

A We have colored the individual wells with yellow indicating the Pennsylvanian production, blue indicating Devonian production, and where the two are producing they are colored half yellow and half blue.

Q Point these out, will you please?

A State 396 No. 2 and 396 No. 3 on the Sinclair lease.

Q Would you point to that exhibit and point to the wells which have been completed and which are producing from the Pennsylvania formation or the Strawn line?

A At the present time there are 12 producers from the Strawn line, and the yellow indicates the present Strawn production.

Q All right. Now, will you go over to Exhibit 4 and tell the Commission just what that exhibit reflects?

A This is also a structural map of the Dean Pool contoured on the top of the Pennsylvanian formation itself. The green area

indicates the present horizontal limits of the Pennsylvania Pool.

Q Do you have indicated on that map or Exhibit the wells which are producing from the Strawn line formation?

A Those are also indicated, designated by the yellow color surrounding each well.

Q Now, will you step over to Exhibit 5 and explain that Exhibit to the Commission?

A Exhibit 5 is a structural map of the Dean Pool contoured on the lower Wolfcamp zone which is possibly productive.

Q And how is the Wolfcamp shown on that map there, the possible producing area?

A We have oil-water contact indicated by a dashed red line; it is believed that will be the limits of production in the lower Wolfcamp.

Q Has there any well completed in the Wolfcamp formation?

A No, there has not.

Q Will you point to Exhibit 1 there--or did you point out the productive zone of the Wolfcamp?

A The 10,400-foot zone has indicated production, yes.

Q And how thick is that production zone?

A Approximately 30 feet.

Q That is gross thickness? A Yes, sir.

Q Are there any other sections in the Wolfcamp formation which appear to be productive of oil or gas?

A At the present time I don't believe that the drill stem testing throughout the filed, and also the electric logs, have indicated any other zones of probable production.

Q You have testified that the gross thickness of the zone in the Strawn formation which appears to be productive of oil is approximately 100 feet. What is the average net pay thickness of the Strawn zone?

A It is essentially 30 feet throughout the field.

Q Is that the average thickness over the field?

A Yes, it is.

Q And the Upper Penn--what is the approximate thickness of that zone which appears to be productive?

A It is considerably less, approximately seven feet throughout the field.

Q What is the net thickness of the net pay zone in the Wolfcamp formations which appears to be productive?

A Approximately eleven feet throughout the field.

Q All right. Will you tell us what, would you describe those various formations, how are they made up, what kind of rocks or--.

A The Strawn, the Upper Pennsylvanian and the lower Wolfcamp are very similar, brown to gray in color, with fine and medium crystalline and limestone, there is considerable fracturing and most of the porosity is developed in reservoirs, and the porosity as a whole is rather erratic throughout the field.

Q What kind of reservoirs are those, are they good, or bad, or what kind?

A Of the three I believe the Strawn is by far the best due to its greater thickness, but I would have to classify both the Upper Penn and the Lower Wolfcamp as salvage primarily.

MR. HARBEN: That's all.

MR. PORTER: Does anyone else have any questions to ask of Mr. Merrill?

BY MR. NUTTER:

Q Did I understand you to say that the top of the Wolfcamp has an average depth of approximately 9650 feet?

A I believe that is correct, as shown in the well electrical log cross-section.

Q And the top of the Pennsylvanian occurs at about 10,600 feet, I believe?

A That is correct.

Q And the top of the Strawn?

A At approximately 11,500 feet.

Q And this lower Wolfcamp pay is the only pay that drill stem tests have indicated to be present in the Wolfcamp formation?

A I don't understand the question.

Q I say this lower Wolfcamp, the one you are speaking of at 10,400 feet, is the only pay that drill stem tests indicated to be in the Wolfcamp?

A Correct.

Q And it occurs only 200 feet above the top of the pay?

A Correct.

Q Which is the top of the defined limits of the Pennsylvania Pool at the present time?

A Yes.

Q In other words, we would have to increase the vertical limits by 200 feet to take in that pay, is that right?

A That would get the only pay indicated at the present time.

Q And yet your application is to take in the Wolfcamp formation with the Dean-Pennsylvanian Pool and define all that as one pay section, from 9650 to 11,500 feet, is that correct?

A That is correct.

Q Is there any kind of marker in the Wolfcamp formation that is pretty well defined?

A I believe the top of the Wolfcamp is accepted generally by most of the oil companies in that area.

Q Is there any mark below the top of the Wolfcamp?

A None that is consistent.

Q There is not a consistent marker?

A No.

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

BY MR. MANKIN:

Q Mr. Merrill, you have referred many times to the Upper Pennsylvanian which appeared to be productive by drill stem tests, is that correct?

A Yes.

Q Is that same area also called the Cisco portion of the Pennsylvanian?

A I believe that is correct.

Q And that could be correlated as the Cisco?

A I believe that's right.

BY MR. NUTTER:

Q Here in the Wolfcamp you have estimated oil-water contact at 9650, is that correct?

A That is correct.

Q How was that established?

A By evaluation of the drill stem tests we have made throughout that zone. Several of the tests encountered water.

MR. MANKIN: I see, I believe that is all.

BY MR. HARBEN:

Q What is the total of the thickness from the top of the Wolfcamp to the top of the Mississippian?

A It would be approximately 3100 feet.

Q And that is the section which we are asking be defined as the Dean-Permo-Pennsylvanian Pool?

A That is correct.

MR. HARBEN: All right.

MR. PORTER: Does anyone else have some questions? If not, the witness will be excused. Do you intend to introduce the exhibits?

MR. HARBEN: Yes, we offer in evidence Exhibits 1, 2, 3, 4 and 5.

MR. PORTER: Without objection they will be admitted.

W. J. ROGERS,

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

DIRECT EXAMINATION

BY MR. HARBEN:

Q What is your name?

A W. J. Rogers.

Q Where do you reside, Mr. Rogers?

A Midland, Texas

Q By whom are you employed?

A Sinclair Oil and Gas Company.

Q How long have you been employed by Sinclair Oil and Gas Company?

A Nineteen years.

Q What is your official position at the present time?

A Division Petroleum Engineer.

Q And as such did you have under your supervision the engineering work in Lea County?

A Yes, sir.

GOVERNOR SIMMS: The Commission considers him qualified as an expert.

Q Thank you. Mr. Rogers, have you made a study of the Pennsylvanian Formation as it has heretofore been defined, and of the Wolfcamp formation?

A Yes, sir.

Q And what kind of study did you make and for what purpose?

A Well, first we studied the oil reserves and the economics of the Pennsylvanian Zone and we have prepared a tabulation which would--

Q (Int.) Would you speak up a little louder, please, so everyone can hear you.

A We first prepared a tabulation showing the oil reserves and economics of the Pennsylvanian zone and that, I think, we are prepared to introduce as an Exhibit.

Q All right. Have you prepared some data which, I believe, is labelled "Oil Reserves & Economics of the Pennsylvanian Pool?"

A Yes, sir, that is the tabulation to which I was referring.

Q And that is marked Exhibit 6?

A Yes, sir.

Q Before we get into Exhibit 6, have you also prepared an Exhibit No. 7 which shows the oil reserves and economics of the Wolfcamp zone?

A Yes, sir.

Q And did you also prepare some data and information marked Exhibit 8 which reflects the economics of the proposed Permo-Pennsylvanian pool?

A Yes, sir.

Q Were those exhibits prepared by you or under your supervision?

A Yes, sir.

Q And do those exhibits correctly reflect the information which they purport to reflect?

A Yes, sir.

Q All right. Now, let's take Exhibit 6, Mr. Rogers. Will you explain that exhibit to the Commission, please sir?

A Exhibit 6 shows the oil reserves and economics of the Pennsylvanian zone. I might mention here that in case No. 1016 which was heard on February 15th of this year, that Sinclair's Mr. C. L. Wilson presented an economic summary of the Pennsylvanian zone. And the summary which we are presenting heretoday confirms or is essentially the same as the one Mr. Wilson presented back in February. However, we do have additional data that has been obtained, and for that reason I thought it would be well to go

ahead and go through the same sort of economic calculations to show the picture as it is today. For example, under Item 1 of Exhibit 6, we show the factors used in computing the Pennsylvanian Reserves. The first item A, which is porosity, we find now, using the weighted average of core analysis on eight wells that the average porosity is 5.03%. I believe Mr. Wells testified at the time that the average porosity was 6.47% based on two wells, and we now have an analysis based on eight wells. The second item, 1-B, is effective pay thickness. We find now from an analysis of electric-micro-radio-active logs on 15 wells in the field that the effective pay thckness is 37.7 feet. I believe Mr. Wilson testified at the time that the average pay thickness was 33 feet based on an analysis of seven wells--

Q (Int.) Excuse me--that 37.7 figure includes the productive zone known as the Strawn line and also the Upper Pennsylvania, does it not?

A That's right. Item 1-c is the formation volume factor of 2.315 barrels of reservoir oil per barrel of stock tank oil. That is the same factor used previously by Mr. Wilson. Also the connate value of 16% used today is the same one used by Mr. Wilson. And Item I-e, the oil recovery of 20%, is the same figure used previously. Now, using those figures we come to Item II by which we show the Pennsylvanian oil in place, and that equals 5.350 stock tank barrels per acre. Now the recoverable Pennsylvanian Stock Tank reserves amount to 1,070 barrels per acre. I believe Mr. Wilson's testimony indicated at the time that there were 1200 barrels per acre. We figure now under Item 3-b (III-b)

that the [illegible] barrels of recoverable oil for 40 acres amounts to 42,800 ba[illegible] and on 80 acres that figure is 85,600 barrels. We have used, in computing the economics, a price of $2.83 per barrel; that is the same figure used previously. Then summing up the economics of the Pennsylvanian well, we find that the net loss to the operator with one well on 40 acres would amount to $149,948.00, whereas the reserves under 80 acres in the Pennsylvanian would result in a loss of $51,220.00.

Q In other words, if a well was drilled into the Pennsylvanian formation and the oil was produced from the Strawn Line and the Upper Pennsylvania, an operator could expect to end up with a loss of $51,220, where he was drilling one well to 80 acres, is that right?

A That's right. In otherwords, the 80 acre reserves in the Dean-Pennsylvanian are insufficient for a paying well.

Q Do you have anything further to say about that exhibit?

A No, sir.

Q All right. Let's go to Exhibit No. 7. Will you explain that, please sir?

A Exhibit 7 is a tabulation showing the oil reserves and economis of the Wolfcamp Zone. Under Item I-a we have used a porosity of 5.3%; we obtained that value from a core analysis on one well in the field, the Magnolia Owens #1. By core analysis and by analysis of electric-micro-radio active lots on 13 wells in the field, we estimate the effective pay thickness to be 11.4 feet. Under Item I-c we used a formation volume factor of 1,880 barrels reservoir oil per barrel of stock tank oil. That figure was ob-

tained from a reservoir fluid analysis obtained in the Gladiola Wolfcamp fluid. We believe the fluid there is similar to what we have in the Dean-Wolfcamp zone, and it is also similar to the reservoir fluid we have in the Strawn line. We have used a connate water factor of 27% and, again, we have used an estimated oil recovery of 20% for the Wolfcamp formation. Putting those factors together, we calculate under Item II that the Wolfcamp oil-in-place equals 1820 barrels per acre, and that the recoverable reserves then amount to 364 gross barrels per acre which would give 14,560 barrels per 40 acres, and 29,120 barrels per 80 acres. Skipping on down to the economics, we have calculated those on the basis of 80 acres and find that a single well drilled to the Wolfcamp formation and using the 80 acre reserves would result in a loss to the operation of $152,125.00. Now, if it were possible to dually complete a well in the Wolfcamp and Pennsylvanian formations, we have calculated the economics of the Wolfcamp section itself and find that based on the reserves for 40 acres, it would be possible to show a profit of $284.00.

Q Do you mean on a 40 acres or 80 acres?

A On 80 acres,--this would show a profit of $284.00. Now this $284.00 profit is in the Wolfcamp only and it doesn't begin to offset the $51,220.00 loss which would result in the drilling of a well and the completion and operation in the Pennsylvanian formation, of the same well.

Q What would that reduce the loss to?

A Well, approximately $51,000.00.

Q Now, of course, if you drill one well to each 40 acres,

the losses would be much greater then that?

A That's right.

Q Do you have anything else to say in connection with Exhibit 7?

A No, sir.

Q All right. Let's go to Exhibit 8, and will you explain that exhibit to the Commission, please?

A Exhibit 8 shows the economics of the proposed Permo-Pennsylvanian pool. Under Item I we have added the recoverable reserves in stock tank barrels per acre for the Pennsylvanian Zone and the Wolfcamp Zone. The sum of those two amounts to 1434 barrels per acre. And skipping on down to the economics, we find that a single Permo-Pennsylvanian well on 40 acres would result in a loss of $120,954.00. Whereas the reserves on 80 acres would result in a very small profit, being $11,768.00.

Q And that small profit of $11,768.00 would only result after an investment of some $300,000.00, isn't that right?

A Yes, sir, that's right.

Q Or approximately so. All right. Do you have anything further to say in connection with Exhibit 8?

A No, sir.

(OFF RECORD to enable commission and witness to check Sinclair Exhibits to be sure all copies distributed were identical.)

Q Mr. Rogers, I hand you Sinclair's Exhibit No. 9, and ask you if you are familiar with that Exhibit?

A Yes, sir.

Q Was that prepared by you or under your direction?

A Yes, sir.

Q And is the information reflected on that exhibit true and correct?

A Yes, sir, it is.

Q Now, I hand you Exhibit 10 and ask you if you are familiar with that exhibit?

A Yes, sir.

Q Was that prepared by you or under your supervision?

A That is correct.

Q And is the information reflected thereon true and correct information?

A Yes, sir.

Q I hand you Exhibit 11 and Exhibit 12. Were those two exhibits, 11 and 12, prepared by you or under your supervision?

A Yes, sir.

Q And is the information reflected on those exhibits true and correct?

A Yes, sir.

Q All right, will you take Exhibit 9 and explain that to the Commission, please, sir?

A Exhibit 9 is a chart showing the reservoir performance of the Dean-Pennsylvanian pool. In this chart the bottom hole pressure, the monthly oil-gas production, the gas-oil ration, and the number of hours completed in the field are all plotted against time.

Q Now, what do you mean by 'plotted against time', Mr. Rogers--I wonder if you would explain that a little further?

A Well, the horizontal scale at the bottom of the chart is plotted in months. Shall I explain Exhibit 10?

Q Yes, please.

A Exhibit 10 is the same data plotted against cumulative oil production. In other words, the bottom scale is cumulated oil production for the Dean-Pennsylvanian pool.

Q Now as to those exhibits, will you explain the line across the top of the exhibits?

A The line across the top shows the bottom hole pressure history of the Dean-Pennsylvanian pool up to date.

Q All right. Now, will you go to Exhibit 11?

A Exhibit 11 is a chronological summary of, or tabulation of the bottom hole pressures that were used in plotting the bottom hole pressure curves on the charts.

Q All right--and Exhibit 12?

A Exhibit 12 is a tabulation showing the production data for each well in the Dean-Pennsylvanian pool, and that data was plotted on the two charts, exhibits 9 and 10.

Q All right. Now going back to Exhibit 12--no, Exhibit 11, will you comment upon the bottom hole pressures as shown on that exhibit, please sir?

A Yes, sir. I would like to point out, first, from these exhibits that up until July the first, 1956, there had been some ten wells completed. Of course, all of these completions were in the Strawn zone. Now, the cumulative oil production up to the same time, that is July 1, 1956, was approximately 246,000 barrels. As can be noted from the chart, Exhibit 9, the first production

from the pool was obtained in December, 1955. The production for the month of June, 1956, was approximately 50,000 barrels of oil and 100,000 m.c.f. of gas, and you will note, too, from Exhibits 9 and 10, that the gas ratio has increased from approximately 1600 cubic feet per barrel to 2,000 cubic feet per barrel. You will the bottom hole pressure decrease from an initial pressure of 4,056 p.s.i. to 3,620 p.s.i. as of June, 1956, which represents a dop in pressure of about 436 p.s.i. Now, in respect to that bottom hole pressure history, our two charts, Exhibits 9 and 10, we have used a symbol which is used to denote the initial bottom hole pressure or newly completed wells, and from that chart--

Q (Int.) Which exhibit are you referring to now?

A On both 9 and 10, we used the same symbol, of course, on both charts.

Q Yes, all right.

A We note from this that the bottom hole pressure on newly completed wells, regardless of location, are approximately the same as average reservoir pressures at the time, and we state and feel that this is very good evidence that there is excellent communication throughout the field, and that a well can effectively drain in excess of 80 acres. I believe that summarizes our bottom hole pressure history.

Q Now, the bottom hole pressure as shown on Exhibit 11, that is the pressure taken in the wells producing from the Strawn line, is it not?

A Yes, sir, that's right.

Q And that does not take into consideration the pressures

which might be found in the top of the Pennsylvanian or in the Wolfcamp zone?

A No, the only wells completed were completed on the Strawn line, section, and that is the section on which we have the bottom hole pressure history.

Q Now, Mr. Rogers, from the information which you have been able to gather, from your study of the Pennsylvanian formation, and the Wolfcamp formation, and from the testimony which you have given here before this Commission, do you have a recommendation to make to the Commission as to the combining of the Wolfcamp formation with the Pennsylvanian pool?

A Well, yes. I think that they should be combined as a matter of economics and drainage efficiency. I think that since the lower Wolfcamp and the Upper Penn sections appear to be very similar geologically, and also by oil stem tests and oil gravities, since those are similar to the Strawn section, we would also expect a well completed in those formations could drain in excess of 80 acres, so by reason of the economics and drainage efficiency, we can certainly justify the 80 acres being added to the Pennsylvanian and designated as the Permo-Pennsylvanian pool.

Q In your opinion would the Wolfcamp as a separate pool be developed by operators and the oil produced therefrom if it remains a separate pool?

A Well, the reserves in the Wolfcamp are not sufficient to show a pay-out.

Q And an operator would not be justified to drill a well

to the Wolfcamp zone to recover oil from that formation?

A No, sir; I think it will be recovered only as salvage.

Q In your opinion would it prevent waste if the Wolfcamp formation is combined with the Pennsylvanian Pool and designated as one pool, the Dean-Permo-Pennsylvania Pool?

A Yes, sir.

Q All right. Now, would you state your recommendations as to the drilling pattern or drilling units?

A Well, I would suggest that the 80's could run in either a north-south or east-west direction, and that the well could be located on either forty of the 80-acre tract so long as the well is drilled no closer than 330 feet to the boundaries of the 40-acre tracts.

Q Of the quarter-quarter section?

A Yes, sir.

Q And the units to run either north and south or east and west as may be elected by the operator?

A Yes, sir.

Q Now, what is your recommendation, Mr. Rogers, with respect to the dual completion of the Devonian and Permo-Pennsylvanian pools?

A Well, the order as it is written now permits dual completions between the Dean-Devonian and Dean-Pennsylvanian pools. I think it should be amended or a new order be entered permitting completion of the Wolfcamp with the Devonian formation in the Dean-Permo-Pennsylvanian and Dean-Devonian pool.

Q And would you recommend using parallel strings of tubing?

A Yes, sir.

Q And to be dually completed in the same manner as required under the present order?

A Yes, sir.

Q Do you have any other comments you wish to make, Mr. Rogers?

A No, sir.

MR. HARBEN: I believe that is all of this witness.

GOVERNOR SIMMS: Bill, I would like to ask a question. Is the cumulative effect of these last four exhibits in layman's or psuedo-layman's language to the effect that there is good communication both from the point of conservation and economics on this lease?

A Those exhibits show good communication in the Strawn line section. All of our Pennsylvanian wells are completed at the present time in this Strawn lease and those exhibits show that there is excellent communication horizontally in that particular section.

GOVERNOR SIMMS: But not vertically?

A Not vertically with respect to the Wolfcamp or Upper Penn, no, sir. There is no communication vertically. However, I do think since these formations are similar geologically to the Strawn section that we would have good horizontal communication in these sections above.

GOVERNOR SIMMS: Thanks, Bill.

BY MR. HARBIN:

Q I have one question: In your opinion, a well to every 80 acres would recover all the oil in the Pennsylvanian and Wolfcamp

formations? A Yes, sir.

Q And you would eventually recover as much oil with one well to every 80 acres as by every 40 acres?

A Yes, sir, the performance to date indicates very good communication and very good drainage throughout.

Q And it would not be ecomically profitable to drill a well and produce the Pennsylvanian formation by itself and drill another and produce the Wolfcamp formation by itself?

A No, sir; they are both marginal sections and we are fortunate, I think, in having this Wolfcamp stringer there to help pay for the development in the field. It is very marginal, even with all three formations lumped together.

BY MR. PORTER:

Q Mr. Rogers, to complete a well in the Wolfcamp there, approximately where would the perforations be?

A Approximately at 10,400 feet.

Q 10,400--and the Pennsylvania, I believe, is presently producing from below 11,000?

A 11,500.

Q Do you realize that to extend the vertical limits of that pool, it would automatically lower the depth range and also the allowable?

A No, sir, I hadn't given that consideration. I can see--

Q (Int.) Well, of course, your discovery of a well in the pool establishes the depth range in that pool and in this case if the limits are extended and the well is perforated at a lesser depth, you would lower the--

A (Int.) We would have a smaller allowable as a result. I think in looking at the overall picture that it would be desirable to have that in spite of the reduction in the allowable, however.

BY MR. NUTTER:

Q Mr. Rogers, turning first to your Exhibit 6, do you have the individual porosities on those eight wells?

A Yes, sir.

Q The eight that you have the core analyses on?

A Yes, sir.

Q What is the range of those, please?

A I see a low of 3.4% and a high of 7.3; our average of 5.03 per cent is a weighted average.

Q Now, on this--if you do have a tabulation of those, I would like to have the tabulations rather than your reading it out and cluttering up the record with the figures.

A I would be happy to give them to you.

Q Now, the economics of the Pennsylvania well shown on Exhibit 6 are purely for a single completion well, are they not?

A Yes, sir.

Q And a dual completion is not shown?

A No, sir.

Q The economic picture would be changed, however, if it were a dual completion, would it not?

A Well, I can give you several tabulations; Exhibit 7 shows the result of dually completing between the Wolfcamp and the Pennsylvanian, and the result of that as shown on Exhibit 7, we could gain $284.00 from the Wolfcamp reserves by dual completion. How-

over, the Pennsylvania section in the same well would lose $51,220.00.

Q But on Exhibits 6, 7 and 8 have you shown the economics of dually completing a well in the Pennsylvanian or Permo-Penn and Devonian--was there no consideration for the Devonian development?

A No, sir. I have estimated, however, the amount of money that could be realized by dually completing in an existing Pennsylvania well equipped with 7"--in other words, if you already had a Pennsylvanian well drilled and comped with 7", it would be possible to show a profit there of $21,769.00.

Q And on Exhibit 7 in paragraph I, sub-section (c), your formation volume factor should be 1.880 rather than 1,880, should it not?

A That's right, this is a missprint.

Q Where was that volume factor obtained?

A From the reservoir fluid analysis from the Gladiola Wolfcamp. You will note the factor being 1.88 as compared to a formation volume factor in the Pennsylvanian being 2.3. We think the formation volume factor would be somewhere in the range of that one we got from the Gladiola Wolfcamp analysis.

Q You suspect the communication across the Wolfcamp would be favorable--I think you stated a while ago that you have had good communication across the Strawn as evidenced by Exhibit 11, and you stated you expected the communication across the Wolfcamp would be good because the formations were similar?

A Yes, sir.

Q And I think you said the formation volume factor is comparable too?

A Yes, it is different but it is still a comparatively higher formation volume factor. In other words, there should be a lot of gas in solution there, and we expect that fluid to be very mobile as it is in the Strawn section.

Q Do the electro and radio-active logs on the Gladiola resume the ones in the Dean-Wolfcamp?

A When we computed the formation volume factor, we were concerned mostly with the similarity of the reservoir fluids. I don't recall checking the electric log characteristics especially.

Q What was the source of your connate water figure of 27%, on Exhibit 7?

A I believe we estimated that as a result of core analysis in the Gladiola-Wolfcamp.

Q That came from the Gladiola-Wolfcamp too. And why did you use a recovery factor of 20% there?

A Because we expect the performance to be similar to that in the Pennsylvania-Strawn.

Q You expect it will be pretty much the same insofar as that is concerned?

A Yes, sir.

Q I think we pretty well established at the last hearing that 20% is a reasonable figure for the Strawn.

A I think so too.

Q Mr. Rogers, I have one question on Exhibit 9: During the month of April, gas production zoomed up quite a bit from previous production. What was the cause of that?

A The actual figures are shown on Exhibit 12. And you are comparing April with March, is that--?

Q Well, I was concerned, comparing April with March and May, the two months on either side of it.

A I believe that would be due--if you will refer to Exhibit 12 and look at the production on Magnolia-Anderson's Estate No. 1, we note in the month of March that well produced 8,166 barrels of oil and 11, 939 cubic feet of gas, whereas in the month of April, it produced 6,866 barrels of oil and 30,569 cubic feet of gas or m.c.f. of gas. In other words, apparently there was a sharp increase on the gas-oil ratio in that well in April--I believe that is the only well through the month of May that had what we call--what we considered a high gas-oil ratio. The others all showed oh, fifteen and seventeen hundred.

Q Is that the well in the Northwest corner, Section 5, 16 something--16, 36--?

A Referring to Exhibit 3, it is the well in the Southwest corner of the field, being lot 4 in Section 5, range 37 east, township 16 south.

Q From the drill stem tests, are you able to determine what the acual flowing pressures of this Wolfcamp formation would be?

A We compared the shut-in bottom hole pressures obtained on drill stem tests in the Wolfcamp with those in the Upper Pennsylvania and the Strawn, and those structures correlated to common data are almost identical when you compare the original pressures in each zone. As for flowing bottom hole pressure, as recorded on drill stem tests, I believe it varied quite a bit in the Wolfcamp and also in the Pennsylvanian.

Q Did they vary on the flowing pressure or just on drill stem testing?

A Well, I mean the flowing, due to the erratic nature of the three formations from one location to another, the flowing pressure, drill stem tests and recovery might vary.

Q But they compare favorably?

A Almost exactly when referred to common data.

Q How about fluid analysis in the Wolfcamp as compared with the Strawn section?

A We don't have one in either the Wolfcamp or the Pennsylvanian. The only one we have is on the Strawn section. However, the oil gravities are similar. I believe in the upper Wolfcamp they are 38 or 39 as compared to 43 and 44 in the Strawn line.

Q Mr. Rogers, in essence, what this application is for, if you take all three parts of the application, is to set a spacing pattern for a pool that has never had a well completed, is that correct?

A Not if we combine three strings, we already have some 12 wells completed in the Pennsylvanian pool--we are just asking that the Wolfcamp stringer be added so that we may produce it as salvage--we already have 12 wells completed in the Wolfcamp.

Q But if we set an 80-acre spacing pattern for the entire pool and then through the Wolfcamp, we would be setting a spacing pattern for a pool that has never had a completed well in it, isn't that correct?

A That is correct.

(MR. NUTTER indicated that he had no further questions.)

BY MR. MANKIN:

Q Referring again, Mr. Rogers, to this Magnolia-Anderson well, which has had a very large, very rapid, increase in gas-oil ratio, would you say that possibly the reason for this was that this well was completed on the edge of the pool and had a small oil column---had-mostly a gas column?

A Yes, I think it is due in part to the fact that the net oil effective pay in that area is very thin, and not that there was a gas cap there, but the bottom hole pressure in that particular well has decreased to a point below the saturation pressure.

Q There was only about a 17-foot perforation in that particular well, wasn't there?

A A very small amount, yes, sir.

Q Smaller than most of the other net pay zones in the other 11 wells?

A That's right, less than the others.

Q Another question in regard to ldual completions--I believe you recommended continuing the parallel strings for the Permo-Pennsylvanian and the Dean-Devonian, is that right?

A Yes, sir.

Q That is your recommendation? A Yes, sir.

Q You would not favor a single string completion of one tubing string in the Permo-Pennsylvanian and Devonian because it might leave a lot of liquid underground?

A I would not favor it personally.

Q Do you think because of the waste--

A (Int.) It would depend on wh[illegible] formation was depleted

first. It is possible you would get the same oil but it might take a long time to do it and it would depend on which zone was depleted first.

Q Then you think a better reservoir performance would be had by continuing with parallel stringing as you have done in the past?

A Yes.

Q There have been some 40-acre completions, and the Ohio Dean which is a possible completion, and the Magnolia L. What provisions did you make for 80-acre spacing for those wells?

A I believe the operators of the tracts off-setting could be pooled and form 80-acre units in those cases. For instance, the Atlantic Dow 40, actually that is about a 50-acre governmental lot, could be combined with the governmental lot to the south, being Magnolia's State L lease.

Q It would be to the south or to the east as well, couldn't it?

A This plat doesn't show it, but the Magnolia K well to the east shows on your exhibit as a location; actually it has been completed racently so it could not be formed with the governmental lot to the ast, it would have to be to the south.

Q You say it has been completed? A Yes, sir

Q So it would have to be with the Magnolia's 40 acres to the south of the Atlantic Dow?

A Yes, sir.

Q Are there any other exceptions or problems that might arise other than the Ohio Dean? -- and the Magnolia L?

A No, sir, I don't recall any problems that would arise.

Q Then you have no particular solution for the 80 acres if the Ohio Bean was a Pennsylvanian completion?

A Well, yes, sir; that 40 acres could be added to the 40 to the east, the Sinclair Oil and Gas Company Lease 413.

Q If that was a producing Sinclair, it would be agreeable?

A I think we would certainly negotiate along those lines, yes, sir.

Q That's all.

BY MR. NUTTER:

Q On our order 799, which requires that cement be circulated to a point 500 feet above the top of the Pennsylvanian, if these areas were combined into the Pennsylvanian, would you recommend it at 500 feet above the top of the Wolfcamp?

A I would suggest 500 feet above the uppermost producing section.

Q So far we only have one section producing--is there a possibility there might be more later on?

A There is that possibility, yes; however, what I meant by that was that if an operator was circulating his cement and found it came 500 feet above that 10,400 stringer, and if for some reason he wanted to go higher in the Wolfcamp zone, he can perforate I believe, he would as a prudent operator, go in there and put up his cement high enough above the uppermost section he contemplates perforating. However, if the Commission should write that in the order, that it must be 500 feet above the top of the upper Wolfcamp, I am sure the operator can do that physically in the well.

MR. NUTTER: I believe that's all.

BY MR. MANKIN:

Q Mr. Rogers, order R-799, which you are seeking revision of here, indicated that the Devonian-Pennsylvanian zone would have pipes set on the bottom, 500 feet above the Pennsylvanian, and permeate two zones?

A Yes, sir.

Q Do you still recommend that?

A I think that the important thing there is to have the cement from the bottom of the oil stem come up high enough to protect the upper formations and whether you had an open hole in the Devonian below the oil formation I don't think is important; I think it would be satisfactory if the order were to indicate that the open hole in addition to the perforation could be utilized in the Devonian.

Q Then it is your recommendation that possibly the order should have an additional provision for administrative approval if the open hole completion was necessary, that it could be granted administratively rather than in another hearing?

A Yes, sir, I think that would certainly take care of it.

BY MR. RUSSELL COUCH:

Q Mr. Rogers, I was interested in your statement that Ohio Oil Company's Ohio Dean could be added to the 40 acres to the east and Sinclair would be willing to negotiate with us on the pooling of our 40 acres to the east. I take it that you have no objection to the recognition of the Ohio Oil Company's exception to the spacing pattern insofar as what has been completed?

A No, sir. I believe that the application stated that the wells already completed previous to the order would be exceptions.

Q And Ohio was in that category? A Yes, sir.

MR. COUCH: Thank you.

MR. PORTER: Any other questions of this witness? If not, the witness will be excused.

MR. HARBEN: I would like to offer the exhibits identified by Mr. Rogers, exhibits 6, 7, 8, 9, 10, 11 and 12.

MR. PORTER: Without objection they will be received.

(RECESS.)

MR. PORTER: The meeting will come to order, please. Does anyone have anything further in this case?

MR. HARBEN: I would like at this time to offer in evidence the testimony which was given on February 15, 1956, in case 1016. That was the dual completion hearing which was had on that date and pursuant to such hearing, Order R-799 was issued on April 27, 1956, and I would like that testimony to be made a part of the record in this case.

MR. PORTER: Without any objection, it will be made a part of the record.

MR. HARBEN: That is all we have—I would like to make a short statement before the Commission.

MR. PORTER: Does anyone else have a statement?

MR. COUCH: Mr. Couch for Ohio Oil Company. The AC Dean No. 1 was drilled at the time this application was filed and, as shown by our application filed January, 1956, the well was projected to test the Pennsylvanian and Devonian formations. Now it

is drilled approximately 13,000 feet and located 660 feet from the west line and 990 from the north line of Section 35, township 15 south range 6 east. It is the opinion of the Ohio Oil Company that this should be recognized as an exception to any 80-acre spacing put into effect for the Dean-Pennsylvanian pool as it now exists or hereafter may be enlarged, and the well should be granted the same allowable as under the rules for 40-acre pattern and the depth at which a well is dually completed. And we request that this be considered in any order entered in this case.

MR. GRADY: Mr. Robert Grady of Columbian Carbon Company. We have a working interest in the Dean field and concur with Sinclair's recommendation.

MR. TOMLINSON: W. T. TOMLINSON for the Atlantic Refining Company. We operate one well in the Dean-Pennsylvanian pool. In the beginning of the development of the Dean pool, Atlantic delayed drilling of its well hoping that 80-acre spacing would be the spacing adopted. We continue our support of 80-acre spacing by concurring in Sinclair's application for it in this instance.

MR. PORTER: Thank you, Mr. Tomlinson.

MR. WALKER: Don Walker, representing Gulf Oil. We have no operations in the area at the time; however, we have leases which we expect may be productive in the future and would like to state that we are in accord with the request made in this application.

MR. PORTER: Anyone else?

MR. HARBEN: I would like to make a brief statement, if I may. If the Commission please, Sinclair and other operators

, in

were justified in asking the Commission to grant the orders which we have asked for in our application. We have a situation here. Where we have a small stringer or zone 11 feet in thickness, I believe, in the Wolfcamp. It has been testified to that there are approximately 364 barrels per acre recoverable oil from the presently known zone of the Wolfcamp formation which will probably produce oil. We believe that because of the economics involved, that the Commission should enter an order combining the Wolfcamp formation with the Dean-Pennsylvanian formation and designating it as the Permo-Dean-Pennsylvanian pool. Otherwise it seems to me that if the Wolfcamp formation is left as a separate pool, that the probabilities are that the oil would never be recovered which is now in the Wolfcamp formation because of the economics, no one could afford to drill a well in the Wolfcamp formation in order to recover that small amount of oil. I believe the exhibit will show the Devonian formation does not cover the entire area covered by the Pennsylvanian Pool, and therefore, as to some of the Pennsylvanian formation and the Wolfcamp formation, there would be no possibility of a recovery of that by perforating Devonian wells, and in order to prevent waste, to protect correlative rights, and as a measure to further conservation, in order that the oil may be recovered from the Wolfcamp formation, we believe that the Commission should enter an order combining the Wolfcamp and the Dean-Pennsylvanian pools and designating it as the Dean-Permo—Pennsylvanian pool, and that the dual completion order be amended so as to permit dual completion in the Devonian and Dean-Permo-Pennsylvanian pool. We also believe we are justified

in asking for 80-acre spacing, for it is obvious that the economics do not permit the drilling of a well on every 40 acres to recover in the Pennsylvanian and Wolfcamp formations, and our Mr. Rogers testified that as much oil can be recovered by drilling one well to every 80 acres as can be recovered by drilling one to every 40 acres. We believe the unit should be run either north and south or east and west, according to the election of the operator. Thank you.

MR. PORTER: Anyone else have anything in this case? If not, we will take the case under advisement. We will take up next, case No. 1103.

****

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

I, DOROTHY B. MYERS, a Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the Oil Conservation Commission for the State of New Mexico, was reported by me in shorthand and reduced to typewritten transcript by me, and that the same is a true and complete record of said proceedings, to the best of my knowledge, skill and ability.

WITNESS my hand and seal this 9th day of August, 1956.

Dorothy B. Myers
COURT REPORTER

SUNRAY MID-CONTINENT OIL COMPANY
P O BOX 2039
TULSA 2, OKLAHOMA

R. L. BOSS, V CE PRESIDENT
C. J. KERWIN, SUPERINTENDENT
PRODUCTION DIVISION
R. V. GRIFFITH, GENERAL MANAGER
GAS GASOLINE DIVISION

J. M. DOUMA, MANAGER
PRODUCTION OPERATIONS DIV S C N
H. S. PATTON, JR. MANAGER
ENGINEERING DIVISION

PRODUCTION DEPARTMENT

July 10, 1956

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

Gentlemen:

Enclosed herewith please find six copies of the following applications of Sunray Mid-Continent Oil Company:

(1) Application for establishing the Lane ~~Lower~~ Wolfcamp Field and drilling units for the ~~Lower~~ Wolfcamp, source of supply underlying SE/4 of Sec. 26; S/2 of Sec. 25; The #/2 of Sec. 35; All of Sec. 36-T9S-R33E; SW 30 and W/2 31-T9S-R34E; E/2 of Sec. 2, All of Sec. 1; NE/4 of Sec. 11; The N/2 of Sec. 12-T10S-R33E, W/2 of Sec. 6 and NW/4 of Sec. 7-T10S-R34E, Lea County, New Mexico.

(2) Application for establishing the Lane Cisco Field and drilling units for the Cisco, source of supply underlying SE/4 of Sec. 26; S/2 of Sec. 25; The E/2 of Sec. 35; All of Sec. 36-T9S-R33E; SW 30 and W/2 31-T9S-R34E; E/2 of Sec. 2, All of Sec. 1; NE/4 of Sec. 11; The N/2 of Sec. 12-T10S-R33E, W/2 of Sec. 6 and NW/4 of Sec. 7-T10S-R34E, Lea County, New Mexico.

(3) Application requesting permission for dual completion of wells in the Lower Wolfcamp common source of supply and the Cisco common source of supply underlying the area described above.

It is requested that these three applications be set for hearing on the August 15 docket before the Oil Conservation Commission.

Very truly yours,

SUNRAY MID-CONTINENT OIL COMPANY

John D. Gassett

John D. Gassett

JDG:ldh
Att'ms.

BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF SUNRAY MID-CONTINENT OIL COMPANY FOR AN ORDER ESTABLISHING THE LANE ~~LOWER~~ WOLFCAMP FIELD AND UNIFORM DRILLING AND SPACING UNITS FOR THE FURTHER DEVELOPMENT OF THE ~~LOWER~~ WOLFCAMP, COMMON SOURCE OF SUPPLY UNDERLYING SE/4 OF SEC. 26; S/2 OF SEC. 25; THE E/2 OF SEC. 35; ALL OF SEC. 36-T9S-R33E; SW 30 AND W/2 31-T9S-R34E; E/2 OF SEC. 2, ALL OF SEC. 1; NE/4 OF SEC. 11; THE N/2 OF SEC. 12-T10S-R33E, W/2 OF SEC. 6 AND NW/4 OF SEC. 7-T10S-R34E, LEA 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 Sunray Mid-Continent Oil Company and respectfully alleges as follows:

1. That the Applicant is the operator and owner of oil and gas leases within the following described area: Southeast Quarter of Section 26; South half of Section 25; the East half of Section 35; all of Section 36 in Township 9 South, Range 33 East; Southwest 30 and West half 31, Township 9 South, Range 34 East, the East half of Section 2, all of Section 1; the Northeast Quarter of Section 11; and North half of Section 12 in Township 10 South, Range 33 East; the West half of Section 6 and Northwest Quarter of Section 7, Township 10 South, Range 34 East, Lea County, New Mexico.

2. That Applicant has drilled thereon several wells penetrating the ~~Lower~~ Wolfcamp Formation, and that its State "F" No. 1 located in the Southeast of the Northwest of Section 1, Township 10 South, Range 33 East, is now producing oil and gas from said Lower Wolfcamp Formation. The productive portion of which is found in this well between the depth of 9644 feet to 9656 feet.

3. That Applicant believes that the ~~Lower~~ Wolfcamp Formation underlies the area described above, and is found at between the approximate depth of 9600 feet and 9750 feet; that it should be designated as the Lane Lower Wolfcamp Field.

4. That in the interest of preventing waste of oil and gas, eliminating the drilling of unnecessary wells, recovering the greatest amount of oil and gas, and protecting the correlative rights in the common source of supply, 80 acre drilling and spacing units should be formed for the production of oil and gas therefrom.

5. That Applicant suggests that a uniform drilling and spacing pattern may be achieved by dividing each governmental quarter section into 2 rectangular units by a line running North and South through the center thereof and that the permitted wells should be located with one in the center of the Northwest 40 acres of each quarter section and one in the center of the Southeast 40 acres of each quarter section; that tolerance of 150 feet on a line through the permitted location and only toward the center of the units should be allowed where surface conditions and obstructions make it undually hazardous and expensive to drill at the permitted locations.

6. That attached hereto and made a part hereof is a plat of the area sought to be spaced.

7. That a well location exception should be granted to all wells drilled or actually drilling at the time of the filing of this application and not located on the location prescribed by the Conservation Commission in any order pursuant to this application.

8. That a copy of this application was sent by registered mail, to the following:

Intex Oil Company, 717 Meadows Building, Dallas, Texas
Sinclair Oil & Gas Company, Box 521, Tulsa, Oklahoma
Aztec Oil & Gas Company, 920 Mercantile Securities Bldg., Dallas 1, Texas
Delhi-Taylor Oil Corporation, Oregon Tower Building, Dallas 1, Texas
Humble Oil & Refining Company, Box 1600, Midland, Texas
Skelly Oil Company, Box 1650, Tulsa, Oklahoma
Seaboard Oil Company, 1400 Continental Building, Dallas, Texas
Lion Oil Company, Lion Building, El Dorado, Arkansas

Midstates Oil Corporation, 7th Fl., Midstates Building, Tulsa, Oklahoma
Phillips Petroleum Company, Phillips Building, Bartlesville, Oklahoma
Cities Service Oil Company, Cities Service Building, Bartlesville, Oklahoma
The Texas Company, Box 1720, Ft. Worth, Texas
British-American Oil Producing Company, Box 749, Corrigan Tower Bldg., Dallas, Texas
J. F. Danglade, Lovington, New Mexico
J. E. Simmons, Lovington, New Mexico
Honolulu Oil Corporation, 204 West Illinois, Midland, Texas
Gulf Oil Corporation, Box 1290, Ft. Worth, Texas
Union Oil Company of California, 200 Union Oil Building, Midland, Texas

who are all of the parties interested in this application so far as is known to this Applicant.

WHEREFORE Applicant prays that this application be set for hearing, that notice thereof be given according to law and that upon hearing of said application, an order be entered herein establishing the Lane Lower Wolfcamp Field, and 80 acre drilling and spacing units for the development of and production of oil and gas from the Lower Wolfcamp, common source of supply, herein above described and for such other order as the Commission may deem proper.

Dated at Tulsa, Oklahoma this the 10th day of July, 1956.

SUNRAY MID-CONTINENT OIL COMPANY

By John D. Gassett
John D. Gassett, Attorney

By Burns H. Errebo
Burns H. Errebo, Attorney

CLASS OF SERVICE
This is a fast message unless its deferred character is indicated by the proper symbol.

WESTERN UNION
TELEGRAM

W. P. MARSHALL, PRESIDENT

1201

SYMBOLS
DL=Day Letter
NL=Night Letter
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MAIN OFFICE OCC

P LA 119 KB142 1955 JUL 24 AM 11 28 (20)

1955 JUL 24 AM 11:24

K TUA331 PD=FAX TULSA OKLA 24 1207PMC=

WARREN MANKIN, NEW MEXICO OIL CONSERVATION COMMISSION=

125 MABRY HALL CAPITOL BLDG TELEP ONE 3-7376 SANTA FE NNEX=

CONFIRMING YOUR TELEP ONE CONVERSATION WITH OUR MR. KELLOGG WE AGREE TO YOUR IDENTIFYING THE ZONES INVOLVED IN OUR APPLICATIONS FOR LANE FIELD AS WOLFCAMP AND PENNSYLVANIAN OIL RESPECTIVELY. WE HAVE NO OBJECTION TO YOUR CONSOLIDATING OUR APPLICATION FOR PURPOSES OF GIVING NOTICE=

SUNRAY MIDCONTINENT OIL CO BURNS H ERREBO=

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

DEAN PENNSYLVANIAN POOL
PRODUCTION DATA (BBLS. & MCF)

Operator Lease & Well No.		1955 Dec.	1956 Jan.	Feb.	Mar.	Apr.	May	Per Well Totals
Sinclair State 739 #1	Oil	1941	7215	6759	7248	7090	6886	37139
	Gas	1544	12246	12185	12800	11970	11886	62631
	Wtr.	45	316	200	220	200	217	1198
Humble State "AJ" #1	Oil	1213	6906	6552	6759	6810	6882	35122
	Gas	20771	11830	11217	11592	11679	11803	78892
Magnolia Anderson Est. #1	Oil		7341	8013	8166	6866	6185	36571
	Gas		11342	11715	11939	30569	24096	89661
	Wtr.					60	62	122
Sinclair State 758 #1	Oil		933	6653	7216	7018	6877	28697
	Gas		1683	12600	12726	12130	11960	51099
Atlantic Federal Dow #1	Oil			6313	9426	9001	8757	33497
	Gas			7670	12508	11710	12093	43981
	Wtr.			13	19	9	9	50
Humble State "AJ" #2	Oil				2330	6789	6845	15964
	Gas				4210	12268	12369	28847
Magnolia Barbara Owens #1	Oil						3526	3526
	Gas						5060	5060
Tide Water State "AE" #1	Oil							Not Comp.
	Gas							
Humble State "AP" #1	Oil							Not Comp.
	Gas							
Monthly Field Totals	Oil	3154	22395	34290	41145	43574	45958	190516
	Gas	22315	37101	55387	65775	90326	89267	360171
	Wtr.	45	316	213	239	269	288	1370

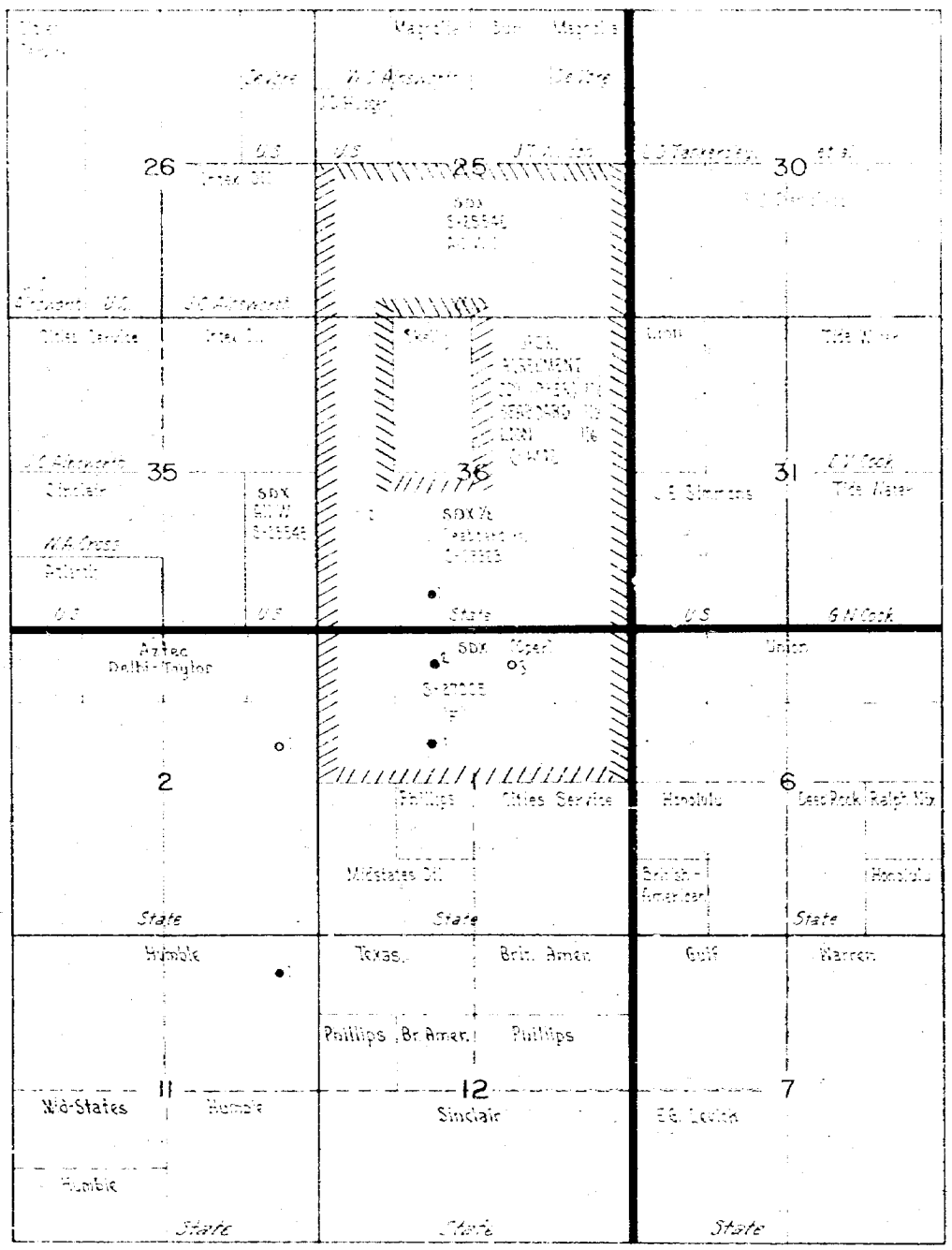
BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
SINCLAIR EXHIBIT No. 12
CASE 1102

R-33-E

R-34-E

T 9 S

T 10 S



PRODUCING FORMATION	SUNRAY OIL CORPORATION	PRODUCING LEASES
NAME — AVERAGE DEPTH	FIELD LANE	STATE "F"
	DISTRICT N & W TEXAS GROUP TATUM	
	COUNTY LEA STATE N. MEXICO	
	SCALE	
	3000 1500 0 1500 3000 6000	
	P.E.L.	

RCM CORE ANALYSIS LTD.

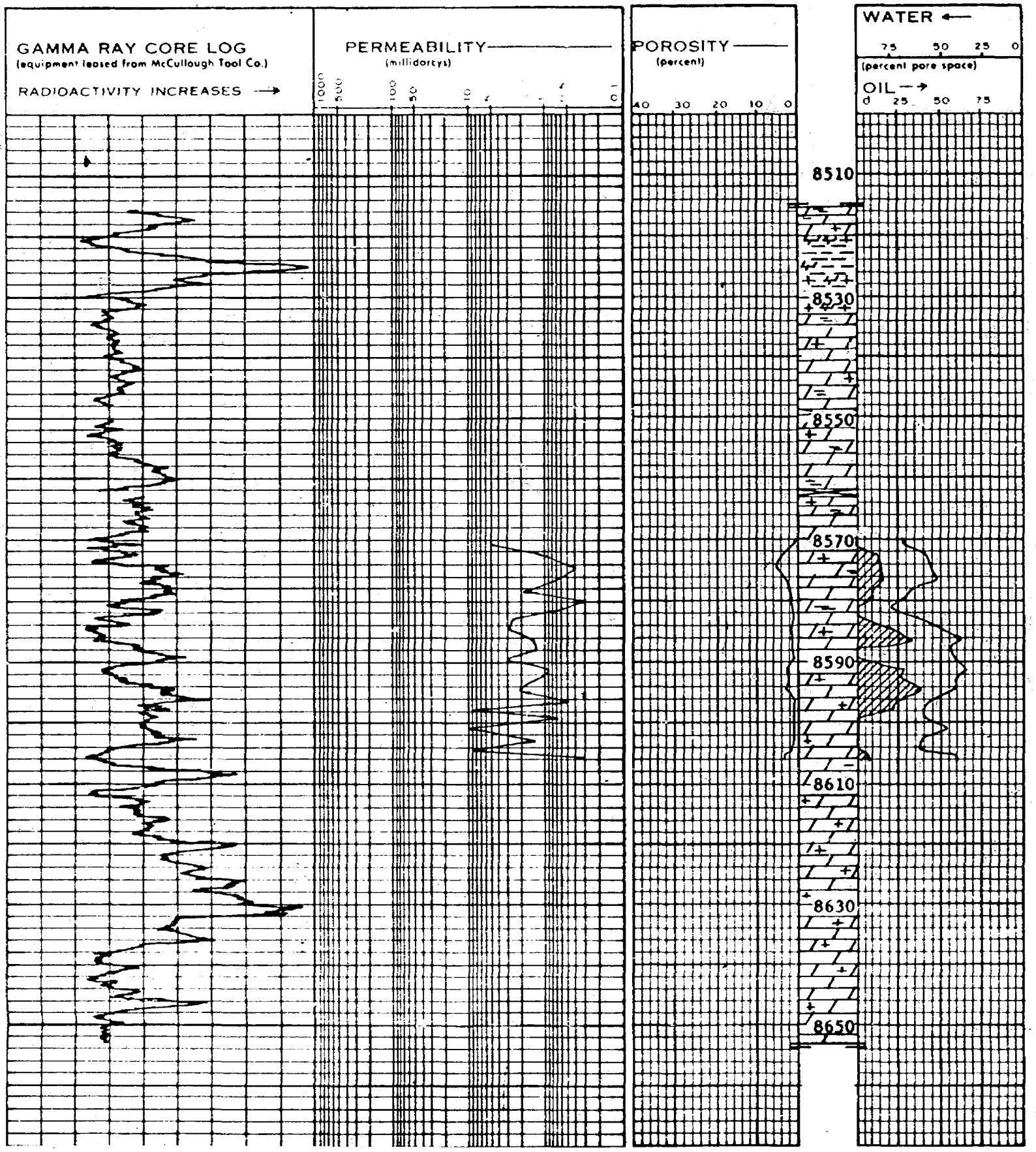
ABILENE, TEXAS — MONAHANS, TEXAS — HOBBS, NEW MEXICO
OKLAHOMA CITY, OKLAHOMA — MIDLAND, TEXAS

REPORT OF CORE ANALYSIS

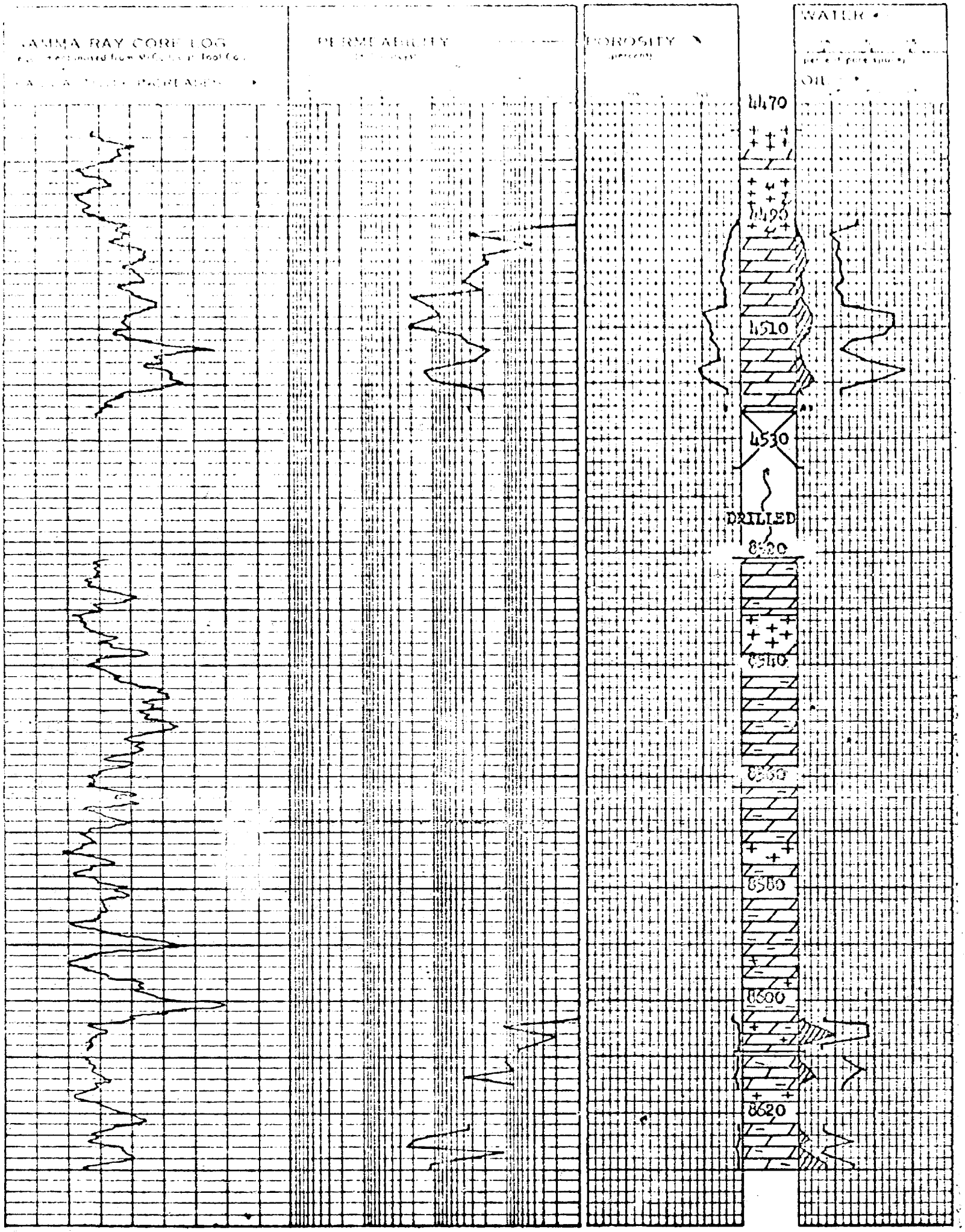
COMPANY Coastal States Gas Producing Company
FEE Skelly State WELL NO 1
FIELD Undesignated
LOCATION 1978' FNL & 1993' FWL, Sec.21, T9S, R33E
COUNTY Lea STATE New Mexico

ELEVATION 4376' KB
DRILLING FLUID Salt Water Base Mud/Oil Added
FORMATION Abo
TYPE OF CORE Diamond 3-1/2"
ANALYST JC,AB,BL SERVICE "C"
LAB NO H-498 DATE 10/19/63

GRAPHICAL PRESENTATION OF RESULTS



GRAPHICAL PRESENTATION OF RESULTS



COMPANY [illegible] FILE NO [illegible]
WELL [illegible] 1-15 DATE 1-2-64 ENGRS [illegible]
FIELD [illegible] "H" ABO FORMATION ABO ELEV 4375' KB
COUNTY LEA STATE [illegible] DRLG FLD WATER BASE MUD CORES DIAMOND 3 1/2"
LOCATION [illegible] REMARKS SAMPLED AS DIRECTED BY CLIENT

COMPLETION COREGRAPH

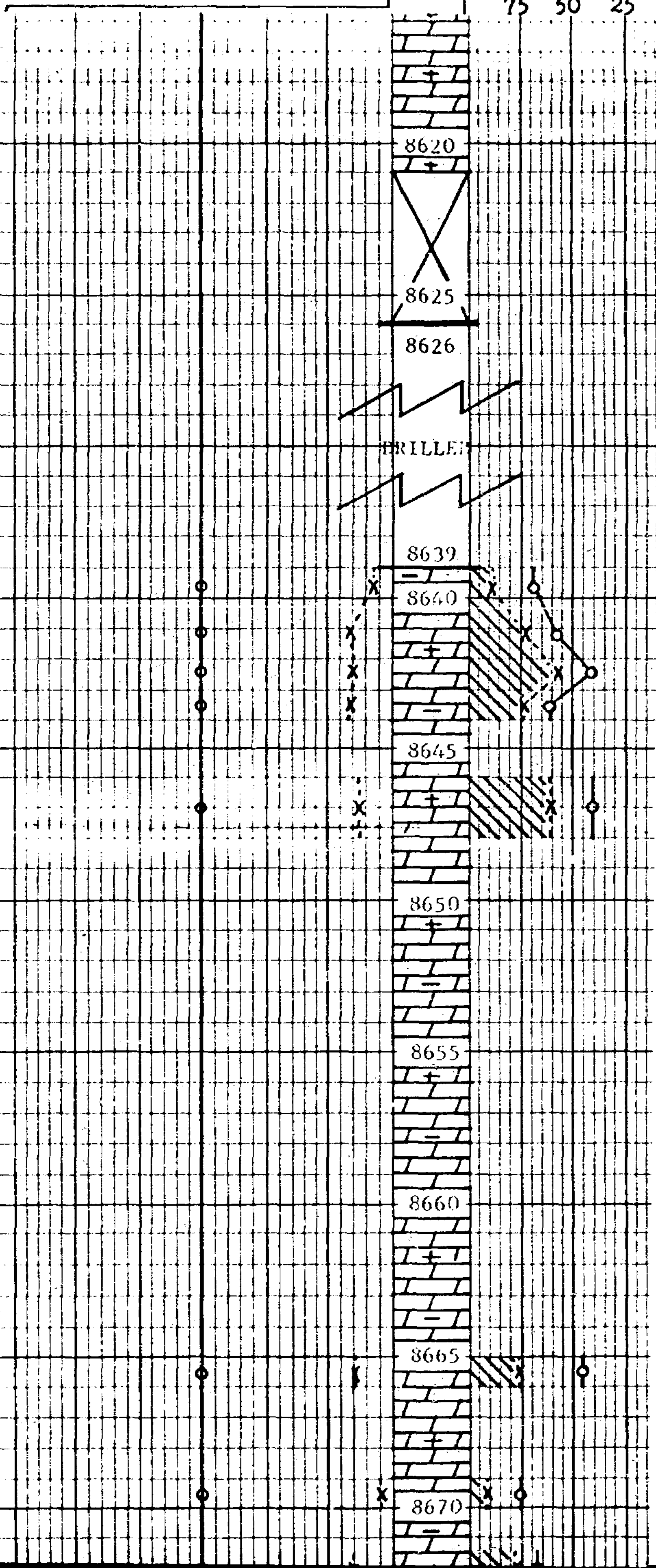
SAND | LIMESTONE | CONGLOMERATE | CHERT | ANHYDRITE
SHALE | DOLOMITE | OOLITES

SAMPLE CHARACTERISTICS
F: Fractured L: Laminated FG; MG; CG Type Grain Size S Stylolitic V: Vuggy

PROBABLE PRODUCTION
O: Oil W: Water G: Gas T: Transitional

TOTAL WATER O—O
PERCENT PORE SPACE
75 50 25

1	8639.0-40.3	<0.1	<0.1	1.4	11.8	68.1	
2	8640.3-41.9	<0.1	<0.1	3.1	27.0	57.5	F
3	41.9-42.9	<0.1	<0.1	3.0	43.2	40.9	F
4	42.9-44.0	<0.1	<0.1	3.1	26.0	61.7	
5	8646.0-48.0	<0.1	<0.1	2.5	33.0	40.2	F
6	8665.0-66.0	<0.1	<0.1	2.9	24.1	45.5	
7	8669.0-70.0	<0.1	<0.1	0.9	8.8	75.8	
[illegible]	[illegible]	<0.1	<0.1	2.0	[illegible]	67.3	



HAROLD L WILLIAMS

PALEONTOLOGICAL LABORATORY
R. V. HOLLINGSWORTH
BOX 51 PHONE 2-4521
MIDLAND, TEXAS

REPORT
January 15, 1956

LEA COUNTY, NEW MEXICO

Sunray Mid-Continent Oil Company
New Mexico-State No. 1-F Elev: 4262 DF
Sec. 1, T 10 S, R 33 E
1983.3 FNL & 1980 FWL of sec.
Comp: 12-10-55 TD: 12,637 PB: 9693 Producer

Summary and Suggested "Markers"

8860: Top Wolfcamp limestone, by lithology
8860-9680: Wolfcamp fusulines
8860-9450: Hueco types
8860-9120: Upper Hueco types
9580-9680: Bursum types
9747: Top Cisco series, by lithology
9750-10,190: Cisco fusulines
9750-9765: Lower Thrifty types
9767-10,190: Graham types
10,220: Top Canyon series, by lithology
10,220-10,410: Canyon fusulines
10,540: Top Strawn series, by lithology
10,550-11,100: Strawn fusulines
10,580-11,100: Lower Strawn types
11,100: Top Atoka series, by lithology
11,170-11,490: Atoka fusulines
By lithology only:
11,570: Top Morrow(?) series
11,865: Base Morrow(?) series
11,865: Top Mississippian limestone
12,360: Top "Kinderhook" zone
12,530: Top Woodford shale
12,600: Top Fusselman dolomite
12,637 TD: In Fusselman dolomite

Samples examined from 8600 to 12,637 feet, total depth.
Two sets of samples were examined from 11,300 to 11,865 feet.
Core cuts by courtesy of the Lion Oil Company.
¢ - Denotes core cuts.

Detailed Report

8600-8860: No fossils found

8860: Suggested top Wolfcamp limestone, by lithology

Lea County - Sunray Mid-Continent Oil, New Mexico-State No. 1-F

8860-9680: Wolfcamp fusulines
8860-9450: Hueco types
8860-9120: Upper Hueco types
8860-8950: Schwagerina - upper Hueco types
Schubertella @ 8890-8900 & 8930-50
Triticites @ 8890-8900
9040-9050: Schubertella; Schwagerina
9090-9100: Schwagerina
9110-9120: Schubertella; Schwagerina - upper Hueco types
9130-9140: Schwagerina - nondescript Hueco types
9150-9160: Schwagerina; Triticites
9210-9240: Schwagerina
9320-9330: Schwagerina
9390-9400: Triticites
9440-9450: Triticites - nondescript Hueco types
9460-9470: Triticites - nondescript Wolfcamp types
9500-9520: Schwagerina; Triticites
9530-9540: Oketaella; Schwagerina
9540-9570: Triticites - nondescript Wolfcamp types
9580-9680: Bursum types
9580-9620: Schwagerina; Triticites - nondescript Bursum types
9630-9680: Triticites - nondescript Bursum types

9680-9750: No usable fossils found

¢9747: Suggested top Cisco series, by lithology

9750-10,190: Virgil (Cisco) fusulines
9750-9765: Lower Thrifty types
¢9750-9761: Triticites - lower Thrifty types
¢9761-9765: Dunbarinella - lower Thrifty types
9767-10,190: Graham types
¢9767-9776: Triticites cf. Wayland types
9780-9790: Triticites - nondescript Graham types
9880-9970: Triticites
9970-9990: Dunbarinella; Triticites
10,010-10,100: Triticites
10,140-10,190: Triticites - nondescript Graham types

10,190-10,220: No usable fossils found

10,220: Suggested top Canyon series, by lithology

10,220-10,410: Missouri (Canyon) fusulines
10,220-10,230: Triticites - nondescript Canyon types
10,270-10,280: Triticites
10,360-10,370: Triticites
10,400-10,410: Triticites - nondescript Canyon types

10,410-10,550: No fossils found

Lea County - Sunray Mid-Continent Oil, New Mexico-State No. 1-F

10,540: Suggested top Strawn series, by lithology

10,550-11,100: Des Moines (Strawn) fusulines
10,550-10,560: Fusulina - nondescript Strawn types
10,580-11,100: Lower Strawn types
10,580-10,590: Fusulina - lower Strawn types
10,690-10,710: Fusulina
10,720-10,730: Fusulina; "Fusulinella-Fusulina"
10,780-10,810: Fusulina
10,820-10,830: Fusulina; Wedekindellina
10,860-10,870: Fusulina
10,940-10,950: Wedekindellina
10,960-10,970: "Fusulinella-Fusulina"; Wedekindellina
11,010-11,030: Eoschubertella; Fusulina
11,080-11,100: Eoschubertella; Fusulina - lower Strawn types

11,100: Suggested top Atoka series, by lithology

11,100-11,170: Few unusable fusuline fragments

11,170-11,490: Atoka fusulines
11,170-11,180: Fusulinella - Atoka in age
11,180-11,200: Eoschubertella
11,230-11,260: Fusulinella
11,320-11,330: Fusulinella
11,410-11,420: Fusulinella
11,480-11,490: Fusulinella - Atoka in age

11,490-12,637 TD: Fossils only as noted below.

11,570: Suggested top Morrow(?) series, by lithology
11,865: Suggested base Morrow(?) series, by lithology

11,865-12,530: Mississippian limestone
11,865-11,900: Limestone, very pale orange to grayish orange very fine to fine paurograined, slightly oolitic, with little white dull opaque chert included.
11,900-11,920: Oolitic limestone, grayish orange to pale yellowish brown micrograined to very fine paurograined, with little very light gray dull opaque chert included.
11,920-11,950: Oolitic limestone, yellowish gray to pale yellowish brown very fine paurograined, "silty"-textured, finely oolitic, with little chert as above included.
11,950-11,970: Oolitic limestone, very pale orange to grayish orange very fine paurograined, with little light brownish gray to medium gray dull to subvitreous translucent to opaque chert.
11,970-12,000: Cherty limestone, very pale orange to moderate yellowish brown micrograined to very fine paurograined, with some white to very light gray dull opaque chert included.

Lea County - Sunray Mid-Continent Oil, New Mexico-State No. 1-F

11,865-12,530: Mississippian limestone.....(Con't.)
12,000-12,140: Limestone, very pale orange to grayish orange micrograined to very fine paurograined, with little bluish white to very light gray dull to subvitreous translucent to opaque chert.
Thin interbeds of yellowish gray very fine paurograined "silty"-textured limestone in 12,030-140.
12,140-12,240: Argillaceous limestone, pale yellowish brown to moderate brown very fine to fine paurograined, slightly siliceous, with little very light gray to pale yellowish brown dull opaque chert included.
12,240-12,360: Argillaceous limestone, dark to dusky yellowish brown micrograined to very fine paurograined, slightly siliceous, with little light gray, gray-speckled, dull to subvitreous translucent to opaque chert included.
12,360-12,450: Argillaceous limestone, light olive gray to greenish gray micrograined to very fine paurograined, with streaks of light gray to light greenish gray soft platy slightly calcareous shale included.
12,450-12,490: Silt, yellowish gray to light gray fine- to medium-grained, slightly calcareous, with streaks of shale as above.
12,490-12,530: Silt, yellowish gray to pale yellowish brown fine- to medium-grained, very slightly calcareous, with streaks of shale as above included.
Correlation and Age: Based on lithology, stratigraphic position, and regional correlations. Strata from 12,360 to 12,530 feet are lithologically Kinderhook-like.

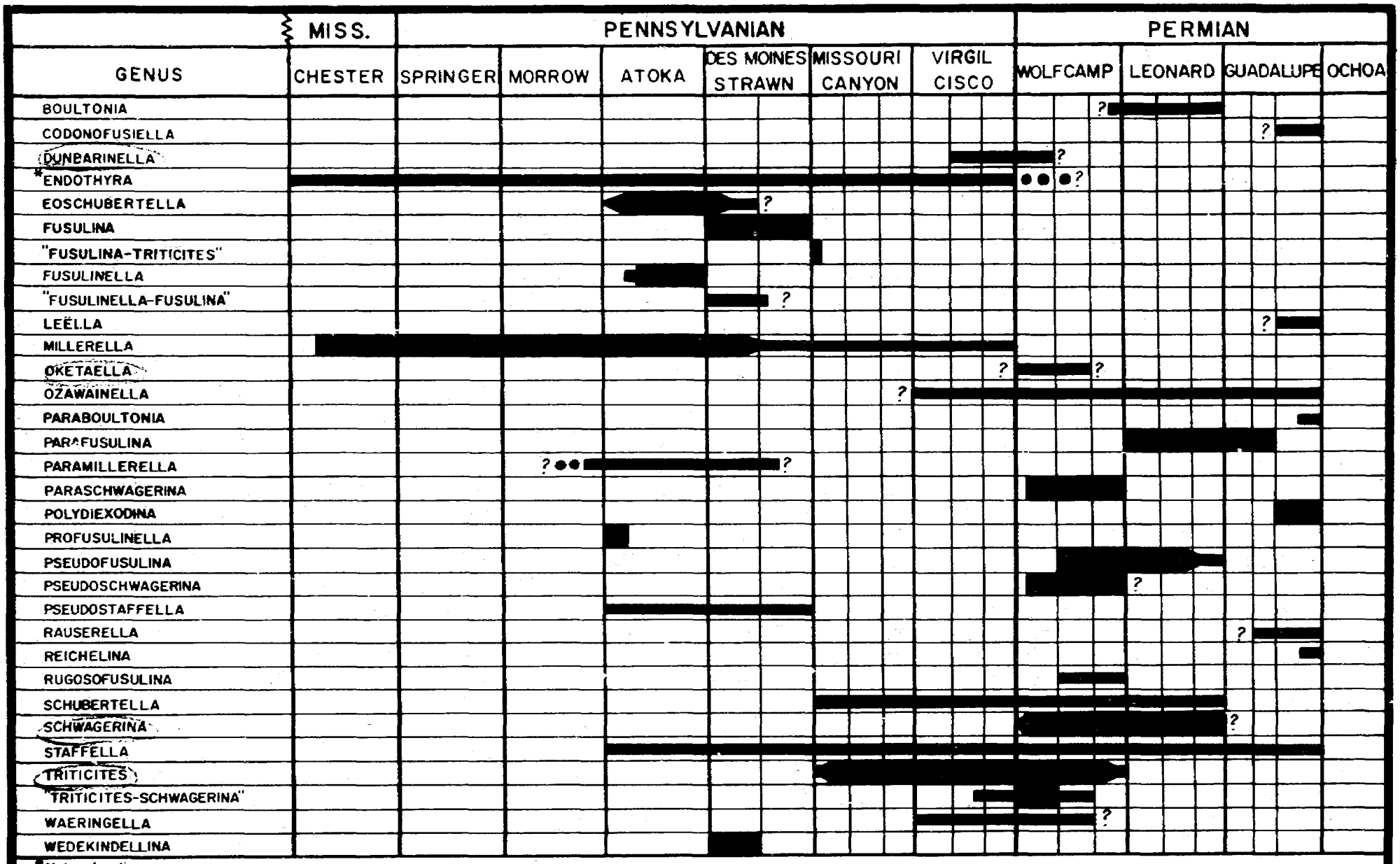
12,530-12,600: Woodford shale.....Mississippian(?)
12,530-12,600: Shale, dusky brown to brownish black, non-calcareous, with few black resinous fine-sized spores & little dark brown dull opaque chert included.
Streaks of very pale orange fine-grained silt in 12,580-600.
Correlation and Age: Based on lithology, presence of spores, stratigraphic position, and regional correlations.

12,600-12,637 TD: Fusselman dolomite.....Silurian
12,600-12,637 TD: Dolomite, white to very light gray fine paurograined to very fine mesograined, rhombic, with little light gray to light bluish gray dull to vitreous translucent to opaque chert included.
Correlation and Age: Based on lithology, stratigraphic position, and regional correlations.

Samples examined from 8600 to 12,637 feet, total depth.
Two sets of samples were examined from 11,300 to 11,865 feet.
Core cuts by courtesy of the Lion Oil Company.

R. V. HOLLINGSWORTH

RVH:emk



*Not a fusuline

FUSULINE RANGE CHART

ABBREVIATED —— TENTATIVE

PALEONTOLOGICAL LABORATORY

MIDLAND, TEXAS JULY, 1956

R. V. HOLLINGSWORTH

HAROLD L. WILLIAMS

AVERAGE RESERVOIR CHARACTERISTICS
LANE FIELD, LEA COUNTY, NEW MEXICO

	WOLFCAMP	PENNSYLVANIAN
Subsurface Depth, Feet	5,367	-5,546
Porosity, Percent	10.5	4.9
Permeability, Md.	373	8.7
Feet Cored		
N. M. State F-1	---	36
N. M. State F-2	13.7	38
Connate Water, Percent	20%	30%
Oil Gravity, °API	48	49
Original Reservoir Pressure, psia	3,539	3,564
Solution Gas-Oil Ratio, cu.ft./bbl.	1,638	1,638
Bubble Point Pressure, psia	3,405	3,405
Reservoir Temperature, °F	162	163
Formation Volume Factor, Original	1.822	1.820
Cumulative Recovery, 8-1-56	49,489	17,366
Original Stock Tank Oil, bbls./ac.ft.	370	146

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 6
CASE 1125

BEFORE THE
OIL CONSERV. [illegible]
SANTA FE, [illegible]
7
CASE 1125

WELL TEST DATA
LANE FIELD, LEA COUNTY, NEW MEXICO

WOLFCAMP

Operator	Lease	Well No.	Date of Test	Time Tested	Production Water Bbls/Day	Production Oil Bbls/Day	Production Gas MCF/Day	Choke Size	GOR
Sunray Mid-Continent	N. M. State F	1	12-11-55	24 hrs.	0	341	682	14/64	2,000
"	"	1	3-28-56	24 hrs.	0	162	321	8/64	1,980
"	"	1	6- 9-56	6 hrs.	0	203	300	11/64	1,475
"	"	1	7- 1-56	4 hrs.	0	337	420	-	1,245
"	"	1	7-29-56	24 hrs.	0	181.81	238	10/64	1,309
"	"	1	7-28-56	24 hrs.	0	191.59	244	10/64	1,272
"	"	1	7-31-56	24 hrs.	0	174		9/64	1,709
Sunray Mid-Continent	N. M. State I	1	7-14-56	3 hrs.	0	198	337	13/64	1,702
Humble Oil & Refining	N. M. State AM	1	3-31-56	24 hrs.	627	54.1	93	Pump	1,715
"	"	1	4- 8-56	23½ hrs.	403	62.8	134	Pump	2,131
"	"	1	4-20-56	24 hrs.	346	81.2	154	Pump	1,895

PENNSYLVANIAN

Sunray Mid-Continent	N. M. State F	2	4- 9-56	24 hrs.	0	299	478	12/64	1,600
"	"	2	6- 9-56	4 hrs.	0	188	283	-	1,504
"	"	2	7- 1-56	4 hrs.	0	236	338	13/64	1,432
"	"	2	7-27-56	24 hrs.	0	187.33	253	11/64	1,353
"	"	2	7-28-56	24 hrs.	0	179.06	253.8	10/64	1,408
"	"	2	7-31-56	24 hrs.	0	199.72		10/64	1,251
Sunray Mid-Continent	N. M. State I	1	7- 9-56	4½ hrs.	0	345	442	13/64	1,281

BOTTOM HOLE PRESSURE DATA
LANE FIELD, LEA COUNTY, NEW MEXICO

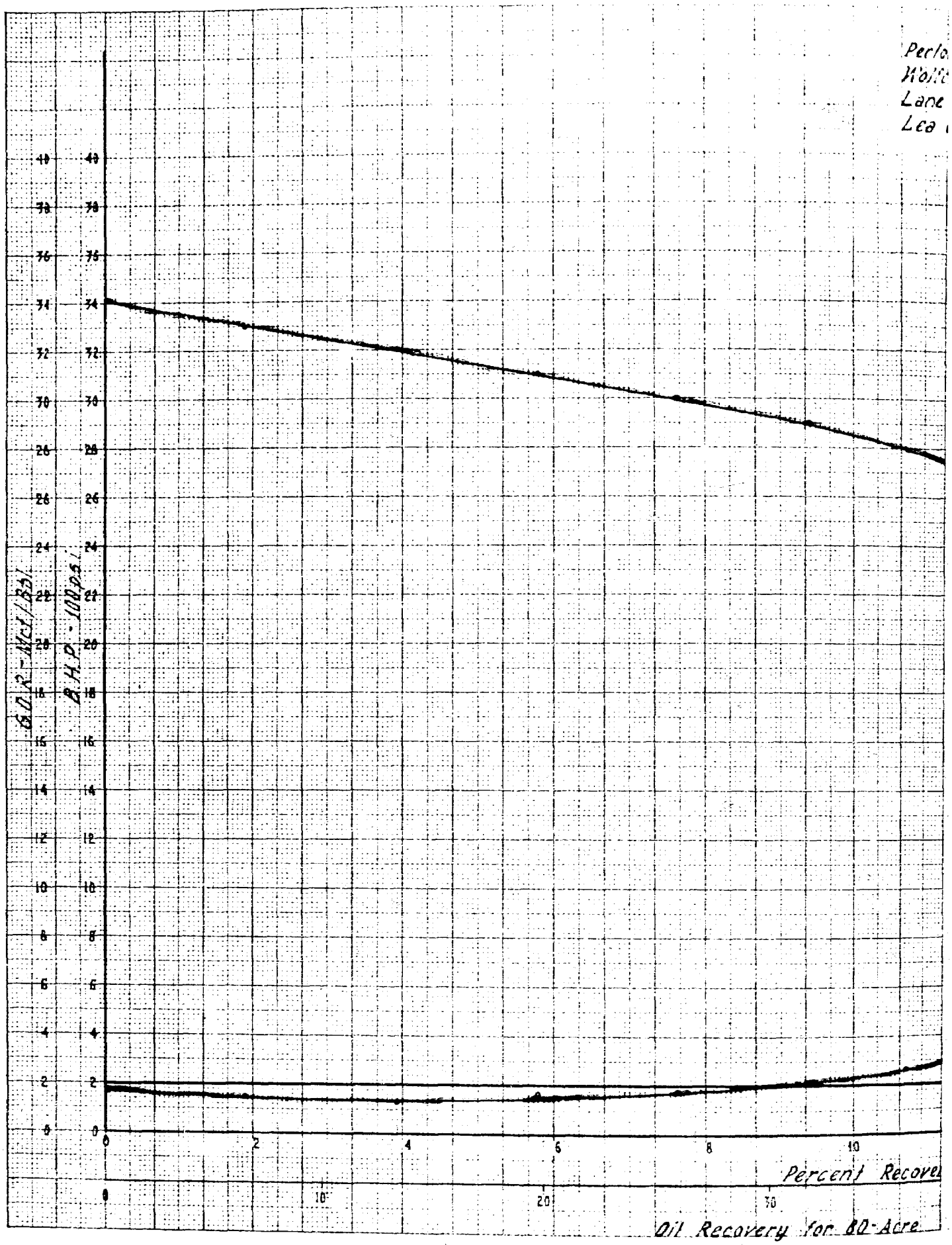
BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 6
CASE 1125

WOLFCAMP

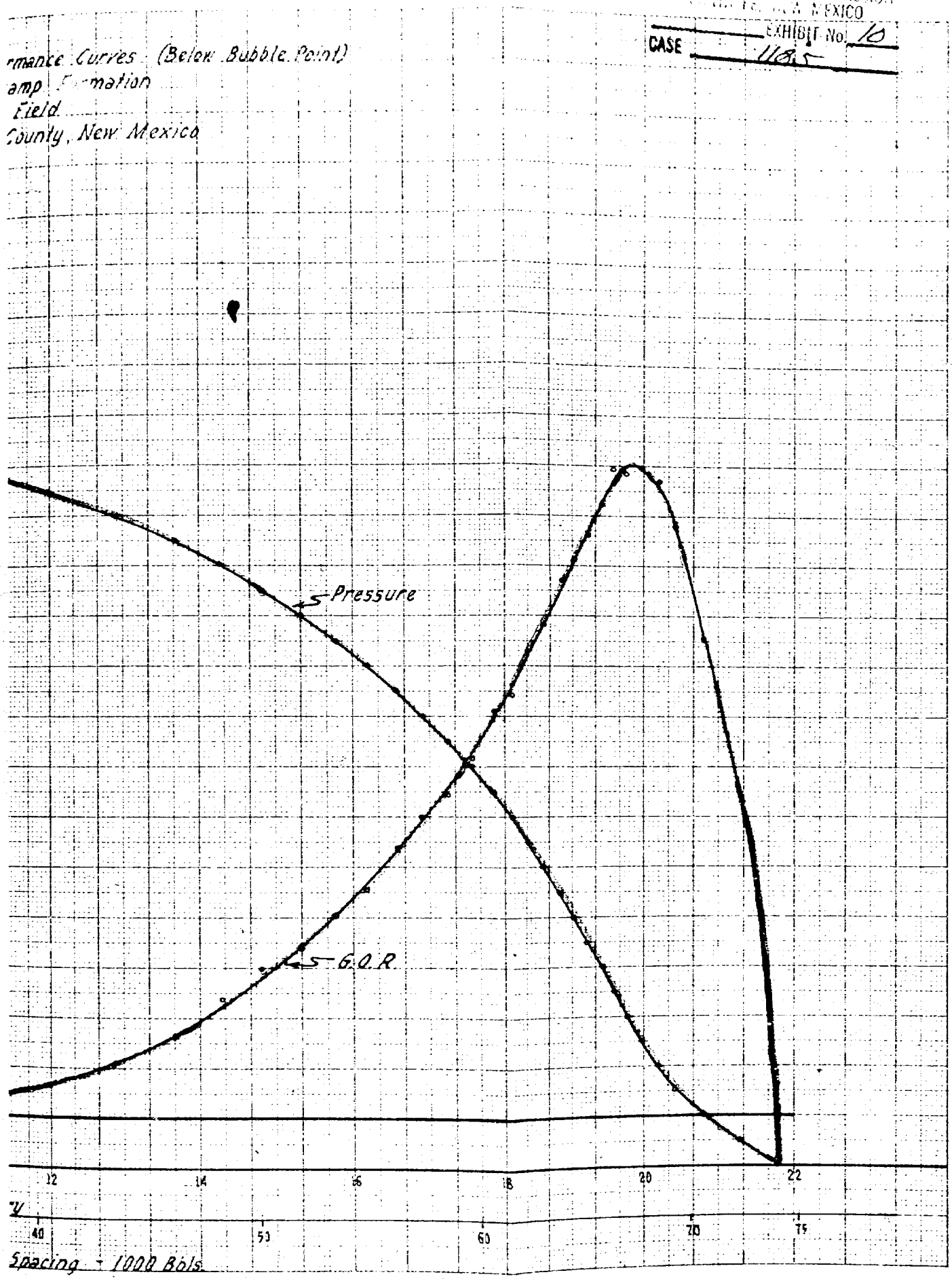
Operator	Lease	Well No.	Test Date	S.I. Time (hrs.)	Datum	BHP @ Datum PSIG
Sunray Mid-Continent	N. M. State F	1	12-31-55	168	-5,387	3,516
"	"	1	1-30-56	168	-5,387	3,512
"	"	1	4-17-56	49½	-5,387	3,487
"	"	1	6- 9-56	48	-5,387	3,479
"	"	1	7- 1-56	144	-5,387	3,479
"	"	1	8- 8-56	48	-5,387	3,514
Sunray Mid-Continent	N. M. State I	1	7-11-56	48	-5,387	3,510
"	"	1	8- 2-56	24	-5,387	3,514
Humble Oil & Refining	N. M. State AM	1	2,25-56	100	-5,387	3,466

PENNSYLVANIAN

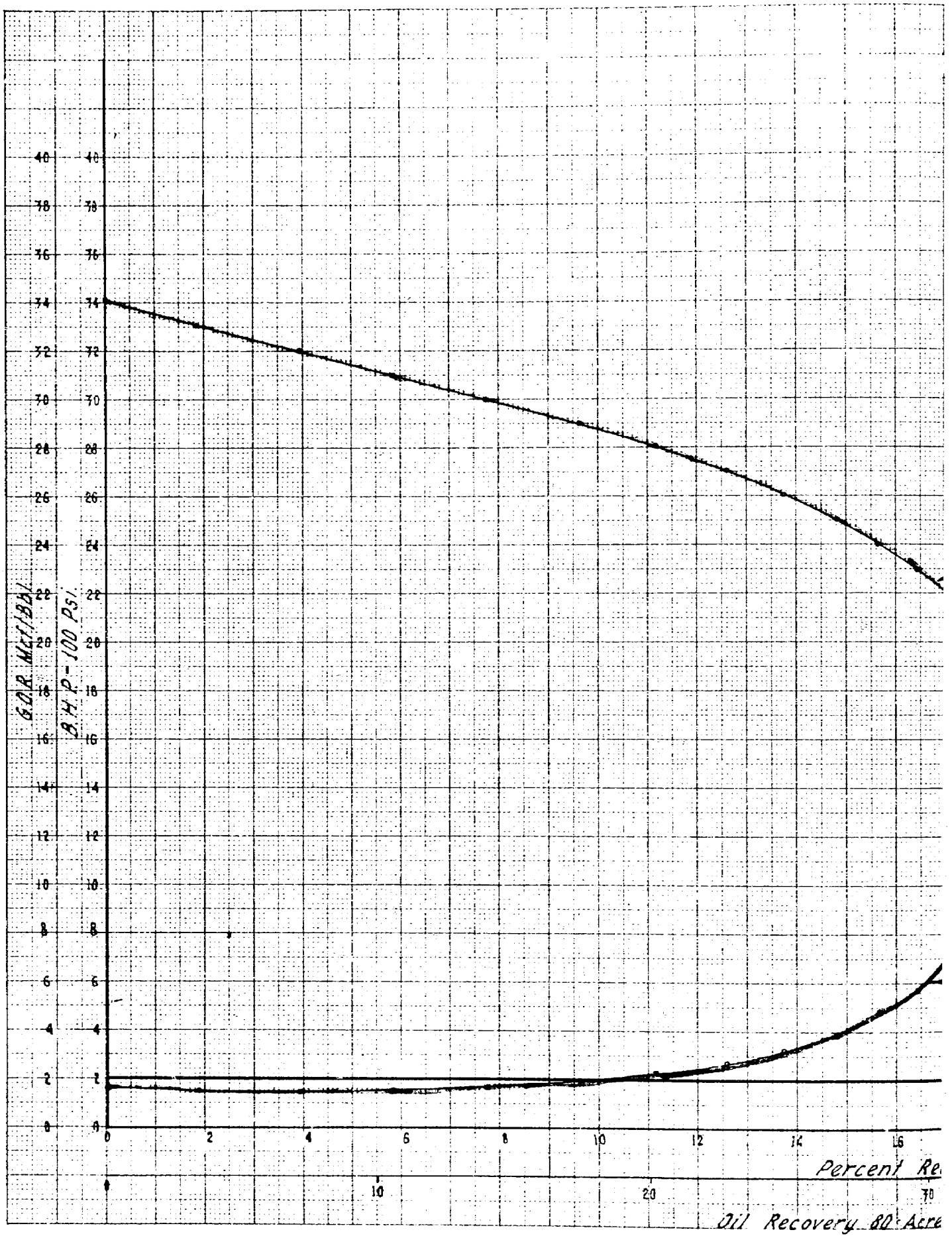
Sunray Mid-Continent	N. M. State F	2	4-17-56	51½	-5,510	3,537
"	"	2	6- 9-56	25¼	-5,510	3,413
"	"	2	7- 1-56	144	-5,510	3,388
"	"	2	8- 8-56	47	-5,510	3,457
Sunray Mid-Continent	N. M. State I	1	7-11-56	48	-5,510	3,382
"	"	1	8- 2-56	24	-5,510	3,347



rmance Curves (Below Bubble Point)
amp Formation
Field
County, New Mexico

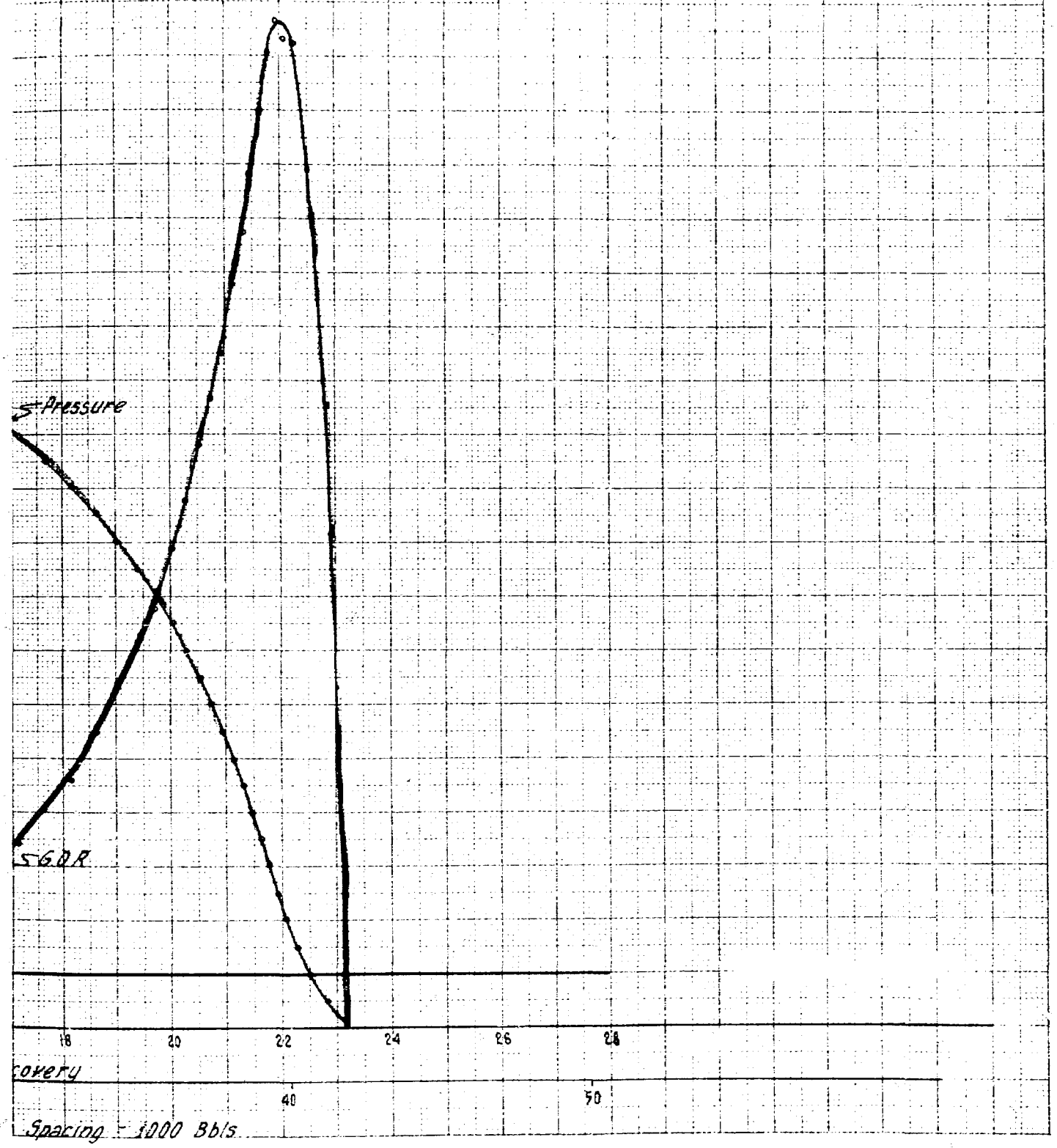


Spacing - 1000 Bbls



BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 11
CASE 1125

Performance Curves (Below Bubble Point)
Pennsylvanian Oil Formation
Lane Field
Lea County, New Mexico



BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT NO. 12
CASE 1125

ECONOMIC STUDY
LANE FIELD, LEA COUNTY, NEW MEXICO

	Wolfcamp	Penn.	Single Completion: Wolfcamp 40 Acres	Single Completion: Wolfcamp 80 Acres	Single Completion: Pennsylvanian 40 Acres	Single Completion: Pennsylvanian 80 Acres	Dual Completion 40 Acres	Dual Completion 80 Acres
Orig. ST Oil in Place, Bbls/acre foot @ BPP	369.2	145.5						
Average Net Pay Thickness, feet	11.5	15.5						
Orig. ST Oil in Place, Bbls/acre @ BPP	4246	2256						
Recovery Factor, Percent Oil in Place	20.8	22.5						
ST Oil in Place, Bbls			169,840	339,680	90,240	180,480	260,080	520,160
Recoverable Oil, Bbls			35,327	70,653	20,304	40,608	55,631	111,261
Recoverable Gas, Mcf			246,205	492,401	130,815	261,629	377,020	691,030
Sales Price:								
Oil, Dollars/Bbl	$2.83	$2.83						
Gas, Dollars/Mcf	$ .08	$ .08						
Gross Value Oil			$ 99,975	$199,947	$ 57,460	$114,920	$157,436	$314,869
Gross Value Gas			19,696	39,392	10,465	20,930	30,161	55,282
Gross Value of Hydrocarbons			$119,671	$239,339	$ 67,925	$135,850	$187,597	$370,151
Expenses:								
Development Cost			$172,000	$172,000	$172,000	$172,000	$192,000	$192,000
Operating Cost			14,131	21,196	8,122	12,182	19,470	27,815
Royalty	1/8		14,959	29,917	8,490	16,981	23,449	46,269
Direct Taxes			5,399	10,785	3,100	6,199	8,500	16,763
Total Expense			$206,489	$233,898	$191,712	$207,362	$243,419	$282,847
Net Profit (Or Loss) To Operator			($ 86,816)	$ 5,441	($123,787)	($ 71,512)	($ 55,822)	$ 87,304
(Operating Cost/Bbl			$ 0.40	$ 0.30	$ 0.40	$ 0.30	$ 0.35	$ 0.25
(Taxes on Oil/Bbl			$ 0.13	$ 0.13	$ 0.13	$ 0.13	$ 0.13	$ 0.13
(Taxes on Gas (on total value)			4.4%	4.4%	4.4%	4.4%	4.4%	4.4%

LANE FIELD, LEA COUNTY, NEW MEXICO

PERFORMANCE EQUATION
(ABOVE BUBBLE POINT)

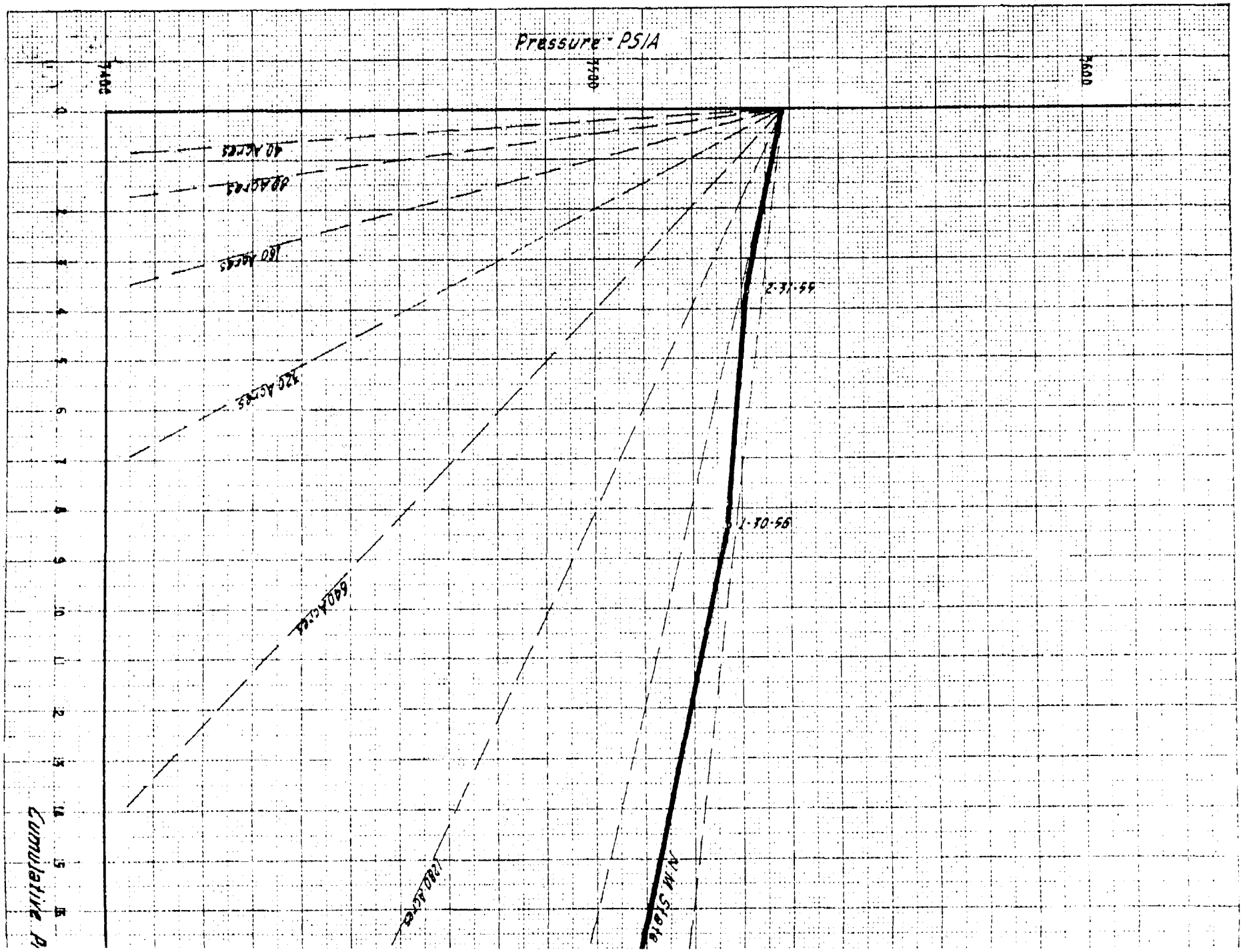
1. PRESSURE DECLINE = $\frac{\text{CUMULATIVE PRODUCTION}}{(\text{AREA})(\text{OIL IN PLACE/ACRE})(\text{EXPANSION FACTOR})}$

$$\Delta P = \frac{n}{(A)(N)(B)}$$

2. AREA = $\frac{\text{CUMULATIVE PRODUCTION}}{(\text{PRESSURE DECLINE})(\text{OIL IN PLACE/ACRE})(\text{EXPANSION FACTOR})}$

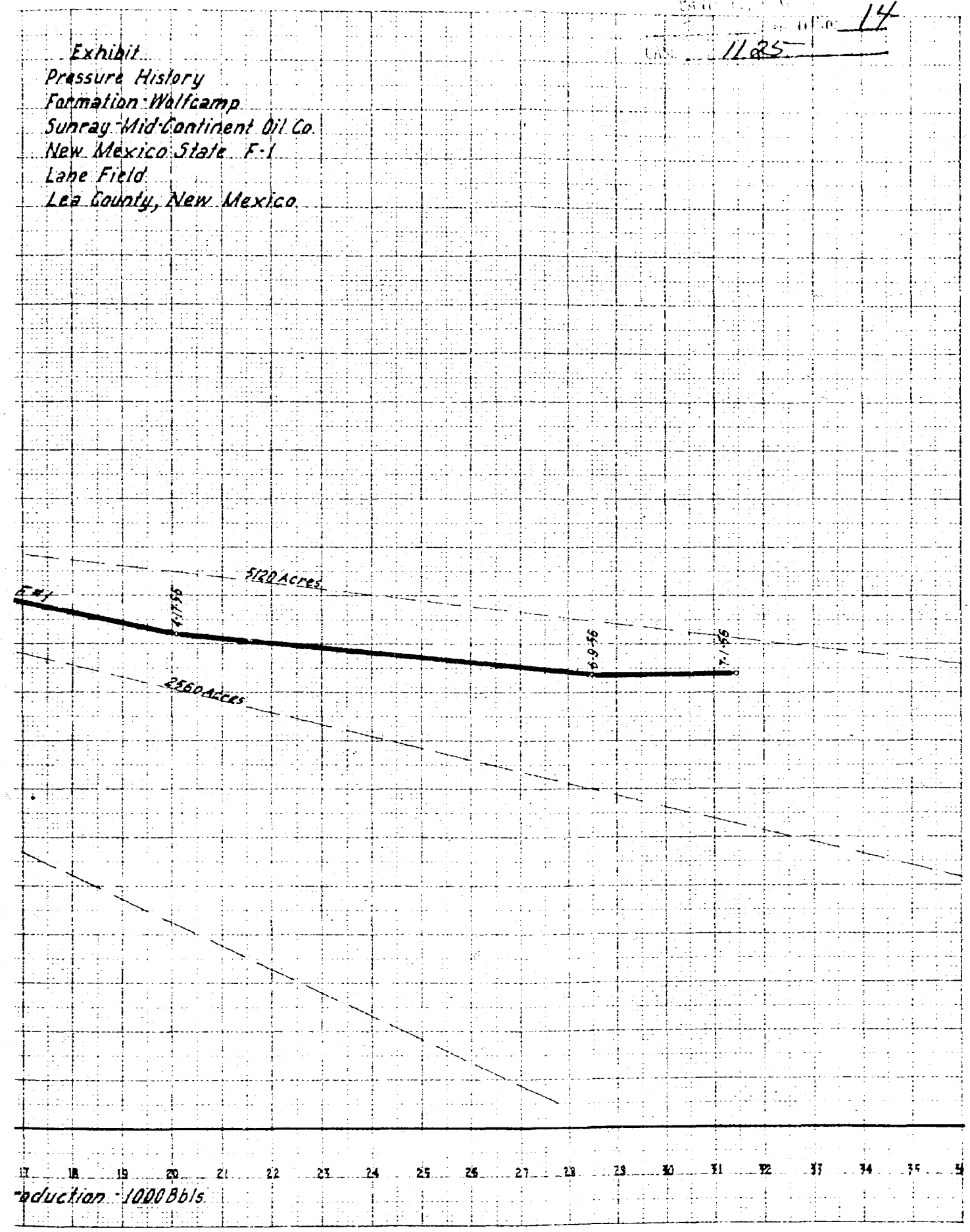
$$A = \frac{n}{(\Delta P)(N)(B)}$$

A = DRAINAGE AREA IN ACRES
B = COMPOSITE EXPANSION FACTOR OF RESERVOIR OIL, WATER, AND ROCK. BBL./BBL./PSI.
n = CUMULATIVE OIL PRODUCED - BBLS.
N = ORIGINAL STOCK TANK OIL IN PLACE/ACRE - BBLS./ACRE
ΔP = PRESSURE DECLINE FROM ORIGINAL CONDITIONS - PSI



BEFORE THE
OIL CONSERVATION COMMISSION
CASE NO. 1185 EXHIBIT NO. 14

Exhibit
Pressure History
Formation: Wolfcamp
Sunray Mid-Continent Oil Co.
New Mexico State F-1
Lane Field
Lea County, New Mexico



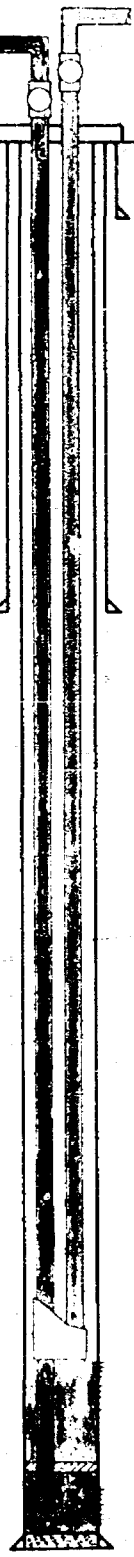
SUNRAY MID-CONTINENT OIL CO.

PROPOSED DUAL COMPLETION

WOLFCAMP AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO

WOLFCAMP AND PENNSYLVANIAN ZONES FLOWING



TO PENNSYLVANIAN SEPARATOR AND STOCK TANKS

TO WOLFCAMP SEPARATOR AND STOCK TANKS

13 3/8" OD CASING AT APPROX. 300 FT

9 5/8" OD CASING AT APPROX 4000 FT.

2 3/8" O.D. EUE TUBING WITH 2.910" O.D. COUPLINGS.

2 3/8" O.D. EUE TUBING WITH 2.910" O.D. COUPLINGS

PARALLEL STRING ANCHOR (OPTIONAL)

BAKER MODEL "D" PACKER AT APPROX. 9750 FT.

WOLFCAMP PERFORATIONS AT APPROX 9650-9660 FT.

PENNSYLVANIAN PERFORATIONS AT APPROX. 9785-9811 FT.

7" OD CASING SET AT APPROX. 9850 FT.

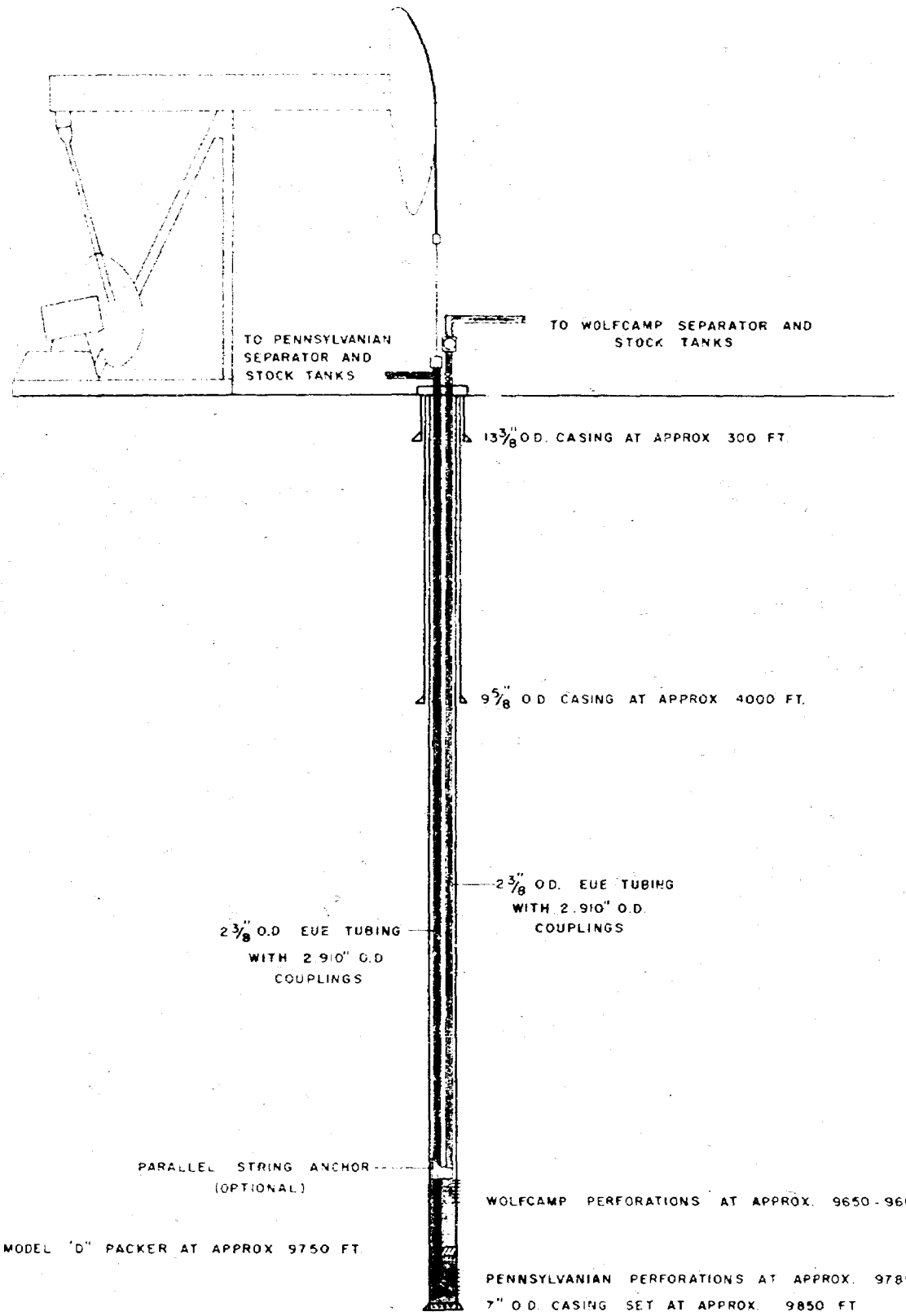
SUNRAY MID-CONTINENT OIL CO

PROPOSED DUAL COMPLETION

WOLFCAMP AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO

WOLFCAMP ZONE FLOWING AND PENNSYLVANIAN ZONE PUMPING



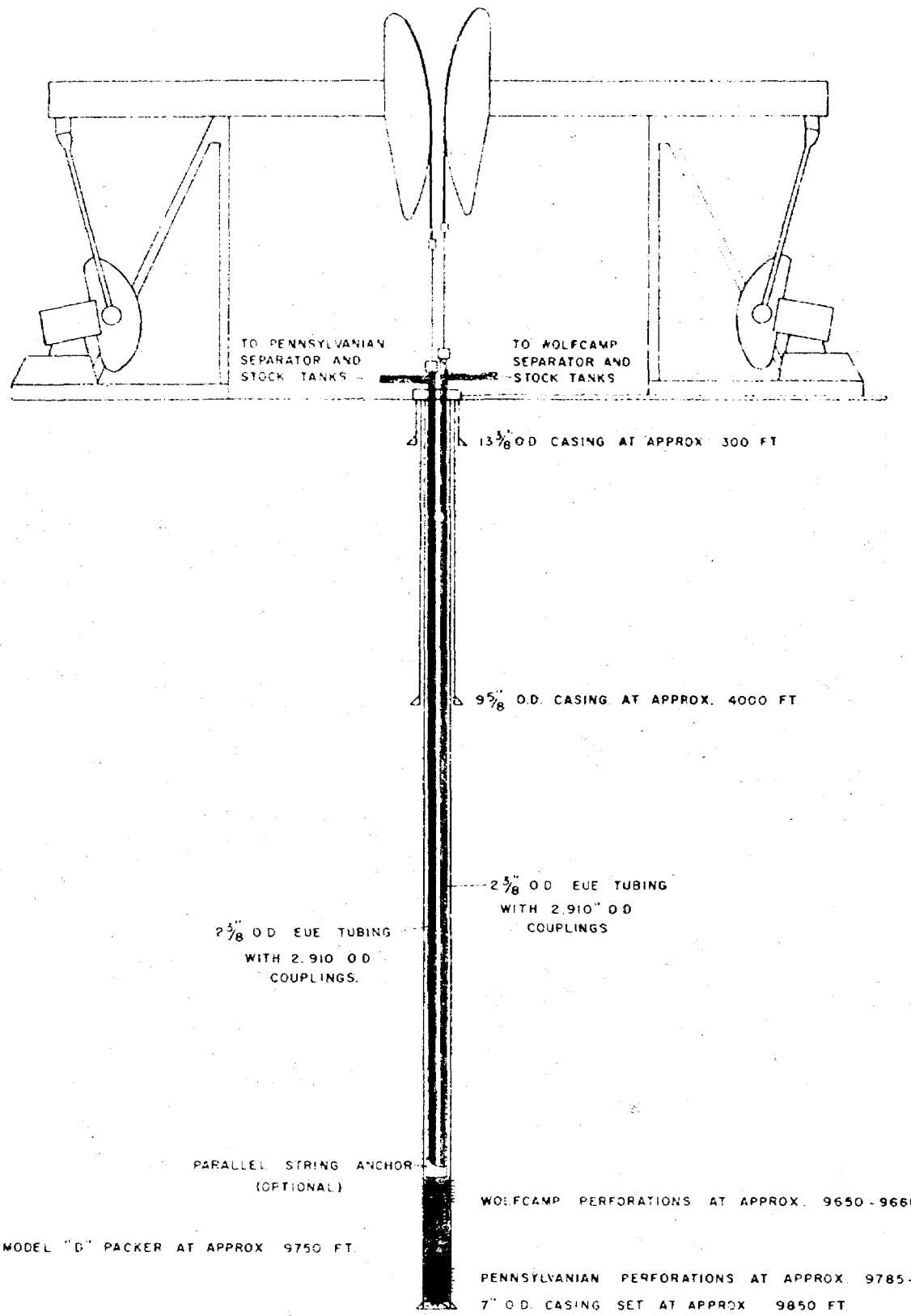
SUNRAY MID-CONTINENT OIL CO

PROPOSED DUAL COMPLETION

WOLFCAMP AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO

WOLFCAMP AND PENNSYLVANIAN ZONES PUMPING



SUNRAY MID-CONTINENT OIL CO.

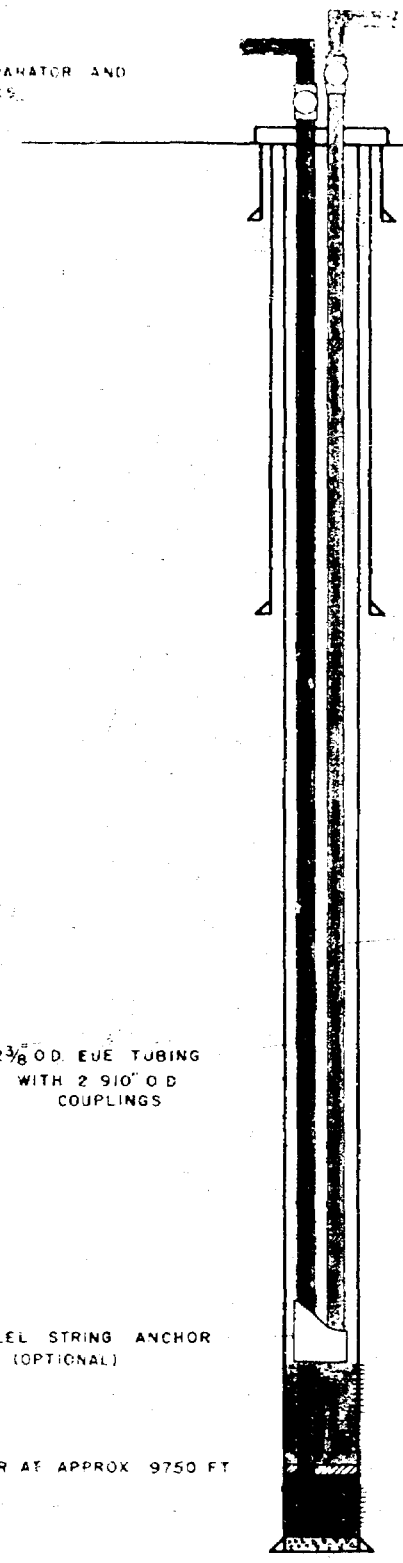
PROPOSED DUAL COMPLETION

WOLFCAMP AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 16
CASE 1185

WOLFCAMP AND PENNSYLVANIAN ZONES FLOWING



TO PENNSYLVANIAN SEPARATOR AND STOCK TANKS

TO WOLFCAMP SEPARATOR AND STOCK TANKS

13 3/8" O.D. CASING AT APPROX. 300 FT.

9 5/8" O.D. CASING AT APPROX. 4000 FT.

2 3/8" O.D. EUE TUBING WITH 2.910" O.D. COUPLINGS

2 3/8" O.D. EUE TUBING WITH 2.910" O.D. COUPLINGS

PARALLEL STRING ANCHOR (OPTIONAL)

WOLFCAMP PERFORATIONS AT APPROX. 9650-9660 FT.

BAKER MODEL "D" PACKER AT APPROX. 9750 FT.

PENNSYLVANIAN PERFORATIONS AT APPROX. 9785-9811 FT.

7" O.D. CASING SET AT APPROX. 9850 FT.

SUNRAY MID-CONTINENT OIL CO

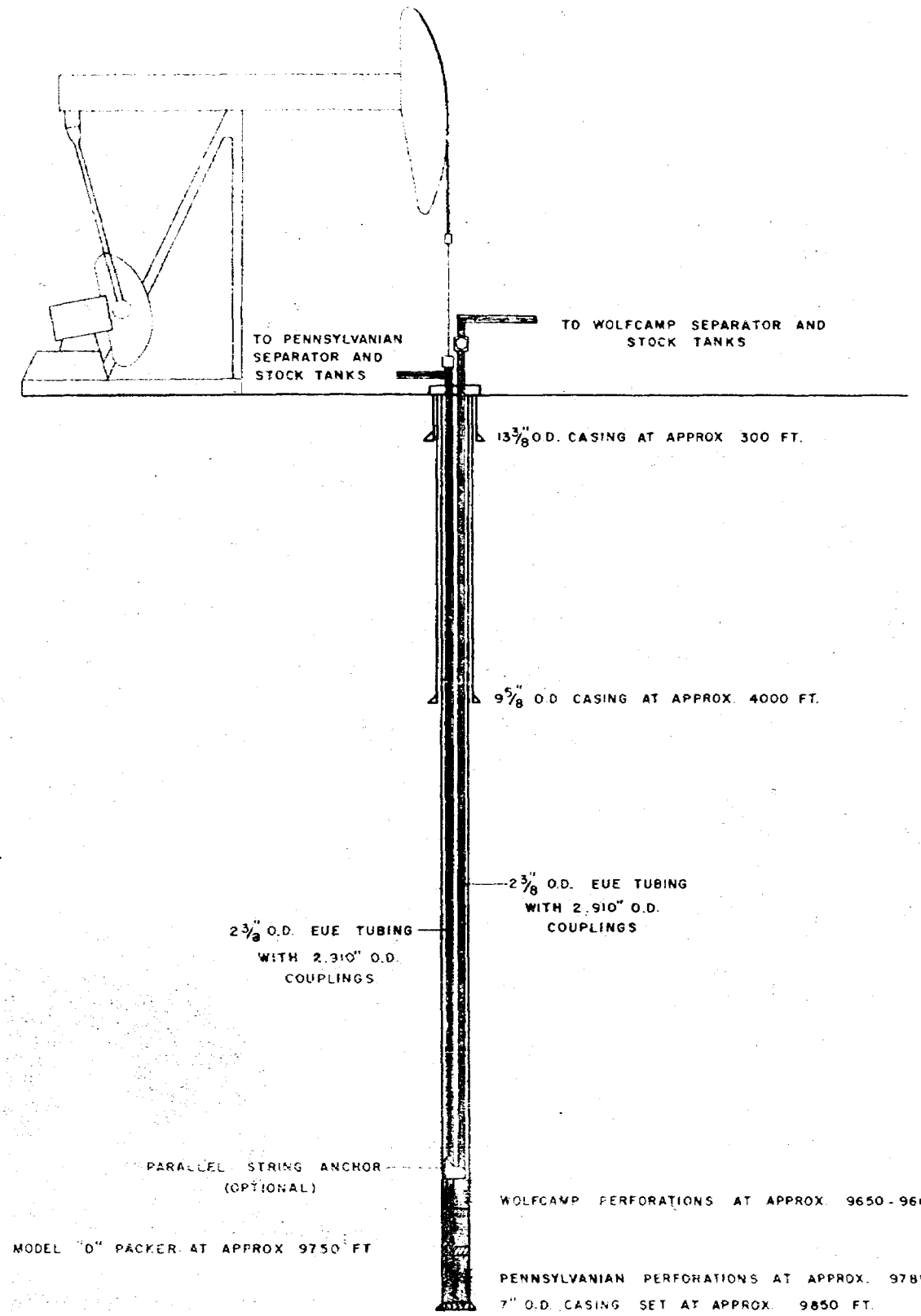
PROPOSED DUAL COMPLETION

WOLFCAMP AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 17
CASE 1125

WOLFCAMP ZONE FLOWING AND PENNSYLVANIAN ZONE PUMPING



SUNRAY MID-CONTINENT OIL CO

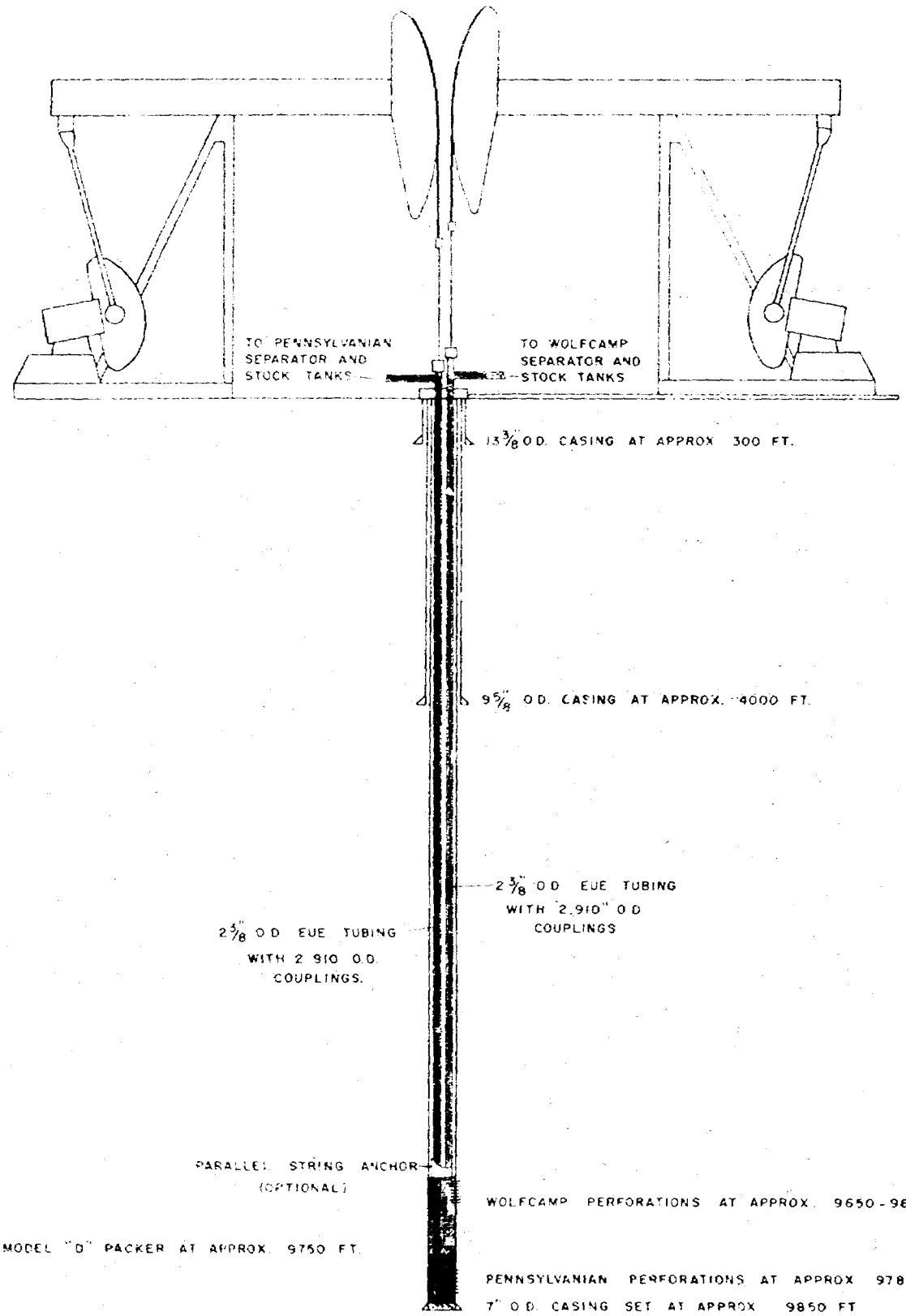
PROPOSED DUAL COMPLETION

WOLFCAMP AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 18
CASE 1125

WOLFCAMP AND PENNSYLVANIAN ZONES PUMPING



Statement to be read into Record

Case #1125

Prepared by H.N. Wade, The Texas Company.

The Texas Company believes that the testimony presented by Sunray Mid-Continent indicates that dual completions between the Wolfcamp and Pennsylvanian formations, and development of these formations on 80 acre spacing, are justified in the Lane Field. Therefore, The Texas Company concurs with Sunray Mid-Continent in requesting dual completion privileges and 80 acre development in this field.

SEABOARD OIL COMPANY
MID-CONTINENT DIVISION
DALLAS 1, TEXAS

Dkt # 1125

August 10, 1956

41-7 Field Rules
Lane Field

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

Gentlemen:

Seaboard Oil Company is a working interest owner in the leases operated by Sunray Mid-Continent Oil Company in the Lane Field, which may be described as all of Section 36 with the exception of the east half of the northwest quarter, Township 9 south, Range 33 east, and the north half of Section 1, Township 10 south, Range 33 east, Lea County, New Mexico.

Seaboard Oil Company concurs with Sunray Mid-Continent Oil Company's application to develop the Wolfcamp formation on 80-acre spacing, to develop the Cisco formation on 80-acre spacing, and to dually complete the wells by means of twin strings of tubing. Seaboard Oil Company believes this to be the most feasible method to develop these two reservoirs and strongly urges the Commission to establish such rules as will be applicable to grant Sunray Mid-Continent's applications at the Hearing on August 15, 1956.

Yours very truly,

PR:mj

SEABOARD OIL COMPANY

By: Ebb White

Ebb White, Manager
Production Department

cc: Mr. J. H. Douma
Sunray Mid-Continent Oil Co.
Box 2039
Tulsa, Oklahoma

cc: Mr. A. W. Wood
Lion Oil Company
Midland, Texas

CITIES SERVICE OIL COMPANY

CITIES SERVICE BUILDING
BARTLESVILLE, OKLAHOMA

8 August 1956

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

Re: Case No. 1125-Application of Sunray Mid-Continent Oil Company to extend the Lane-Wolfcamp Pool to establish the Lane-Pennsylvanian Pool, to provide for 80-acre drilling and spacing units in said Pools, and for a blanket dual completion rule for said Pools.

Gentlemen:

We are in receipt of copies of the applications filed in the above captioned matter, and Docket No. 27-56 setting it for hearing on August 15, 1956. Cities Service Oil Company has a leasehold interest within the proposed delineated area for the Lane-Wolfcamp and Lane-Pennsylvanian Pools.

It is our opinion, based on the data available to us and our experience with similar type production in other areas, that a development program of one well to 80 acres will adequately and efficiently drain these respective pools. However, in the interests of greatest ultimate recovery we do not subscribe to a frozen development pattern. Experience has proven that more oil can ultimately be produced when more latitude is permitted in the selection of drilling sites so that structural features can be taken advantage of to a greater extent. In this connection we recommend that 80-acre drilling and spacing units be established by dividing quarter sections into either North and South or East and West halves, at the option of the operator, and that the location of the permitted well for each unit be restricted only to a distance not nearer than 330 feet to the unit boundary line. The incorporation of such a rule would also tend to expedite development, and eliminate unnecessary spacing exception hearings.

The policy of this company with respect to the dual completion of wells is the same throughout its entire area of operations. We believe that

in almost all fields comprising more than one oil producing reservoir, oil-oil dual completions are feasible and practical. In our judgment this is true in the instant case. As one of the companies who have pioneered dual completion practices, we have had occasion to field test many types of equipment required for these installations. As a result of this experience, and our observations of other operations, we know that wells can be dually equipped and efficiently produced with no commingling of fluids either with the use of one or two tubing strings. This is true regardless of whether the wells are flowing or produced by artificial lift.

It is our recommendation that a field wide dual completion rule be adopted for the Lane-Wolfcamp and Lane-Pennsylvanian Pools but that the type of such installation be left discretionary with the operator as long as it is in conformity with good engineering principles and practices that have been generally accepted and approved by the industry and other state regulatory agencies. We do not believe that the regimentation of dual completions can be justified as a sound conservation policy.

Yours very truly,

J. A. Cleverley
Vice President

JAC:dw

CLASS OF SERVICE

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WESTERN UNION

TELEGRAM

W. P. MARSHALL, PRESIDENT

1201

SYMBOLS

DL = Day Letter

NL = Night Letter

LT = International Letter Telegram

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NEW MEXICO OIL CONSERVATION COMMISSION=

STATE CAPITOL BLDG SANTA FE NMEX=

RE CASE 1125 SUNRAY MID=CONTINENT OIL COMPANY'S APPLICATION CONCERNING DELINEATION, 80=ACRE UNITS, WELL SPACING, AND DUAL COMPLETIONS. GULF IS AGREEABLE TO REQUESTS CONTAINED IN SUNRAY MID=CONTINENT'S APPLICATION WITH THE EXCEPTION OF PROPOSED WELL SPACING WITHIN 80=ACRE UNITS. GULF OIL CORPORATIONFAVORS SUFFICIENT FLEXIBILITY IN THE WELL LOCATION REQUIREMENT TO PERMIT AN OPERATOR TO DRILL ON EITHER END OF AN 80=ACRE UNIT=

H M BAYER GULF OIL CORP=

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