

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE 1598 Application of Phillips Petroleum Company for an order establishing 80-acre spacing units in the Ranger Lake-Pennsylvanian Pool, Lea County, New Mexico, and for extension of the horizontal limits of said pool. Applicant, in the above-styled cause, seeks an order promulgating special rules and regulations for the Ranger Lake-Pennsylvanian Pool, Lea County, New Mexico, to provide for 80-acre spacing units. Applicant further seeks an order extending said pool to include the following described acreage: W/2 W/2 of Section 13; all of Sections 14, 15, 22, 23, 26 and 27; W/2 NW/4 and SW/4 SW/4 of Section 24; and W/2 W/2 of Section 25, all in Township 12 South, Range 34 East, Lea County, New Mexico.

Mabry Hall
Santa Fe, New Mexico
February 19, 1959

BEFORE:

A. L. Porter
John Burroughs

TRANSCRIPT OF HEARING

MR. PORTER: The Commission will take up next Case 1598.

MR. PAYNE: Case 1598, "Application of Phillips Petroleum Company for an order establishing 80-acre spacing units in the Ranger Lake-Pennsylvanian Pool, Lea County, New Mexico, and for extension of the horizontal limits of said pool."

MR. GRANTHAM: I am Everett Grantham of Grantham, Spann and Sanchez, 904 Simms Building, Albuquerque, New Mexico. I would

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like to present to the Commission Mr. Carl W. Jones, attorney of Midland, Texas, representing Phillips Petroleum Company, with whom we are associated in this case. We have two witnesses.

MR. BUELL: If the Commission please, may I interrupt long enough to ask if the Commission intends to get to the Angels Peak case today?

MR. PORTER: No sir, Mr. Buell, we'll reconvene in the morning at the State Highway Auditorium on Cerillos Road. This hall will not be available this evening and we don't feel like we have time to complete this docket this evening, so these gentlemen will be available for a short time in the morning and we will have a morning session at which time we will take up the Angels Peak case.

MR. VERITY: Your honor, in light of that statement, I wonder if I could allow the record to show a statement that I might make at this time on behalf of Southern Union Gas Company in that case because I can't be here in the morning, and in Case 1599, application of El Paso Natural Gas Company for 320-acre spacing --

MR. PAYNE: Mr. Verity, I wonder if you couldn't just dictate it to Mrs. Postlewaite and we'll read it in the record for you.

MR. VERITY: I'll be happy to. All we want to say is that we want to join in the application.

MR. PORTER: If you will dictate your statement.

MR. PAYNE: Take that down.

MR. PORTER: Mrs. Postlewaite will be glad to take it.

MR. VERITY: You will allow that to be in the record tomorrow?

MR. PAYNE: Yes, sir.

MR. VERITY: Thank you.

MR. PORTER: Do you have your witnesses? Please stand to be sworn at this time.

(Witnesses sworn in.)

MR. JONES: I should first like to state that its been some years since I last appeared before this Commission, and it is a pleasure and an honor for me to be back. May it please the Commission, this is the application of Phillips Petroleum Company for an order extending the horizontal limits of the Ranger Lake-Pennsylvanian Pool in Township 12 South, Range 34 East, Lea County, New Mexico, and for establishing 80-acre drilling units and other special rules and regulations for said pool. The extension requested is to include within the horizontal limits of this pool wells which have been recently completed in the pool, and for further extension of the horizontal limits to include an area which they think is now known to be reasonably productive within the pool. We will request 80-acre spacing units and other special field rules for this pool, which will be presented later.

Now, in this connection, I should like to mention the fact that when this application was filed by Phillips Petroleum Company

sometime in the latter part of December, we were not then aware that a nomenclature hearing involving the pool had also been called on January 14. Now, the nomenclature hearing was heard on January 14 and at that time, it was recommended by Mr. R. M. Montgomery of the Commission's Artesia Office that the horizontal limits of the Ranger Lake-Pennsylvanian Pool be extended to include the southwest quarter of Section 24 in Township 12 South, Range 34 East. If the Commission has acted on that nomenclature hearing, I am not aware of it, but I will say for the purpose of this hearing that although our application was filed previous to the nomenclature hearing, we ask that the horizontal limits be extended to include, insofar as Section 24 is concerned, only the southwest quarter of the southwest quarter because that was the location on which Mr. Gordon Cone had drilled a producing well. However, in this hearing we don't propose to rehash the matter that was gone into at the January 14 nomenclature hearing, but we would like it understood that we do not waive any right we might have if the circumstances warrant to contend at a later hearing and attempt to show to the Commission that all of the southwest quarter is not productive because of a dry hole drilled on the northwest quarter of the southwest quarter and that therefore all of that quarter section should not be assigned to the Gordone Cone well in the southwest quarter of the southwest quarter.

MR. PORTER: Mr. Jones, in that connection, I believe the Commission has acknowledged Mr. Montgomery's recommendation in a

nomenclature order; however, we will review that.

MR. JONES: Yes, sir. We don't propose to go into productive acreage at this hearing, anyway, but I am mentioning the fact that we didn't want to waive any right that we might have if we would waive it, for asking for another hearing.

MR. PORTER: Yes, sir.

MR. JONES: Our first witness will be Mr. Carl F. Lawrence.

CARL F. LAWRENCE

called as a witness, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. JONES:

Q Will you state your name, please, for the record?

A Carl F. Lawrence.

Q And by whom are you employed?

A Phillips Petroleum Company.

Q In what capacity are you employed and where?

A I am employed as Division Development Geologist at Midland, Texas.

Q Now, in connection with your employment by Phillips Petroleum Company as Division Development Geologist at Midland, Texas, have you had occasion to study and are you familiar with the Ranger Lake-Pennsylvanian Pool in Lea County, New Mexico?

A Yes, sir.

Q Have you previously testified and have your qualifications been accepted as a petroleum geologist before this Commission?

A Yes, sir.

MR. JONES: Is there any question about his qualifications?

MR. PORTER: No questions.

Q (By Mr. Jones) Mr. Lawrence, in connection with this application, have you had prepared by you or under your supervision, a structure map of the Ranger Lake-Pennsylvanian Pool?

A Yes, I have.

Q Will you put that on the board, please?

A Yes, sir.

MR. JONES: For your convenience, we have had some of these exhibits prepared in a brochure, although they have been offered separately.

MR. PORTER: Thank you.

Q (By Mr. Jones) Mr. Lawrence, will you mark that as Phillips Exhibit Number One, please?

A Yes, sir.

(Whereupon, the document was marked as Phillips Exhibit Number One for identification.)

Q (By Mr. Jones) Will you explain to the Commission the preparation of this structure map, Mr. Lawrence, and what it shows with regard to this pool?

A In discussing this field, I would first like to give the

Commission the benefit of knowing where the field is and a little bit about the history of the Ranger Lake-Pennsylvanian Field. The geographic location of the field, it is located in north central Lea County, New Mexico, approximately ten miles northwest of the townsite of Tatum. Geologically speaking, the Ranger Lake field is located centrally in the Lea-Chavez Basin. The north margin of the living basin lies approximately twenty-four miles to the east.

The discovery well, the Phillips Petroleum Company and Texas and Pacific Coal and Oil Company Number 1 West Ranger Unit, located 660 feet from the south and 660 feet from the east line in Section 23, Township 12 South, Range 34 East, Lea County, New Mexico, is the discovery well. That well was drilled to a total depth of 12,976 feet in the Siluro-Devonian formation and completed on 9/29/56 through perforations 10, 312, 10, 351 feet opposite the Cisco of Pennsylvanian age. The initial flowing potential was 406 barrels of oil per day, gravity was 41.3, the gas-oil ratio was 1096 to 1.

Since the discovery of the field, the activity and progress in the field, since the discovery, five development wells were drilled. The current status is five Pennsylvanian producers, and one Pennsylvanian dry hole was drilled in the course of the development. There are at present no current drilling wells.

Now, our Exhibit Number One is a structure map contoured on top of the Ranger Lake pay horizon. The structure map is

contoured on a twenty-five foot interval, and the current producing wells are indicated along with the datum, below subsea, of the top of the Ranger Lake pay zone.

Q Will you give the location of these wells, please?

A The five current producing wells are as follows: The Phillips and T and P Number--West Ranger Lake Unit is located in the northwest of the northwest of Section 25, the Phillips T and P Number 1 West Ranger Unit is located in the southeast of the southeast of Section 23, the Phillips T and P Number 3 West Ranger Unit is located in the northwest of the southeast of Section 23, and the Phillips and Texas and Pacific Number 4 West Ranger Unit is located in the southeast of the northwest. The Gordon Cone Number 2 State is located in the southwest of the southwest of Section 24. The one dry hole drilled in the course of the development was the Gordon Cone Number 1 State, which is located in the northwest of the southwest of Section 24. All those wells I have mentioned were in Township 12 South, Range 34 East.

Now, the field structure, as we have interpreted it, our present subsurface interpretation indicates that the field is a northwest-southeast trending anticlinal feature. The apex of the structure is centered diagonally across Section 23.

The field boundaries to date, the eastern limits of the Ranger Lake Field have been established by the Gordon Cone Number 1-24 State, located in the northwest of the southwest of 24, 12 South, 34 East.

Q That was the dry hole, was it not?

A That is correct. The well indicated a pinch-out of the porosity pay zone, and porosity was just absent opposite the pay zone. The oil-water contact of the field was established at minus 6211 by the Phillips Petroleum Company and Texas and Pacific Coal and Oil Company Number 2 West Ranger Unit. This well is located in the northwest of the northwest of Section 25, 12 South, 34 East. This contact was established by a water test on that well from 10, 361, minus 6211 to 10, 371 feet opposite the Cisco. Salt water was established from those perforations. The subject well produces water from a series of perforations, 10, 8, 102, 82 to 103, 30 feet. That's opposite the Cisco formation.

Now, the northwest and to some extent the southwest boundaries of the field have not yet been established. In analyzing the lithologic character of the pay zone, we have described it as a light to dark brown Silurian dolomite of Cisco-Pennsylvanian nature, and this exhibit is both regular and chrySTALLINE with a certain amount of fractured porosity. The average gross pay interval pay is 92 feet, and as far as the net pay figure, we have so far indicated it to be approximately thirty-three feet.

Q Mr. Lawrence, have you also prepared a cross section of the field?

A Yes, sir.

MR. JONES: I will ask that it be marked as Phillips Exhibit Two.

(Whereupon, the document was marked as Phillips Exhibit Number Two for identification.)

Q (By Mr. Jones) Will you describe that exhibit to the Commission, please?

A This is a northwest-southeast cross section taking that section through the center of the field. The cross section starts in the southeast with the Phillips-Texas and Pacific Number 2 West Ranger Unit, this well being located in the northwest northwest of Section 25, 12 South, 34 East. It transgresses in a northwesterly direction through the Phillips and Texas and Pacific Number 1 West Ranger Unit to the Number 3 West Ranger Unit and terminates in the northwest with the Phillips and Texas and Pacific Number 4 West Ranger Unit, this well being located in the southeast of the northwest of Section 23, 12 South, 34 East. The first line encountered here at the tip is the top of the Cisco formation. This cross section was made at a datum of minus 5900 feet. The red line, shaded red line indicates the top of the gross pay section, the blue line indicates the gas or oil-water contact at minus 6211.

We have also put on the logs, included on the cross section the completion interval and the total depth of the well, as well as the potential as indicated below each well log. We have used gamma-ray neutron logs in this cross section, which will--it's a good tool as far as indicating porosity as well as mythology.

Q Do you have anything else with regard to this exhibit,

Mr. Lawrence?

A No, sir.

Q All right, sir. From your study of the field, Mr. Lawrence, and the exhibits you have presented, the structure map and the cross section, is it your opinion that the five completed producing wells in the field which you have previously identified are within a common reservoir and producing from a common source of supply?

A Yes, sir.

Q All right. Now, Mr. Lawrence, the application requests the extension of the horizontal limits of the Ranger Lake-Pennsylvanian Pool to include the west half of the west half of Section 13. If you will point to those sections, please?

A Yes.

Q All of Sections 14, 15, 22, 23, 26 and 27, the west half of the northwest quarter and the southwest quarter of the southwest quarter of Section 23 and the west half of--24, I beg your pardon.

A 24.

Q And the west half of the west half of Section 25. Now, realizing that only five wells have been completed in the field, but from the nature of the formation and from your study of it, is it your opinion at the present time that this area now may reasonably be expected to be productive in this formation?

A Yes, sir.

Q Now, Mr. Lawrence, speaking only as a geologist, is there anything in connection with the geology and lithology of the producing formation that would preclude, in your opinion, one well in this field from draining eighty acres?

A No, sir.

Q And then is it your opinion as a geologist that one well in the field will drain eighty acres?

A Yes, it is my opinion that one well will drain sufficiently eighty acres.

MR. JONES: That's all the questions we have of this witness.

MR. PORTER: Mr. Lawrence, you testified that one well, in your opinion, will drain eighty acres. In your opinion, would you get as much oil from eighty acres with one well as you would with two?

A Sir, are you speaking, if you had two wells in eighty acres, do I think that you would get more oil than if you had one?

MR. PORTER: Yes, sir.

A No sir, it is my opinion that if you drill one well in eighty acres, you would get just as much oil as if you had two on there.

MR. PORTER: Any further questions?

MR. UTZ: Yes, sir.

MR. PORTER: Mr. Utz?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Lawrence, are you basing your contention of extending the horizontal limits of this pool solely on your Exhibit Number One, your contour map?

A Not entirely, no sir. We have considerably other acreage in the area and we have done considerable investigation into the area, shall we say, as far as seismic exploration and additional subsurface information is concerned; however, security will not permit us to exhibit those. We base that on what we know of the area in general and what we think it would do.

Q Are you basing it on the seismic permeability?

A Not entirely, no sir, because our seismic is, of course, off the Devonian, we do not attempt to show it off the Pennsylvanian markers. We base it, of course--I mean, we have a limited amount of wells in the area, as you know, but on what we know of those wells that are in the field there, and in addition, we took into consideration this shallow dry hole, and we based our opinion, as far as the productive acreage, we don't mean to say that all the acreage we have included there will be productive, no sir; we do, however, feel that it stands a chance of being productive.

Q You are asking, are you not, for the extension of the horizontal limits of this pool to include that acreage that you just described, aren't you?

A Yes sir, we are. We feel that it stands a reasonably

good chance of being productive.

Q Yet you say that a portion of that may not be productive, even according to your interpretation of subsurface --

A Yes sir, a certain amount of that may not be productive, but we won't know until we get a well in.

Q Well --

MR. JONES: I should mention that while we have included all of this acreage, that we think there is good reason to believe it will be productive within the scope of this application, but of course the immediate objective is to get included within the horizontal limits of the pool the presently producing wells and offset locations, but we thought that we would include what in our opinion is reasonably expected to be productive so that the Commission can decide what, in its opinion, should be the extent of the pool in order to save any possible nomenclature hearings that we may have, but the immediate objective is to bring within the limits of the pool the presently producing wells and offset locations.

Our next witness--I beg your pardon, was that all the questions?

MR. UTZ: I do have some more questions.

MR. PORTER: Mr. Jones, to clarify this point, I mean, to get something here that may be material, in the absence of special rules, any well drilled within a mile from an existing pool must be drilled, spaced and prorated in accordance with the

pool --

MR. JONES: Yes, sir.

MR. PORTER: --within the nearest pool?

MR. JONES: Yes, sir.

MR. PORTER: Mr. Utz, you may continue.

Q (By Mr. Utz) In view of the statement that Mr. Porter has just made, would that not include enough acreage around the present outlines of the pool to preclude 40-acre drilling?

A One mile, you say?

Q Yes, sir.

A Yes sir, I believe it would.

Q Would it not be more practical to extend the pool as production is gotten in the area so that there would not be any possibility of including dry acreage in the pool, or as little as possible?

A Yes sir, I don't think we would have any objection to that.

Q Well, Mr. Lawrence, do you have an engineering witness that will take the stand?

A Yes, sir.

MR. UTZ: Then that will be all the questions I have.

MR. PORTER: Anyone else have a question of Mr. Lawrence? You may be excused.

(Witness excused.)

MR. PORTER: Did you offer your exhibits?

MR. JONES: Yes sir, we will offer in evidence Phillips Exhibits One and Two and we also ask that the well data sheet, I think, which is attached to the left hand side of that brochure you have there, which simply gives well information, we didn't go into the details of it, that will lastly be identified as Phillips Exhibit Number Three.

(Whereupon, the document was marked as Phillips Exhibit Number Three for identification.)

MR. PORTER: Without objection, Phillips Exhibits One, Two and Three will be received into the record.

MR. JONES: Our next witness will be Mr. W. R. Bohon.

W. R. BOHON

called as a witness, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. JONES:

Q Will you state your name for the record, please?

A W. R. Bohon.

Q Where do you live, Mr. Bohon?

A In Bartlesville, Oklahoma.

Q By whom are you employed and in what capacity?

A Phillips Petroleum Company. I am a supervising area petroleum engineer for the Western Area. In Phillips' operation, the Western Area is comprised of West Texas and Southeastern New

Mexico, in which area this field lies.

Q And in connection with that employment, have you made a study and are you familiar with the Ranger Lake-Pennsylvanian Pool in Lea County, New Mexico?

A Yes, sir.

Q Now, Mr. Bohon, you have not previously testified before this Commission, as I understand it, is that correct?

A That's correct, sir.

Q Will you then explain to the Commission your education and experience in the field of petroleum engineering?

A I was graduated from the University of Oklahoma in 1948 with a Bachelor of Science Degree, entered the employment of Phillips Petroleum Company for one year, after which I returned to the University of Oklahoma and obtained a Master of Petroleum Engineering Degree in 1950. I then re-entered the employ of Phillips Petroleum Company and have been employed by them since. I have worked at Midland, Texas in the Western Division, which is also the same as the Western Area, the area that covers West Texas and Southeastern New Mexico, was then transferred to Bartlesville, during which time I was also assigned to work on the same area, was then transferred to the Gulf Coast Division, and in 1956 was transferred back to Bartlesville as the supervising area petroleum engineer for the Western Area.

MR. JONES: Are there any further questions about his qualifications?

MR. PORTER: The witness' qualifications are accepted.

Q (By Mr. Jones) Mr. Bohon, have you had prepared by you or under your supervision, a brochure of the Ranger Lake-Pennsylvanian Pool?

A Yes sir, I have.

Q All right, sir.

MR. JONES: Now, we ask that that be identified as Phillips Exhibit Four.

(Whereupon, the document was marked as Phillips Exhibit Number Four for identification.)

Q (By Mr. Jones) Mr. Bohon, will you go through the information shown on that exhibit, Phillips Exhibit Four, please?

A Yes sir, the information, this data contained in this exhibit was prepared as a result of my study of this field. I would like to review that at this time because it is the basis for my conclusions.

The physical properties of the reservoir rock of the Ranger Lake-Pennsylvanian Field were determined to have an approximate average porosity of 8.7 per cent. Now, this approximate porosity was determined by using a core analysis from the Phillips Ranger Number 1, and relating to the gamma-ray neutron log of that well. That relation was then used to estimate the porosity in the remaining wells, we have cored only one well. The maximum measured permeability in the core analysis of the Phillips

Ranger Number 2 was 28 millidarcies and the connate water from this same core analysis was 25 per cent.

As for the structural features of the reservoir, Mr. Lawrence has gone over those and I will not go over that again. The crude is an under-saturated crude and as such, there is no gas cap and no gas-oil contact. The original water-oil contact was determined by myself to be 6210 feet below the subsurface or below subsea.

The characteristics of the reservoir fluid as determined from production tests are as follows: The average gravity of the storage tank oil was 40.4 degrees API, and from the characteristics of the crude, I have estimated that the saturation pressure is 2,250. Formation volume factor at the original reservoir pressure is estimated to be 1.409 and at the saturation pressure, it is estimated to be 1.430. The solubility of the crude from production tests was estimated to be 754 cubic feet per barrel, and of course that is the same solubility that you would have at the saturation pressure.

Reservoir pressure and temperature is the original reservoir pressure as determined in the Phillips Ranger Number 1. Shortly after it was completed, it was measured to be 3,530 PSI. Approximately 7,500 barrels of oil had been produced from this well to the time that the pressure measurement was made. The reservoir temperature has been determined to be 162 degrees Fahrenheit from several bottomhole pressure measurements.

The reservoir pressure history, I will go into that later. We have a tabulation and a graphical exhibit of that and for the time being, I'll skip over that. The productivity indices that have been taken in the subject field range from a minimum of .793 to 1.553 barrels per day per pound pressure drop. Statistically, as of December the 1st, 1958, there had been produced 368,711 barrels of oil from this reservoir. The gas produced to this date is 285,088 MCF. None of the wells are producing water at the present.

The monthly oil production, and also the monthly producing gas-oil ratios are also shown later on an attachment and a graphical exhibit, which we will go over later. As Mr. Lawrence said, there are currently five producing wells in the field, four of which are operated by Phillips Petroleum Company. The spacing pattern in the field to date conforms to the pattern that Phillips will recommend, which is a staggered 80-acre unit. The state of depletion of the reservoir is the early stage or development stage. The general reservoir mechanics, to date the primary source of reservoir energy has been the expansion of oil above the saturation pressure. The future reservoir mechanism will be a solution gas drive which may or may not be aided by a partial water drive. To date, there has been no evidence of a water drive.

As Mr. Jones said earlier, Phillips is recommending that this field be developed on 80 acres with the well locations to be

not more than 150 feet from the centers of the northwest quarter and southeast quarters of each Governmental quarter section.

The next exhibit in the brochure is a tabulation showing all of the bottomhole pressure measurements that have been taken in this field. I think that you can see these better if you will turn on over to the next exhibit, which is a graphical presentation of this same information. There are four wells in which we have bottomhole pressure information, all of those being the four Phillips Ranger wells. I think that you can see from this visual presentation that the decline trends of the bottomhole pressure in all of these wells are similar, they are following generally the same trend.

I would direct your particular attention to the bottomhole pressure history of the Phillips Ranger Well Number 1 and Number 2. The Ranger Number 1 pressures are designated by a dot with a circle around it and the Ranger Number 2 pressures are designated by a dot and a triangle around it. It is quite apparent that these two wells have almost--well, for all practical purposes, they have identical bottomhole pressure histories, indicating almost infinite communication between these two wells.

Now, the first pressure measurement that we have on the Phillips Ranger Number 2 is shown there in June of 1957. You can see from that that it is considerably below what the original pressure recorded in the Phillips Ranger Number 1 was. Now, that pressure in June of 1957 in the Ranger Number 2 was taken soon

after completion of that well, indicating that there had been considerable drainage in that area from production by the Ranger Number 1.

Q How long had the Number 1 been completed at that date, Mr. Bohon?

A The Number 1 had been completed, let's see, approximately ten months. Now, the next exhibit or attachment in the brochure is a tabulation of production from the Ranger Lake-Pennsylvanian Field. We have tabulated the number of producing wells, the oil production, both monthly and accumulated, the gas production, both monthly and accumulated, and also gas-oil ratios. This same information is shown on the following attachment in a graphical form.

Actually, about the only thing that this information shows is that all of the wells are top allowable wells. The lowest--the Phillips Ranger wells all have been making their allowable from the date of completion. You can see that the gas-oil ratio has been very much the same throughout the producing live of the field, which you would expect for an undersaturated reservoir. Now, the question at hand here actually is that of drainage. Will one well drain adequately 80 acres. The next attachment is a method of determining the drainage from one of these wells. In this particular case, I used the Phillips Ranger Number 1, which was the discovery well in the field and the well with the most producing history. On November 21, 1958, the bottomhole pressure

in the Phillips Ranger Number 1 was determined to be 2,311 PSI.

Accumulated production to this date from the Ranger Number 1 only was 137,000 barrels of oil.

Now, let us assume that this is the only well in the reservoir, or that in other words, it is not in communication with any other well. On that assumption, the original oil in place in this reservoir, or the original oil in place contributed to the performance of the Phillips Ranger Number 1 may be estimated by the formula as shown on the attachment. This calculation shows that the original oil in place contributed to the performance of the Phillips Ranger Number 1 is 9,788,650.

Now then, to determine what area in acres you must have to contain this amount of oil, I have made a pool volume calculation using these criteria or data that we have established for this particular reservoir. In other words, 8.7 per cent porosity, 25 per cent connate water and a formation volume factor at original conditions of 1.429. Also the average thickness for the field has been determined, from inspection of the various logs, to be 32 feet.

The oil in place then under one acre for this average thickness would be 11,488 barrels. The total area contributing then to the Phillips Ranger Number 1 may be determined by dividing the total oil contributing to the performance by the amount of oil that is contained under one acre. This determination shows us that there are 852 acres contributing to the performance of the

Phillips Ranger Number 1.

The next attachment is another way of looking at this question of drainage and basically involves the same calculations or the same equations that we have in this first presentation. In this particular calculation, I have compared what the theoretical recovery would be from a reservoir with crude characteristics as we have here to what the actual recovery has been from the Phillips Number 1, from the Phillips Ranger Number 1. Now, in this case, we have assumed that the Ranger Number 1 is capable of draining only 80 acres. Now, the theoretical recovery from this reservoir, based upon the crude characteristics as we know them, would be 1.4 per cent, from the original reservoir pressure down to the reservoir pressure of 2311, which was measured in the Ranger Number 1 in November of 1958.

Now then, we know that the Phillips Ranger Number 1 has actually produced 137,000 barrels over that same time period, and comparing that actual production to the reserves under an 80-acre tract, we can see that the Phillips Ranger Number 1 has already, or as of November, 1958, recovered 14.9 per cent of the reserve that you could put under 80 acres. Now, what this means is that an area considerably larger than 80 acres is contributing to the performance of this well, and --

Q Mr. Bohon--excuse me, did you have anything further?

A I was just going to say that this particular type of calculation can be made for any of our wells in this field and

they would all show the same thing. Now, as for the magnitude of the acreage that we have of 852 acres, admittedly we could influence this thing by compressibility of the reservoir rock and such as that. Now, those things would change this determination but they would not change the order of magnitude of this determination. In other words, in my opinion, any well in the Ranger Lake Field is capable of draining far in excess of 80 acres.

Q Mr. Bohon, based upon your studies and the data you have presented, is it also your opinion that the five producing wells in the area defined on Phillips Exhibit One are within--producing from the same reservoir and from a common source of supply?

A Yes sir, I know of no reason to believe that they are not. The structure map and the cross section of Mr. Lawrence certainly indicates them to be, and our pressure history in several instances certainly prove beyond any question of a doubt that some of the wells are in almost infinite communication with each other.

Q All right, sir. Is it further your opinion--you have stated it, but for the record I'll ask you again--is it your opinion from your study of this field, Mr. Bohon, that one well in the field will efficiently drain, without waste, 80 acres?

A Yes sir, it is.

Q All right, sir. Now, based upon your studies and the data you have presented, do you have field rules to recommend

to the Commission for the Ranger Lake-Pennsylvanian Pool?

A Yes sir, those field rules are also attached in the brochure that was presented.

Q Now, without reading the rules, will you briefly summarize for the Commission the provisions of each rule?

A The rules, as proposed by Phillips Petroleum Company, are that the field be developed on 80-acre spacing, and that any well projected to or completed in the Ranger Lake-Pennsylvanian Pool shall be located within 150 feet off the center of the southeast quarter or the northwest quarter of a Governmental quarter section. Actually, the majority of these rules, or these rules, and in fact in almost their entirety, were copies after other fields in the State of New Mexico.

Q All right, sir. Now, Rule 3-B provides for exceptions to the location specified in the case of where the application is based upon topographical conditions, is that correct?

A Yes, sir.

MR. JONES: All right, sir. That's all the questions we have of this witness.

MR. PORTER: Mr. Bohon, apparently the well in the southwest of the southwest of Section 24 is already off pattern on what the recommendations are. What would you propose concerning that well?

A Well, sir --

MR. PORTER: Or is that right?

MR. JONES: Yes, sir.

MR. PORTER: Is it off pattern?

A Let's see, we were in the south --

MR. PORTER: Southwest of the southwest of Section 24.

A Yes sir, it's off pattern. Mr. Cone drilled the Number 1 Well, which would have been on pattern but it was a dry hole.

MR. PORTER: What would you propose that the Commission do with that well?

A Well, I think that the Commission would have to, of course, allow it to be produced.

MR. PORTER: In other words, you would recommend an exception --

A Yes, sir.

MR. PORTER: --for that location from the original order?

A Yes, sir.

MR. PORTER: Any questions of the witness?

MR. PAYNE: Yes, sir.

MR. PORTER: Mr. Payne?

MR. PAYNE: I would like to clarify one point, Mr. Bohon. Before I ask you this question, I might explain that we generally consider spacing and proration units as different things and I am wondering here if you are actually proposing 80-acre spacing, which would only allow one well to be drilled on 80 acres or whether you are actually proposing 80-acre proration units so that a man can drill more than one well on 80 acres but just receive

an 80-acre allowable, which is to be divided among the wells?

A Well, actually in that consideration, we are proposing 80-acre prorationing unit.

MR. PAYNE: Thank you, that's all the questions I have.

MR. JONES: Only one well?

A If a man wants to drill more than one well, as long as he only gets one allowable, we don't care how many he drills.

MR. PAYNE: So that actually you are asking for 80-acre prorationing?

A Yes, sir.

MR. PAYNE: Thank you.

MR. PORTER: I understand that we are running out of time in the use of the hall. I had known that there was a meeting here at five-fifteen, but forgot. In the meantime, are there any questions of this witness?

MR. UTZ: Yes, sir.

MR. PORTER: Mr. Utz?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Bohon, I believe you stated in your exhibits that the maximum permeability was 28 millidarcies?

A That was the maximum measured permeability.

Q I see.

A As recorded on the core analysis from the Phillips Ranger Number 2, and I might point out here that from a gamma ray

neutron log analysis, the better porosity development was not cored in that well, so I do not think that this 28 millidarcies is the maximum permeability in the Ranger Lake Number 2 or in the field, but that just happened to be the maximum permeability recorded on the Ranger Number 2.

Q Have you taken any cores in any of these wells?

A In the Ranger Number 2.

Q You didn't core then through the section?

A No sir, we did not get the top part of that, of the Ranger Lake pay, and that part actually, from the gamma-ray neutron analysis, is the most porous section.

Q Can you tell from your neutron analysis about what the permeability is?

A No sir, I cannot.

Q So you have no idea of what the permeability is in that area except that you think it is better than 28 millidarcies?

A Yes sir, I do.

Q Is there any evidence of fractures in this area?

A Yes sir, there is. If you would like, we will submit a copy of this core analysis to the Commission, which does indicate fractures.

Q Yes, we would like to have that, please.

MR. JONES: We ask that that be marked as Phillips Exhibit Five, please.

(Whereupon, the document was marked as Phillips Exhibit Number Five for identification.)

Q (By Mr. Utz) Mr. Bohon, you have not attempted to run any interference tests on this field so far, have you?

A No sir, we have not run any interference tests, nor do we plan to run any interference tests. I would not expect to be able to measure the difference over the drop in pressure recorded on 80-acre spacing or 40-acre spacing between wells, because I would expect that drop from one way to the other to be within the accuracy of a measuring device. I don't have much faith in interference tests. On very, very small spacing or development, they are all right, but on 40 acres, the fact that you cannot record communication between wells, to me, does not indicate that there is no communication. I don't know of any better communication test that you could have than the one in the performance of the Ranger Number 1 and Number 2.

Q You are saying then that you don't feel that you can measure the pressure drop by an interference test?

A What do you mean by an interference test? Maybe if we could clarify --

Q I am shutting in one well in the field and producing an offset well to show what--to see if the shut in well has any pressure drop due to the production of the second well.

A No sir, I do not believe you could for the reason that

your pressure drop is very great in the immediate vicinity of the well bore and this pressure becomes less as you move away from the well, so that by the time you get to a well on 40-acre spacing, then it is within the accuracy of the measuring device, your bomb, it would be within thirty pounds, which I think is within the accuracy of a bomb.

Q Well, sir, in your explanation of--I don't know what the page number is--but your bottomhole pressure, your initial bottomhole pressure on your exhibit you just presented, didn't you use it as a means of showing communication between these wells, the drop in initial pressure on the well after production on the Number 1?

A Yes sir, I did, but those are static pressures. That would be static pressure on a communication test.

Q But you did have a pressure drop?

A Oh yes, you will have pressure drops, very definitely, but you will not be able to pressure at that instant.

Q But you do have a pressure drop by producing one well and shutting in another?

A You might be able to.

Q Referring to that page in the exhibit that you recorded the bottomhole pressures, the initial reservoir pressure on the Ranger Lake Number 1 was 3530, I believe, was it not?

A Yes sir, that was after 7,500 barrels had been produced from that well.

Q I believe that you stated that the Ranger Lake Number 1, but that production which you have just stated, has caused pressure to drop on the Ranger Lake Number 2?

A Yes, sir.

Q To 2843?

A Yes, sir.

Q When was the Ranger Lake Number 3 completed?

A The Ranger Lake Number 3 was completed, well, soon before the first pressure measurement of it. The first pressure measurement on the Ranger Number 3 as shown on this exhibit was taken soon after the completion of that well.

Q The completion of the Number 3?

A Yes, sir.

Q Well, how do you explain then the high pressure in the Number 3?

A Well, the only explanation is that the communication between the Number 3 and the Number 1, that the communication between Well Number 3 and Well Number 1 is not nearly as good as it is between Well Number 1 and Well Number 2.

Q Communication to the northeast, or northwest then, you don't believe is as good as it is to the southeast?

A Well, I couldn't say to the northeast. I don't know just exactly where the communication is good, but it is not as good between those two wells as it is between some of the other wells. As to what areas the communication is or where it is, I

cannot delineate.

Q Well, at any rate, you don't feel the production from the Ranger Lake Number 1 affected the pressure on the Number 3?

A It didn't affect the original pressure, no. Subsequent pressures from the Number 3 appeared to be falling more in line with the pressures of the other wells.

MR. PORTER: We will have to interrupt here so that we can let the other meeting have the hall. Suppose we go into my office, and since there's a few of us, I believe there will be room enough for us to finish there.

(Hearing continued to Mr. Porter's office.)

MR. PORTER: Let the record show that the hearing is reconvened in the offices of the Oil Conservation Commission. I am sorry that we had to move into rather cramped quarters, but we felt it would be better to try and finish this case so that you people could be released.

MR. JONES: We appreciate it.

MR. PORTER: Mr. Utz, would you like to pursue your questioning at this time?

MR. UTZ: I might have a couple of more.

Q (By Mr. Utz) Mr. Bohon, can you tell me how much oil was produced from the Ranger Number 1 at the time you took the pressure on the Number 3?

A At the time we took the pressure on the Number 3, yes sir, that will take me just a second. The Ranger Number 3 pressure

was taken September 13, 1957, and the Ranger Number 1 had produced approximately 65,000 barrels at that time.

Q 65,000?

A Yes, sir.

Q Roughly, half the amount that had been produced when the Number 2 pressure was taken? You had produced 127,000 was it not?

A No sir, the Number 2 pressure has not been related to the Number 1 pressure. The 127,000 barrels was produced from the Number 1 and the pressure of 2311 was taken from the Phillips Ranger Number 1 also. If you will look on the attachment, on November the 21st, 1958, in the Ranger Number 1 the pressure was 2311. From completion to that date, the Ranger Number 1 had produced approximately 137,000 barrels.

Q I see. Well now, how much oil was produced from the Number 1 when the Number 2 pressure was taken of 2843?

A That pressure was taken in July of 1957, July the 10th, and that production was approximately 61,000.

Q 61,000 barrels?

A Yes, sir.

Q And the reason for your Number 3 pressure being so high, I believe you stated, was because you didn't feel the communication between the Number 1 and the Number 3 was as good as it was between the 1 and 2?

A Yes sir, that's true.

Q Do you expect that condition might exist in some of the rest of the pool?

A I really couldn't say. I do think that the performance of the Number 1 Well and the Number 3 Well have indicated that both of them are producing from areas considerably in excess of 80 acres.

Q Due to your volumetric calculation versus production?

A Yes, sir.

Q Do you think that the Number 1 Well had lowered the pressure at all on the Ranger Number 3?

A It apparently had not; if it had, it was not of a significant amount.

Q Actually, the pressure is higher than the initial pressure on the Number 1?

A That's true.

MR. UTZ: I believe that's all I have.

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

GOVERNOR BURROUGHS: What is the approximate cost of completing a well in that field?

A Approximately \$210,000.00.

MR. PORTER: The average depth is about ten?

A Ten thousand, three, ten feve.

MR. PORTER: Does anyone else have a question?

MR. NUTTER: Yes.

MR. PORTER: Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Bohon, what is the top perforated interval in your Well Number 2?

A Well now, Well Number 2 is perforated from 10,326 to 10,336.

Q And the interval that you --

A And there are--pardon me--there are additional perforations at 10,282 to 10,303 and 10,310 to 326.

Q And the interval that you have a core on is approximately how many feet, Mr. Bohon?

A Approximately 65 or 70 feet. The core starts at 10,313, with your uppermost perforation in the Number 2 Well being 10,282, so that the uppermost perforation, the uppermost interval there is 10,282 to 10,303, all of which is above the interval cored here.

Q So approximately what part of the perforated intervals do you have a core available on, in a fraction, one-third, one half, two-thirds of the interval or just what?

A Let's see, we have 21 feet that we don't have a core analysis on and 26 feet of the perforations that we do have a core analysis.

Q So you have a core analysis --

A Approximately half, a little over.

Q --in excess of half?

A Yes, sir.

Q And the highest permeability that you measured on that core was 28 millidarcies?

A That's correct.

Q What is the average permeability, approximately, just by visual examination of the core analysis there, sir?

A I have averaged that, and it was 14 millidarcies, I believe, of what I consider the net pay.

Q Did I understand correctly, Mr. Bohon, when you replied to a question by Mr. Utz, that you believed that these pressure differentials that you showed between the Number 1 Well and Number 2 Well and the Number 1 Well and Number 3 Well indicated a variation in the permeability between the wells?

A Actually, I do not know what caused the fact that there is not nearly as much communication between Well Number 1 and 3 as there is between Number 1 and 2. The reason for that, and this would be merely speculation on my part, it could be that we might have some lensing or something of that nature, I don't know.

Q If lensing were present in here, there's a possibility that drilling wells, only one well to 80 acres, might result in missing a lens?

A Well --

Q And not recovering the fullest amount of oil possible?

A I don't really care to testify about the lensing because

I have not analyzed the cores, or I would prefer that that request be referred to our geologist.

MR. JONES: I believe Mr. Lawrence could tell you this, Mr. Nutter.

MR. NUTTER: Well, Mr. Bohon brought the lensing up, I didn't.

A I said I don't know what the reason is.

Q (By Mr. Nutter) Well, do you think that since we have this possibility, that there is a variation of permeability as detected between two wells which are on the proposed 80-acre pattern, and there seems to be a rather wide variation of permeability or a wide variation in the effect of communication between the various wells, that it might be a little premature to be spacing wells on a pattern that hasn't been definitely established as an effective drain for the area?

A I don't think that the two questions, one as to the communication between two wells, and the other as to the ability of the wells to drain are--I don't believe those are the same question.

Q Well, the communication of the well is the ability of the well to drain, though, is it not?

A Yes, in a way it is, but let's look at it--there are actually two questions involved, whether the Number 1 Well and the Number 3 Well are actually in the same reservoir or separated there by some permeability barrier of some nature, of what

separation or what permeability barrier, I don't know what it is and I am not even sure that there is any, but it does not affect the question of the ability of the well to drain 80 acres. I think the performance of Well Number 1 and Well Number 3 have both exhibited that they are able to drain far in excess of 80 acres.

Q You stated that it would cost approximately \$200,000.00 to drill a well in here. Have you made an estimate of the value of the recoverable oil in place on an 30-acre tract as opposed to a 40-acre tract?

A No. Well, just very generally. I am not sure what the recovery would be. We know what the oil in place is, and an estimate of the oil in place, assuming an 18 per cent recovery factor, we can pretty well determine what the difference would be.

Q Would it be economic to drill two wells on 80 acres in this pool?

A Yes sir, I think that it would be.

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

A I do not think that there would be any additional reserves for recovery by the drilling of two wells.

MR. NUTTER: That might depend on whether you were drilling in the direction of Number 2 or Number 3, though, wouldn't it?

A No, I don't think so.

MR. NUTTER: Thank you.

MR. PORTER: Mr. Engbrecht?

CROSS EXAMINATION

BY MR. ENGBRECHT:

Q Mr. Bohon, in relation to your proposed special field rules, I notice your casing program there. Are you familiar with Rule 107?

A No, sir.

Q In Rule 107, we have two options there, Option 1 and Option 2, and Option 1, if I may read, "Allows all casing strings to stand cemented a minimum of eighteen hours prior to commencing tests. The operators using this option shall report on Form C-103 the actual time the cement was in place before initiating tests." In your Rule, or Special Rule Number 6, you have said that you have a proposal of two strings of pipe set in accordance with the following program: You recommend a three hundred feet surface cemented to the surface and a minimum of twelve hours under pressure before drilling a plug or initiating a test. By the same token, on your "B" proposal of Rule 6 on your producing or your oil string, you have twelve hours there also.

A Yes, sir.

Q Do you wish to enter this as an exception to Rule 107, sir?

A Yes, I think so; however, if the Commission rules otherwise, why we have no real objection to the eighteen hours as opposed to the twelve hours. These rules were prepared by our

Proration Section in Bartlesville and it is my understanding they were taken from field rules of other fields in the State of New Mexico.

MR. ENGBRECHT: I have no other questions.

MR. PORTER: Any further questions?

MR. NUTTER: Yes, sir.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Bohon, in response to a question by Mr. Payne, you stated that you thought it would be all right for an operator to drill two wells on an 80-acre unit providing he only received one allowable, yet somewhere in your recommendations, Recommendation Number 7 provides that the reservoir would be developed on wells that would be located within 150 feet of the center of the northwest and the southeast quarter of each Governmental quarter section. Now, that specifies where the wells would have to be located, would it not?

A Yes, sir. I would assume that any variation from this would have to be approved by the Commission.

Q I see. You would specify a spacing pattern and any well that deviates from that pattern would have to be approved separately?

A Yes sir, for the purpose of a more uniform pattern in the field.

MR. NUTTER: I see.

MR. PORTER: Actually, this is a location pattern, I suppose?

A Yes, sir.

MR. PORTER: Any further questions?

The witness may be excused.

(Witness excused.)

MR. PORTER: I believe you offered all of your exhibits?

MR. JONES: Yes sir, except Four and Five. We will now offer in evidence Phillips Exhibit Four, which was the brochure, and Phillips Exhibit Five, which is the core analysis.

I would like to ask Mr. Lawrence again, if I may, a question which has been raised, whether in his study of the logs of these wells which are shown on this cross section, he finds any evidence of lensing?

MR. LAWRENCE: No sir, I did not find any evidence of lensing whatsoever in the field. All the porosity zones are clearly different throughout all the wells that we have now with the exception of the dry hole, which is in the northwest of the southwest of 24.

MR. JONES: Is that particularly applicable to Well Number 3?

MR. LAWRENCE: Well Number 3, yes sir, we have the same porosity present in it as we do anywhere else.

MR. JONES: That's all I have.

MR. LAWRENCE: It might differ perhaps a little bit here

from the rest of the wells, but the same porosities are present.

MR. PORTER: Let the record show that Exhibits Four and Five were received.

MR. NUTTER: Mr. Lawrence, is there any geological reason that you know of which would cause Well Number 2, the original pressure in Well Number 2 to be lower as a result of production from Well Number 1 and yet the production from Well Number 1 had not affected Well Number 3's original pressure when that well was completed?

MR. LAWRENCE: Well, as we all know--I think Mr. Bohon's explanation on that was the best. He's more qualified to testify to something like that. I agree with him that it is just a case where perhaps the permeability in that well was not quite as good as it was in the other well, but the wells are still in the same reservoir. I think the chart shows that they are approaching the same thing.

MR. NUTTER: Would you have any explanation, Mr. Lawrence, for the fact that Well Number 3 has the highest initial potential of any of the four wells, even though you say it may have the lowest permeability?

MR. LAWRENCE: Well, it has a little more in that pay section.

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

MR. PORTER: Does anyone have anything further to offer in this case?

MR. JONES: That concludes our evidence, may it please the Commission. We do call attention to Paragraph Five of the application stating that of the land covered by the application and to which it is requested the horizontal limits of this pool be extended, that all of Section 23, the west half of the northwest quarter of Section 24, the northwest quarter of Section 25 and all of Section 26 are State-owned lands and they are designated as the West Ranger Unit Area.

The West Ranger Unit Area was approved by this Commission by Order Number R-797 on May 2nd, 1956. We ask that the Commission take administrative notice of this fact. We further point out that of the fourteen other operators in the area proposed to be covered by the pool as extended, they all received actual mailed notice of this application as well as the regular published notice of the Commission.

In closing, we ask that the Commission take administrative notice of the testimony at the January 14th nomenclature hearing -

MR. GRANTHAM: January 12, that is.

MR. JONES: Was it January 12?

MR. GRANTHAM: Yes.

MR. JONES: --wherein it was testified by Mr. H. R. Montgomery of the Commission's Artesia office that he recommended the extension of this field to include all of the southwest quarter of Section 24, and that one well was capable of producing this acreage, consisting of 160 acres.

That's all we have.

MR. PORTER: Anything further to be offered in this case?

MR. UTZ: I would like to ask, what was the completion date of the Cone Number 1 dry hole?

MR. JONES: I think I have it on the application.

MR. BOHON: All that information is on the attachments.

MR. JONES: Let's get it on the record.

It was completed on February 20, 1957.

MR. PORTER: If there is nothing further to be offered in this case, we'll take it under advisement, and the hearing will recess until nine o'clock tomorrow morning at the Highway Commission Office.

(Whereupon, the hearing was recessed until 9:00 a.m., February 20, 1959.)

I. FRIDAY MORNING
FEBRUARY 20, 1959
AUDITORIUM
STATE HIGHWAY DEPARTMENT BUILDING

MR. PORTER: The meeting will come to order.

We will recognize Mr. Grantham.

MR. GRANTHAM: If the Commission please, in Docket 1598, in the application of Phillips Petroleum Company, Ranger Lake, we have no additional testimony, but I would like permission to re-open the case merely to correct one error in the testimony of Mr. Bohon. I think it will take about two minutes.

MR. PORTER: Since all the parties are here who were present in our case yesterday afternoon, the Commission will re-open the case for the purpose of allowing the correction to be made.

MR. GRANTHAM: You may take the stand, Mr. Bohon.

W. R. BOHON

recalled as a witness, having previously been duly sworn, further testified as follows:

DIRECT EXAMINATION

BY MR. GRANTHAM:

Q Will you state your name, please?

A W. R. Bohon.

Q You testified in Docket Number 1598 yesterday?

A Yes sir, I did.

Q There was an item in your testimony you desired to correct, is that true?

2. A Yes sir, that is true.

Q I wish you would proceed, please.

A Thank you. Yesterday afternoon on testifying on the Ranger Lake-Pennsylvanian Pool, in cross examination I was asked the question as to whether or not it would be feasible or possible for an oil company to drill on 40-acre spacing. In answer to that question, I made a quick mental calculation of the reserves, multiplying the estimated recovery factor by the original oil in place, but I used the original oil in place under the 80-acre tract rather than under a 40-acre tract, which of course doubles the reserves and would change the answer to my question from yes to no.

Now, if the Commission would like, I could go into some detail as to the basis for this on the economics to a company, well cost and so forth.

MR. PORTER: Mr. Bohon, unless someone has a question, I don't feel that that would be necessary. Does anyone have a question of the witness concerning this correction?

MR. UTZ: Yesterday Mr. Bohon didn't have the recoverable reserve figures. If he has that this morning, I think it would be well to get them in the record.

A I believe that I said yesterday that the recoverable reserve would probably be from 15 to 20 per cent of the original oil in place. The oil in place under a 40-acre tract is 459,000 barrels. I have used an estimated recovery factor of 18 per cent,

3 which would give a recoverable reserve of 82,620 barrels. As also stated yesterday, the estimated well cost is \$200,000.00. There is an additional \$5,000.00, probably, for tankage, and then later in the life of this field, we will probably have to install pumping equipment and that will cost approximately \$25,000.00 at the depth of these wells, for an estimated total well cost of \$230,000.00.

MR. UTZ: What is your estimate of the value with the oil in place in a 40-acre tract to the surface?

A My estimate, and this is for a tract which has only a one-eighth royalty out of it --

MR. UTZ: Yes, sir.

A The estimate of that value of oil to the working interest is \$181,764.00. I would also like to point out here that the Phillips and T & P Ranger tract has an overriding royalty interest also, which would further reduce that. Obviously, an operator, even with only the one-eighth royalty deducted, cannot afford to drill a \$230,000.00 well when his anticipated recovery before overhead would be \$181,764.00.

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

MR. PORTER: Anyone else have a question concerning these statements?

The witness may be excused.

MR. GRANTHAM: Thank you very much.

A Thank you, sir.

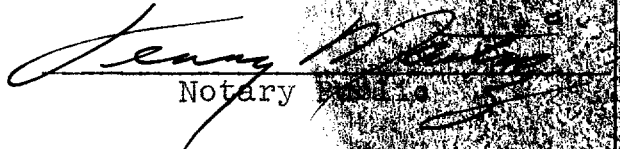
(Witness excused.)

STATE OF NEW MEXICO)
 : ss
COUNTY OF BERNALILLO)

I, JERRY MARTINEZ, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing were reported by me in Stenotype at the time and place aforesaid; that the same was reduced to typewritten transcript by me and contains a true and correct record of said proceedings, to the best of my knowledge, skill and ability.

I FURTHER CERTIFY that I am not employed by or related to any attorney or party of interest in this matter; and, further, that I have no financial interest in the outcome thereof.

DATED this 6th day of March, 1959, in the City of Albuquerque, County of Bernalillo, State of New Mexico.


Notary Public

My Commission Expires:

January 24, 1962