BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO

In The Matter Of:	
Special Hearing December 19, 1951: A rehearing on Case 149 is set for 10 a.m. at Mabry Hall, Santa Fe, New Mexico, on this date. Mid-Continent Petroleum Corporation, Magnolia Petroleum Company and others, have asked recision of Oil Conservation Commission Order R-100 relating to spacing in the Crossroads Pool, (Lea County, New Mexico).	Case No. 149 (Rehearing)

TRANSCRIPT OF HEARING

BEFORE:

Hon. Edwin L. Mechem, Governor

Hon. R. R. Spurrier, Secretary and Member

Special Hearing
December 19, 1951

REGISTER

W. E. McKellar, Jr.	Magnolia Petroleum Company
J. H. Crocker	Mid-Continent Petroleum Corporation, Tulsa
Hiram Dow	Roswell, New Mexico
E. C. Iden	Albuquerque, New Mexico
E. A. Paschal	Oil Development Company of Texas
John W. Strayhorn	Magnolia Petroleum Company
Frank Purdum	Subsurface Engineering Company
E. J. Pierce	Mid-Continent Petroleum Corporation, Midland
M. B. Penn	Mid-Continent Petroleum Corporation, Tulsa
R. E. Murphy	Magnolia Petroleum Company, Roswell, New Mexico
John Major	Oil Development Company of Texas
Glenn Staley	New Mexico Oil and Gas Eng. Committee, Hobbs
Lewis H. Bond	Stanolind Oil and Gas Company, Fort Worth
Jack M. Campbell	Self
Emmett D. White	Leonard Oil Company, Roswell
Charles C. Lawrence, Jr.	New Mexico Oil and Gas Association, Roswell
Cecil R. Buckler	Sinclair Oil and Gas Company, Tulsa, Oklahoma
R. S. Christie	Amerada Petroleum Corporation, Tulsa, Oklahoma

R. S. Dewey	Humble Oil and Refining Company, Midland, Texas
C. J. Ray, Jr.	The Texas Company, Fort Worth, Texas
Mrs. U. D. Sawyer	Crossroads, New Mexico
U. D. Sawyer	Crossroads, New Mexico
Elvis A. Utz	Oil Conservation Commission, Santa Fe
Jason Kellahin	Oil Conservation Commission, Santa Fe
George Graham	Oil Conservation Commission, Santa Fe
L. C. White	Oil Conservation Commission, Santa Fe

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MR. SPURRIER: Meeting will come to order, please.

The only case we have on the docket today is Case No. 149.

(Mr. White reads the Notice of Publication.)

MR. DOW: If you will indulge me just a minute, I would like to state to the Commission our position in this matter and to recount in a way the orders which the Commission has entered in this case from the beginning. In order to be as brief as possible I have written out a statement containing about 50 pages which I would like to refer to and say to the Commission that the Magnolia Petroleum Company; Oil Development Company of Texas; Santa Fe Pacific Railroad Company and Mid-Continent Petroleum Corporation appear before you today pursuant to an application

for rehearing in the matter of oil well spacing in the Crossroads Devonian Reservoir, Lea County, New Mexico, and the Commission's order of November 9th, 1951, granting a rehearing and setting the cause down for a special hearing on this date. These petitioners or applicants for rehearing desire to thank the Commission for granting a rehearing and giving the matter a special setting on this date. We shall try to cooperate with the Commission by being brief as possible consistent with what we believe to be a proper presentation of our side of the case and shall also try to not unduly burden the record.

We shall now enter our appearances in the record as follows: Oil Development Company of Texas and Santa Fe Pacific Railroad Company are represented by Mr. E. C. Iden of the firm of Iden and Johnson, Albuquerque; Magnolia Petroleum Company and Mid-Continent Petroleum Corporation are represented by Mr. Hiram Dow of the firm of Hervey, Dow and Hinkle, Roswell, with W. E. McKellar, Jr., Dallas, Texas specially appearing for Magnolia Petroleum Company, and J. H. Crocker, Tulsa, Oklahoma, specially appearing for Mid-Continent Petroleum Corporation.

Oil Development Company of Texas, Magnolia Petroleum Company, and Mid-Continent Petroleum Corporation are oil and gas lessees and own and operate all wells presently producing oil from the Devonian Reservoir in the Crossroads Pool in Lea County. Santa Fe Pacific Railroad Company owns approximately 50 per cent of

the royalty in the Crossroads Pool and it supports the position of the oil and gas lessees in this matter and as above stated it is represented here today by Mr. Iden.

We do not attempt to flatter ourselves to the extent of thinking that the references we shall hereafter make to Chapter 168 of the Laws of New Mexico, 1949, shall be informative to the Commission. We realize that you gentlemen who have been connected with the Commission for some time have read and studied the Chapter so many times you can very largely repeat the language employed throughout the text word for word verbatim. However, for the purposes of the record in this case we deem it necessary for us to make frequent reference to Chapter 168 and apply, as best we can, its clear provisions to the evidence disclosed by the reporter's transcripts. Therefore, the Commission will understand our motives and we seek your reasonable indulgence in our effort to develop both the law and the evidence.

We might state for the record that the Crossroads Pool in Lea County, New Mexico, has been drilled and developed in the Devonian formation on the basis of and pursuant to an 80 acre pattern for the spacing and drilling of such wells, which order is defined in Case 149 as order number 779, dated July 27, 1948, with the exception of one well to which we shall later refer. At the time this order was promulgated and entered Governor Thomas J. Mabry and Messrs. John E. Miles and R. R. Spurrier

constituted the membership of the Oil Conservation Commission of the State of New Mexico.

The next order of the Commission, pertaining to the matter of 80 acre pattern for well spacing and drilling in the Crossroads Pool, was promulgated and entered by the Commission on January 11, 1950. The effect of this order in Case number 203, order number R-1, was to preserve the 80 acre spacing pattern in Crossroads Pool but to grant unto the Santa Fe Pacific Railroad Company and Oil Development Company of Texas an exception to the pattern provided by order number 779. Governor Thomas J. Mabry was then chairman of the Commission and Messrs. Guy Shepard and R. R. Spurrier were members of the Commission.

The next order promulgated and entered by the Commission in this matter was done on October 27, 1950. This order was in the nature of a citation levelled at the lessors and the oil and gas lessees having interests in the producing area of the Crossroads Pool to appear on November 21, 1950 at a public hearing called for the purpose of showing good cause why order 779 should not be cancelled and rescinded. At the time this order or citation was entered on October 27, 1950 and on the occasion of the hearing held on November 21, 1950 Governor Thomas J. Mabry was chairman of the Commission and Messrs. Guy Shepard and R. R. Spurrier were members. The citation just referred to apparently was issued by the Commission at the

instance and request of Mr. and Mrs. U. D. Sawyer through their attorney, Mr. G. T. Hanners of Lovington, New Mexico.

Following the aforesaid citation and the hearing on November 21, 1950 the Commission issued another order or citation to appear before the Commission again on March 21, 1951 for further hearing based on the original citation of October 27, 1950. The parties so cited appeared again before the Commission on March 21, 1951, at which time the last hearing was had. At the time of the March 21, 1951 hearing the membership of the Commission consisted of Governor Edwin L. Mechem, as chairman, and Messrs. Guy Shepard and R. R. Spurrier as members. Thus, it will be observed that Mr. Spurrier is the only member of the Commission who has participated as such in all of the orders and hearings referred to. It is for that reason the applicants or petitioners for this rehearing feel impelled to review, to some extent, the law and the evidence from the date of the original spacing order number 779 (July 27, 1948) to the time this Commission promulgated and entered its order on October 15, 1951 in Case number 149 (order number R-100) attempting to rescind the original order 779, Case number 149 dated July 27, 1948.

Under Chapter 168 of the Laws of New Mexico, 1949, the Oil Conservation Commission was delegated certain prescribed powers and its duties with respect to the administration of such powers were defined. The Act also prescribed certain inhibitions

and limitations beyond which the Commission was denied authority to act. Under Section 3 of Chapter 168 of the Laws of New Mexico, 1949, the Oil Conservation Commission was created as a statutory body. Under Section 9 of this Law, the Commission is empowered and ordered to prevent waste, as defined in the Conservation Act, and to protect correlative rights. These are the only legal bases for any action which the Commission might take under the law creating the Commission and any and all orders of the Commission to be legal must be designed either (1) to prevent waste, or (2) to protect correlative rights.

Section 13 of Chapter 168, Laws of 1949, sometimes herein referred to as the Conservation Act, reads as follows:

"No owner of a property in a pool shall be required by the Commission, directly or indirectly, to drill more wells than are reasonably necessary to secure his proportionate part of the production. To avoid the drilling of unnecessary wells a proration unit for each pool may be fixed, such being the area which may be efficiently and economically drained and developed by one well. The drilling of unnecessary wells creates fire and other hazards conducive to waste, and unnecessarily increases the production cost of oil or gas or both to the operator, and thus also unnecessarily increases the cost of the products to the ultimate consumer."

Section 13, paragraph (e) of the Conservation Act is as

follows:

"Whenever it appears that the owners in any pool have agreed upon a plan for the spacing of wells, or upon a plan or method of distribution of any allowable fixed by the Commission for the pool, or upon any other plan for the development or operation of such pool, which plan, in the judgment of the Commission, has the effect of preventing waste as prohibited by this act and is fair to the royalty owners in such pool, then such plan shall be adopted by the Commission with respect to such pool; however, the Commission, upon hearing and after notice, may subsequently modify any such plan to the extent necessary to prevent waste as prohibited by this act."

The record in this case shows that all oil and gas lessees owning leases in the Crossroads Pool did agree upon a plan for the development of the Pool. This plan was fully explained to the Commission and all interested parties on July 19, 1948. There was no objection or opposition lodged against the proposed plan by either royalty owners or operators and the Commission thereupon promulgated and entered the original spacing order number 779 adopting conventional 80 acre spacing for the Pool. Thereafter, the Pool was orderly developed on the plan created by the Commission. All wells producing from the Devonian formation in the Pool are spaced on the plan prescribed with the exception of one well drilled by the Oil Development Company of

Texas in the southeast quarter of the northwest quarter of Section 27.

At this time (three and one half years after the original spacing order) at least 10 wells have been completed in the Devonian Formation in the Crossroads Pool and operations have started for the drilling of the eleventh well. It is our contention that this Pool has been and is being developed in an orderly, prudent and efficient manner and the best of faith has obtained on the part of all operators in the Pool. No one will, or can, deny the fact that several millions of dollars have been expended in the drilling of seven Devonian Formation producers and three dry holes. These millions were spent and these wells were drilled by the operators in solemn reliance upon the integrity of an order made by the duly accredited representatives of the Sovereign State of New Mexico and the order thus became act of the State. Let us pause for a moment to see what the State of New Mexico told us three and one-half years ago. I shall quote just a few excerpts. I am now quoting as follows:

"That it is the intention of this order to cover all wells now or hereafter drilling to and producing from the common source of supply from which the discovery well as above described has been drilled to and is now producing from, whether within the probable area as above delineated or any extension thereto, so as to insure a proper and uniform spacing, developing, and pro-

ducing plan for all wells in this common source of supply.

"3. That due to conditions established by the aforesaid discovery well, the Commission finds it advisable to amend and supplement its present rules, regulations and orders to properly cover the question of development of leases and spacing of wells now or hereafter drilling to, into and producing from the Devonian formation, encountered at a depth below 12,000 feet in the Crossroads Pool.

"4. That the present rules, regulations, and orders of the Commission are adequate and sufficient to properly cover the drilling, equipping, and operating of wells to the new common source as found in said above described well and, therefore, the general Statewide Rules and Lea County Rules should remain in full force and effect except as hereinafter modified, amended or superseded.

"5. That the Devonian formation, as found in the discovery well below 12,000 feet, is a common source of supply which should be drilled and developed on a program other than that normally followed under the present rules, regulations, and orders of the Commission, particularly Order No. 637, effective March 1, 1946, with respect to units of proration, spacing and assignment of allowables, because of the depth of such wells, the time necessary to drill, and the high costs attached thereto, in addition to the hazards and scarcity of materials.

"6. That in the interest of the State of New Mexico and in the interest of the general public, encouragement should be given to operators to explore and develop the natural resources of the State by the establishment of a proper and equitable spacing and development program."

Quotation closed. Based on the quoted findings of the Commission, it made its order consonant therewith. The operators have kept faith with the order and relied on it and spent their money and thereby created and acquired substantive rights. In the face of this it seems inconceivable that the creator of the order should back away from its solemn act or at least show an obvious disposition to do so. It is the plain duty of the State of New Mexico, as with any other state of the Union, to stoutly defend its official acts and orders against attack. The Commission distributed the complaint filed herein to the operators on or about October 19, 1950 with this kind of command. You said in effect to us that you (the Commission) were going to reconsider the original spacing Order (779). This much we find no fault with, but you further said to us in effect you were ready to rescind and cancel the order unless we should appear and show good cause why the order should not be rescinded and cancelled. Since the complaint of Mr. and Mrs. Sawyer did not even contain requisite allegations to vest jurisdiction, it certainly seems to us that the Commission clearly erred in not telling the com-

plainants that the State of New Mexico would support and defend its order until they should "show good cause" why you should rescind and cancel. However, you chose to handle the matter in exact reverse. The operators responded to your citation and appeared on November 20, 1950. We stressed seriously as your records show that the complaint of Sawyers should be dismissed. We further stressed with equal seriousness that if you were not ready to dismiss the complaint on the ground of lack of jurisdiction, that the burden of proof should rest with the complainant. We here and now reassert error on the part of the Commission in not dismissing the complaint for lack of necessary allegations to vest jurisdiction. We further reassert error on the part of the Commission in not promptly ordering the complainants to produce their proof to show why the State of New Mexico should abandon and abdicate its solemn Act. The operators advised the Commission of their desire to cooperate and that they had brought witnesses to Santa Fe at some considerable expense and would be willing to put their witnesses on the stand to give the Commission all evidence in their possession relating to the reservoir performance in the Crossroads Pool. This was done by the operators without thereby waiving the purely legal points which had been previously stressed and as referred to. Qualified witnesses testified as this Commission knows. The Commission further knows as the record shows that the testimony was uncon-

tradicted. The complainants offered no testimony whatsoever at the Hearing held on November 20, 1950. After operators' witnesses had finished testifying on both direct and cross, the witnesses were offered to the Commission, for further questioning. Despite this record, we received another command from the Commission to again appear on the 21st day of the following March. The Commission had decided it wanted more information. The operators complied again and offered testimony, cores, and other exhibits. Five highly qualified witnesses testified and by a preponderance of substantial evidence clearly established, we believe, (a) that one well in the Devonian Reservoir in Crossroads Pool will adequately, effectively and efficiently drain more than an 80 acre area and thereby deplete in an orderly manner the reservoir; (b) that the correlative rights of all interested parties will be protected by the well spacing pattern created by this Commission under its order made July 27, 1948. The complainants at this Hearing on November 20, 1951 offered one witness. Their witness agreed with our witnesses that the energy of the Crossroads Pool is a water drive. Next comes the order of the Commission dated October 15, 1951 (order R-100) attempting to rescind and cancel the original spacing order. Let us particularly look at Finding No. 5 of this order, which reads "that there was substantial evidence, though controverted to some extent, that waste and impairment of correlative

rights will result if 80-acre spacing as provided for in Order No. 779 is continued in effect." We stoutly believe and therefore maintain that the Commission again erred in making such an order as was made October 15, 1951 in that the order is in disregard of substantial evidence introduced at the Hearings by the operators and that by a great preponderance thereof the State of New Mexico should not strike down its order No. 779, in view of the law and the facts in this case. The Commission apparently entertains the impression that Section 8 of its Order 779 gives it the right to destroy substantive rights and property rights and vested rights through its language employed in said Section 8 which reads as follows: "The Commission retains jurisdiction in this case for the purpose of issuing such further and additional orders as may be necessary to meet changed conditions, preclude inequities, and preserve correlative rights, etc." We think State and Federal Courts and Regulatory Bodies in other oil producing states have answered this question. In the event good cause is shown to a Regulatory Body for the granting of an exception to an order it has made under which substantive rights have become established and vested, such an exception may be granted after notice and hearing and in case of oil wells in a pool which has been developed under a spacing pattern the Body has authority to make equitable adjustments in allowables in order to protect correlative rights. This rule has been sus-

tained as being reasonable and right and within proper scope of a Regulatory Body. It is in accord with the dictates of justice. This is the view this Commission took when it granted an exception to the Oil Development Company of Texas and the Santa Fe Pacific Railroad Company. However we come again after being granted a rehearing and voluntarily assume the burden through the introduction of further testimony supplementing that already adduced, of proving to the Commission that no waste is occurring and no correlative rights are being impaired.

We appreciate your indulging us to include this statement in the record and set forth before the Commission at the outset our views in the matter. We are coming here again today to supply additional evidence in the light of what has transpired since the last order has been entered. We wish to show the Commission that there is no waste in the manner in which this pool is being developed and that certainly no correlative rights are being impaired. We are ready to go ahead and carry the burden. We maintain we really have been acting in the reverse in this matter all the way through. We still want to cooperate with the Commission and thank them for giving us the rehearing. We are ready.

MR. SPURRIER: You may proceed.

MR. DOW: Mr. McKellar of Dallas is going to question the expert and technical witnesses.

MR. McKELLAR: I would like Mr. Penn, and Mr. Purdum, and Mr. Strayhorn to come forward to be sworn.

This rehearing was applied for principally on two findings which the Commission made in issuing Order R-100. That to the effect that waste to correlative rights would result if the 80-acre spacings was continued in effect. I will attempt to show by the witnesses that the finding is erroneous. The second point I will attempt to prove is that the pressure is being maintained in the field.

I will call as my first witness Mr. Penn.

M. B. P E N N,

having first been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. McKELLAR:

Q Will you please state your name?

A M. B. Penn.

Q Your position?

A Chief petroleum engineer for Mid-Continent Petroleum Corporation.

Q You are the chief petroleum engineer for the Mid-Continent Petroleum Corporation?

A That is right.

MR. McKELLAR: Mr. Penn's qualifications have been presented before the Commission in previous hearings. If there is no objec-

tion I will not go into his qualifications.

MR. HANNERS: We admit his qualifications.

Q Do you have a map showing the present development of the Crossroads Pool?

A Yes, I do.

MR. McKELLAR: That is the map I have already presented to the Commission.

Q Mr. Penn, will you briefly explain what this map shows?

A This map is a copy of an exhibit that was presented at the March hearing that we have brought up to date to show two new wells. One is a drilling well and one is a completed well. It shows the Magnolia 1-B Santa Fe Pacific that was completed in September 1951 in the northwest quarter of Section 26. The drilling well of Mid-Continent Petroleum Corporation which is called UD Sawyer 1-E, which is located in the center of the northeast quarter of the northeast quarter of Section 7, and is today a drilling well.

Q That is a true overall picture of the locations, both dry hole drilling wells and producing wells as now appears in the Crossroads Devonian Reservoir?

A As of this date today.

MR. McKELLAR: I would like to introduce a copy of that in the record.

A You may have this copy.

(Marked exhibit.)

Q Mr. Penn, at the last hearing we had what we called a performance chart entitled Exhibit 9. Has this chart been brought up to date?

A Yes, it has.

Q Do you have some copies of that with you?

A Yes, I do.

MR. McKELLAR: We would like to introduce a copy of the chart as our Exhibit 9B. It is our old Exhibit 9 simply brought up to date.

MR. HANNERS: We have no objection.

Q Mr. Penn, will you briefly explain to the Commission what this chart portrays? First explain the time that each well was completed in this reservoir as portrayed by this chart.

A The chart shows that on curve which has been named number of wells that the discovery well was drilled and completed in May 1948, which is Mid-Continent 1-A Sawyer. January 1949 Magnolia 1-C Santa Fe Pacific was completed. In February of 1949 Mid-Continent No. 1 Dessie Sawyer was completed. In August 1949 Mid-Continent 1-D Sawyer was completed. In October 1950 Oil Development Company 2-27 Santa Fe Pacific was completed. February 1951 Mid-Continent 1-C Sawyer was completed. And the last completion was in September 1951, which is Magnolia 1-B Santa Fe Pacific, which I described in discussing the map.

Q This Magnolia No. 1 Santa Fe Pacific has been completed since the last hearing on this matter was held?

A Yes, I believe it was started following the last meeting in April and completed in December.

Q This chart does not show the well which the Mid-Continent is now in the process of drilling to the Devonian?

A That is correct.

Q What does the chart portray as to cumulative oil production as of October 1, 1951?

A From the cumulative oil curve we can see that approximately one million barrels of oil have been produced. The exact figure is 1,007,584 barrels. That is to October 1, 1951.

Q 1,000,700?

A 1,007,000.

Q 1,007,000?

A Yes.

Q What is the daily average oil production, Mr. Penn, as shown by the chart as of October 1st?

A The daily average oil production is 1,700 barrels.

Q Mr. Penn, the next line on this chart to which I direct your attention is at the top of the page. There is a line the datum pressure. Would you please explain to the Commission briefly just what you mean by this datum pressure line?

A The datum pressure is a curve drawn through the points which

are bottom hole pressures taken at a datum plane in the reservoir.

Q From this chart then the first point on your datum pressure curve would indicate the reservoir pressure as of the date of the completion of the discovery well, the one Sawyer 1-A well.

A Very shortly thereafter.

Q That is what, Mr. Penn?

A That is 4,874 pounds.

Q The bottom hole reservoir pressure of the discovery well shortly after the completion was 4,874 pounds?

A That is correct. We call that the original reservoir pressure.

MR. McKELLAR: I wish to direct the Commission's special attention to that because that is an important point in maintaining whether or not the petitioners have maintained a reservoir pressure in this Devonian Reservoir.

Q In previous hearings you have testified that a strong active water drive is present in the reservoir. Has your opinion on this point changed any since the last hearing was held?

A I have found no evidence to change my opinion.

Q You are still of the opinion that a strong active water drive is present?

A That is correct.

Q Mr. Penn, as I understand it all the engineers that have

testified in the matter have concluded that a strong active water drive is present, is that correct?

A That is correct.

Q Well, I won't go into that any further. Will you please review the wells of Mid-Continent that are making water in this reservoir at the present time?

A There are two wells at the present time that are making water that are owned by Mid-Continent. The Mid-Continent 1-A Sawyer which is the discovery well is making water and the Mid-Continent No. 1,Dessie Sawyer No. 1 well.

Q Your No. 1-A well is making water at the present?

A That is correct.

Q Has your company conducted any study of this well or made any changes in your operating practices or equipment recently in attempting to reduce this amount of water?

A At the present time we are installing a new type of pump on this well as a result of the experiments of the Magnolia on their No. 1-C Santa Fe Pacific. Previous to this installation we have changed the position of the bottom of the tubing. Let me change that. We have lowered the tubing in the well which slightly changed the operating conditions as to oil and water.

Q Did that improve your oil-water ratio?

A For a short time, yes.

Q And you are now in the process of trying to improve it still

further?

A Our idea in putting the pump on, it is called a long left pump, a pump with a 24-foot stroke, is to remove more fluid from the well with the hope that we will increase the daily average oil production.

Q Is the presence of this water in your A-1 well any indication of coning or any indication that any of the producing oil formation is being drowned out, in your opinion?

A It indicates to me that water is now being produced that originally displaced oil that had been produced. The well has never been drowned out and has been producing about the same amount of oil and water since the workover.

Q Is it unusual in your experience as chief petroleum engineer of Mid-Continent to find a well producing water in this type of a water-drive reservoir?

A We would expect that to happen.

Q That would, in your opinion, be more or less normal procedure?

A That is correct.

Q In your opinion is any waste occurring underground, waste damage to the reservoir, in the 1-A well?

A The production of oil and water in a fairly uniform ratio in this type of reservoir does not indicate waste to me. This well, I might say, has produced to date 145,612 barrels of oil.

Q Mr. Penn, are any other Mid-Continent wells making water? You mentioned you had two. What other wells?

A No. 1 Dessie Sawyer which is located in the southwest quarter of Section 27.

Q Approximately how much oil, clean oil, did this Dessie well produce before it began making any appreciable amount of water?

A Approximately 230,000 barrels.

Q Did your company take any action to try and remedy the water condition when the Dessie well began to make water?

A When the well first showed water we cut the production back because we didn't know where the water was coming from, whether we had a hole in the pipe, or whether we were producing formation water, or exactly what might be occurring. We cut the production back and eliminated the production of water.

Q How do you explain this water in this Dessie well which is a well high on structure, Mr. Penn?

A It has been our experience in the operation of faulted reservoirs that wells located near the fault may start making water early in the life of the field regardless of their position on the structure with respect to the water-oil contact.

Q As I understand your opinion then, Mr. Penn, your company has experienced this condition in other wells in other fields which were located, although they were high wells, where they were located or adjacent to a fault line have begun to make water

early and a well which was located lower on the structure but considerable difference away from the fault?

A That is correct.

Q This is nothing unusual in your experience?

A I believe not.

Q In your opinion does this indicate any evidence of coning or drowning out of any of the producing formations in this well?

A I don't know what path the water followed that was produced from the well. I am inclined to believe from our past experience that it came from a fault plain to the well bore.

Q Came up the fault to the porous formation and then across into the well bore? In simple terms is that more or less your position?

A Yes, sir.

Q In your opinion is any waste occurring in this Dessie well?

A No. I wouldn't say it was waste to produce water with oil in such a reservoir as we have here.

Q Nothing unusual in your experience in this type of situation?

A That is correct.

Q In your opinion, Mr. Penn, as a result of your studies, do you think one well will effectively drain 80 acres?

A Yes, I believe one well will drain more than 80 acres in this reservoir.

Q Just briefly will you refresh the Commission's mind upon the

basis of your conclusion?

A The Commission will remember that we brought a number of cores in and showed the porosity and the permeability. We have discussed at length the effectiveness of the water drive as shown by the datum pressure curve which indicates a small loss in bottom hole pressure. That small loss in bottom hole pressure is evidence that our conclusions drawn from the porosity and permeability as to drainage are true. I would further refresh the Commission's memory concerning the interference tests we discussed at the last hearing.

Q Do you have any other points, Mr. Penn, upon which you base your conclusion that there is an inter-connected source or an inter-connected channel for this oil in this reservoir?

A The new wells as they are completed in the field have not had the original bottom hole pressure of 4,874 pounds. As a matter of fact, the point shown on the curve in the month of November 1951 of 4,854 is 20 pounds less than the original bottom hole pressure and is the pressure found in the newly completed Oil Development Company 2-27 Santa Fe Pacific well. This is 20 pounds less.

Q You mean Oil Development or Magnolia?

A Oil Development 2-27 Santa Fe Pacific. This is the average pressure which then existed throughout the reservoir.

Q Mr. Penn, much has been said in this --

A (Interrupting) Would you let me make one more remark? Strike his statement and let me make one more comment? We will present a lengthy discussion after a while from another witness on the bottom hole pressure datum curve and will show that the bottom hole pressure found in Magnolia 1-B Santa Fe Pacific is also the average bottom hole pressure of the field rather than the original bottom hole pressure.

Q Am I to understand that the Magnolia well completed in September of this year came in at approximately the average reservoir pressure and some 20 pounds less than the original bottom hole pressure of the reservoir?

A That is correct.

Q To you that is conclusive evidence that there is an interconnected channel for the oil throughout the reservoir?

A That indicates to me that the oil is in a state of equilibrium in the reservoir as to the pressure which can indicate nothing but drainage to the producing wells.

Q Mr. Penn, much has been said in previous hearings on this subject and regarding correlative rights in this pool. I realize this term is more or less a legal concept. Briefly, it simply means the opportunity afforded each owner of property in a pool to produce his just and equitable share. That being the share he should receive in proportion to his acreage in the pool. It is obvious from a brief review of the map that Mr. and Mrs. Sawyer

own approximately 60 per cent of the acreage in this reservoir, that is the proven or developed acreage. You have testified that we presently have seven producing wells in this reservoir. How many of these seven wells are on property under which Mr. and Mrs. Sawyer own the mineral rights?

A Four wells.

Q The Sawyers presently have four of the seven producing wells?

A Yes, and they own the minerals under it, yes and the well presently being drilled, Mid-Continent 1-EDU Sawyer is drilled on land on which they own the minerals.

Q They have four of the seven with a possibility of having five out of eight?

A That is correct.

Q Or approximately 60 per cent of the producing wells are now on their property?

A That is correct.

MR. SPURRIER: Where is the well that is drilling now?

MR. McKELLAR: It is in northeast of 27.

Q Mr. Penn, how much of this oil has the Crossroads Reservoir produced as of October 1st?

A 1,007,584 barrels.

Q 1,007,584 barrels?

A Yes.

Q What does the one-eighth royalty of this oil amount to?

A 125,948 barrels, or figured at $2.65 a barrel,$333,762.

Q There has been approximately $333,762 paid to royalty owners in this pool as their one-eighth share, is that correct?

A That is correct.

Q What portion of this $333,762 has been paid to Mr. and Mrs. Sawyer?

A Approximately $224,000.

Q $224,163 out of an approximate $333,762?

A That is right.

Q That is approximately 70 per cent, is that correct?

A That is 67 per cent.

Q 67 per cent of the overall royalty has been paid to Mr. and Mrs. Sawyer?

A That is correct.

Q Is this all the revenue that the Sawyers have received from their royalty?

A It is my understanding that they sold approximately one-twelfth of their royalty for $100,000.

Q Then they have already received approximately $324,000 for their royalty?

A That is correct.

Q Do you have any figures as to the current monthly income of Mr. and Mrs. Sawyer from this pool?

A According --

Q (Interrupting) Royalty alone.

A According to the figures of the purchasing company they received $9,217.24 for the oil produced in October 1951. The total for the three month period of September, October, and November of 1951 is $25,546.32. This is for the approximate 11/12 of one-eighth owned by the Sawyers. In other words, after they had sold approximately one-twelfth of their one-eighth.

Q In other words, Mr. Penn, their income, monthly income, currently from royalty alone on the four producing wells on which they own a royalty is approximately $8,000 to $9,000 a month?

A That is correct.

Q Mr. Penn, in your opinion is the pressure presently being maintained in this reservoir?

A The water drive is maintaining the pressure in this reservoir. As a barrel of oil is produced a barrel of water moves into the reservoir. If this did not happen a rapid decline in bottom hole pressure would occur because of the low gas-oil ratio that exists in this reservoir, there being no gas expansion to take place and displace the barrel of oil that has been removed provided there was no water drive, but since there is a water drive, a very effective water drive in this reservoir, a barrel of water displaces each barrel of oil that is produced so that the pressure is maintained.

Q The pressure is being maintained in this?

A That is correct.

Q Mr. Penn, are there any other points that you would like to bring to the Commission's attention?

A I believe not, unless the Commission has something they would like to ask me.

MR. McKELLAR: Unless the Commission has some questions to direct to the witness I turn him over to Mr. Hanners.

MR. HANNERS: If the Commission please, we had not intended to appear impoverished.

CROSS EXAMINATION

By MR. HANNERS:

Q You are aware of the fact, are you not, that the first order made back in July of 1948 was made on the major premise that four sections of land would all be productive of oil from the Devonian formation? That four sections being the four sections that was described in the information filed by the Sawyers?

Mr. Penn, when the information in this case was filed by the Sawyers there was an exhibit attached to it that covered a four section area. Are you familiar with the fact that the four sections there described are the same four sections that were described in the original order made back in 1948?

A I believe that is correct.

Q Are you also familiar with the fact, Mr. Penn, that the order

made in 1948 was made on the assumption that the four section area would all be productive of oil from the Devonian formation?

A I don't recall that fact.

Q The original order did cover the full four sections, didn't it?

A Yes, it did.

Q At our hearing in March I believe that you and other engineers and geologists testified with reference to a map that you introduced as your Mid-Continent Exhibit No. 1. At that time you had an extra copy and I believe one is in the Commission's file and one is here. At our hearing in March, isn't it true, Mr. Penn, that the geologists and the engineers testified that the red line on Mid-Continent Exhibit No. 1 represented the productive area of the Crossroads Devonian field?

A They did that, yes.

Q You subscribed to that same statement at that time, didn't you, Mr. Penn?

A I don't recall whether or not I subscribed to it. It was the evidence presented by the geologists.

Q Will you take my pencil, please, and draw on my copy of Exhibit No. 1 the approximate location of the new Magnolia well in the northwest quarter of Section 26?

A Approximately there. (Witness complies.)

Q You have drawn the location of the Magnolia 1-B well in the

southwest of the northwest of 26 at the outer edge of your red circle which had been previously drawn on the map indicating the boundaries of the field?

A Yes.

Q Do you have the information, Mr. Penn, as to the depth at which the Magnolia well encountered the Betenbaugh lime in the Devonian formation?

A No, sir, I don't.

Q Do any of the witnesses with you today have that information?

MR. McKELLAR: We have it.

MR. HANNERS: I would like for one of the witnesses to show the corresponding depths that the Betenbaugh lime was encountered in the last well.

MR. McKELLAR: Be glad to do it.

Q Draw on the map the Mid-Continent Sawyer well described as, I believe, in the northeast quarter of Section 27.

A (Witness complies.)

Q Mr. Penn, the location of your company's Sawyer E well is some distance beyond the red circle which you had previously used to indicate the boundaries of the Devonian field, is that correct?

A That is correct.

Q Do you now concede, Mr. Penn, that the statement of yourself, if you made it, and the statement of the other engineers and

geologists at the March hearing as to the limits of the Devonian field were in error?

A Yes, sir.

Q Are you able to extend the contours that are shown on this map in a direction northerly so as to include the location of your E well and so as to include the Magnolia 1-B?

A I haven't done that.

Q Will there be one of your witnesses here today capable of doing that?

MR. McKELLAR: May I interrupt. We have a geologist who can testify to the Magnolia well, he being a Magnolia geologist. He can not testify as to what basis the Mid-Continent used in locating their present location. As a matter of fact, as was brought out in the last hearing, I don't think that the geologist, certainly not your geologist and not the Magnolia geologist, who did not testify, I don't think he has closed that on the north. In other words, it is open to get the correlation of the well now being drilled.

Q Mr. Witness, are you able to close the boundaries or the limits of the Devonian field now on the north or on the east?

A No, sir.

Q At the time of our hearing in March the geologist and engineers had closed all of the boundaries of the Devonian field excepting only the engineer Mr. Fitting, isn't that true?

A As I remember, that is correct.

Q So we have a basic error then in the testimony of the engineers and geologists who testified for your company and others in our hearing in March, is that correct?

A I wouldn't use such strong language if I were going to say it. I would say we had a basic revision in the evidence we presented because of the fact that another well has been completed in the reservoir.

Q Didn't you also testify at the March hearing, Mr. Penn, as did the other engineers and geologists, that the Dessie Sawyer well located in the northeast of the southwest of 27 was high on the structure?

A Yes, sir.

Q And would be the last well to make water?

A I don't recall that testimony.

Q Do you recall the testimony that the wells in a water-drive field, that the wells high on the structure will ultimately produce more oil than the wells out on the flanks and wells out on the flanks will go to water first?

A You are reading, I believe, from the transcript of the last hearing.

Q That is correct.

A What page is that?

Q The testimony of the first witness, Mr. Ray.

A What page of your copy?

Q Page 12. If such was the testimony at the March hearing and if you have now encountered water in the Dessie Sawyer well, Mr. Penn, what would the recovery of the water in the Dessie Sawyer well now indicate to you as an engineer?

A I believe I testified that it indicated that water was being produced from the Dessie Sawyer well which came into the well from the fault plain and that is based on our past experience of faulted reservoir production, performance instead of production.

Q Doesn't the fact that you now make water in the Dessie Sawyer indicate lack of uniformity in the water movement in the field?

A Would you explain further your question, please.

Q You testified at the first hearing that the Dessie Sawyer well was high on the structure and that the flank well would go to water before it. How do you explain that statement if the Dessie Sawyer well which is high on the structure is now making water itself other than to say there is a lack of uniformity of water movement through the field?

A If you will please explain what you mean by uniformity I will try to answer the question.

Q You had testified at the first hearing that the edge wells would make water first. How do you now explain the fact that the Dessie Sawyer well is making water and the other edge wells are not?

A I tried to explain in answer to your last question that water was moving into this well I thought, from our past experience, from the fault plain which is nearby.

Q By the way, at what depth are you now producing the Dessie Sawyer well?

A It hasn't been re-completed, it is producing through its original perforations.

Q At what depth? Are you producing it above or below 12,000 feet?

MR. McKELLAR: That fact is in the record in the case. A lot of the evidence that didn't change we didn't bring it all up to date again.

A This record shows the total depth of the Dessie Sawyer No. 1 well as 12, 231 feet. The following intervals were perforated: 11,750 to 765, 11,740 to 750, 11,785 to 11,840. Bottom perforation would be 11,840 which is above 12,000 feet so the answer to your question would be yes.

Q That the Dessie Sawyer well is now producing from above 12,000 feet?

A Yes.

MR. SPURRIER: From above or below?

A Above, the production perforation I assume he is talking about, Mr. Spurrier.

Q Mr. Penn, on the map which you have before you and in our

testimony at the hearing before, you engineers used a minus figure in describing the depth of your wells. Can you give me the figures on the Dessie Sawyer well? What was the original depth that you engineers used in the minus figure?

A I don't have that before me. If you could read it out of the past record it would shorten the proceedings.

Q Maybe I can find it. You talked about some financial matters of the Sawyer people. As I recall you testified at our hearing back in October as to the payout your company had recovered on some of the wells that you had drilled. That was in October of last year. You testified at that time that the Dessie Sawyer well had cost you 442 thousand odd dollars to complete, that you had recovered $386,000, and were then carrying a deficit of $56,000. Do you have those figures handy?

A No, I don't have the October figures here before me.

MR. McKELLAR: Last year? We can assume those to be correct. It is a matter of record in the case.

Q These are taken from the transcript?

A Yes.

Q At that time the Dessie Sawyer had produced 170,000 barrels of oil. The records now show that since October of last year you had produced an additional 108,907 barrels from that well, the Dessie Sawyer well, and that by using the easy factor of $2.00 per barrel for the 7/8 working interest which you have that you

have produced $217,814 and that the Dessie Sawyer well has now paid itself out by more than $161,000. The record you had at that time also showed that the UD Sawyer well D-1 lacked some $80,000 of having paid itself out. The record showed that since that time you have produced 134,721 barrels of oil from the UD Sawyer D-1 and that by using an easy factor of $2.00 per barrel for your 7/8 working interest you have now paid out the UD Sawyer well by more than $169,000.

A Pardon me, which is that?

Q UD Sawyer D-1. So that Sawyer D well in the southwest of the northeast of 27 was completed by you in August of 1949 and at a drilling cost of $334,000. In slightly over two years you have recovered your entire drilling cost plus $169,000. So that from a financial standpoint your company has not done poorly either, has it, Mr. Penn?

A That is a broad question. We try to operate as prudently as possible and show profit for the stockholders.

Q The only well that you now have which has not virtually recovered all drilling costs is the one dry hole that you drilled, is that not true?

A Not according to my record, Mr. Hanners. Would you like for me to bring those up to date according to the Accounting Department records?

Q I would appreciate those figures.

A UD Sawyer A has a red figure of $194,762.17 as of October 31, 1951. UD Sawyer 1-C has a red figure of $116,053.19.

Q How old is that well, Mr. Penn, the 1-C? When was it completed?

A It was completed February 1951.

Q It has a red figure of how much?

A $116,053.19.

Q What was the total drilling cost?

A I show a total leasehold equipment drilling cost and operating expenses to date of $316,627.81.

Q Does that mean that since February of this year you have more than recovered 50 per cent of the cost of the well and all of your leasehold expense?

A Yes.

Q Proceed.

A UD Sawyer 1-D shows a black figure of $200,527.03. No. 1 Dessie Sawyer black figure of $156,053.13. Would you like me to recap that into one number?

Q No, sir, I don't believe that is necessary.

MR. HANNERS: That is all, Mr. Penn.

I would like to offer the instrument previously marked as Mid-Continent Exhibit 1 which has the location of the two new wells, with the understanding that you have engineers present who could give us the statistics.

MR. McKELLAR: We have a geologist.

MR. SPURRIER: Without objection it will be received.

REDIRECT EXAMINATION

By MR. McKELLAR:

Q You, as I understand, you were not contradicting Mr. Ray's testimony that a well high on the structure would be normally the last well on the field to make water in a water-drive reservoir?

A No, sir.

Q You were explaining the Dessie Sawyer as an exception to the general rule because of its close proximity to the fault line?

A That is correct.

Q Which fault line was admitted by Mr. Ray and the geologist for Mr. and Mrs. Sawyer at the last hearing.

A That is my understanding.

Q Mr. Penn, your four producing wells in this reservoir do show that they have now made a profit as an overall proposition, do they not?

A They have.

Q As an overall proposition for the Crossroads Devonian Reservoir has your company made a profit or is the figure still in the red?

A We are still in the red.

Q Assuming that you were in the black, that is the purpose you

are in the state of New Mexico operating for, is it not?

A That is true.

Q You try to make a profit?

A Yes.

Q That is the way you stay in business?

A Yes, sir.

MR. McKELLAR: That is all.

RECROSS EXAMINATION

By MR. HANNERS:

Q The only well that you have that still leaves any of your operations in the red is the one dry hole that you drilled, isn't it?

A I believe I presented figures that showed that two of the wells were in the red and two had paid out as individual wells. That the Sawyer A well had not paid out and the Sawyer C well had not paid out.

Q Aren't they both new wells, Mr. Penn?

A This A well I believe is the discovery well, Mr. Hanners.

Q I beg your pardon. The large red figure you have though is chargeable to the one dry hole, isn't it, principally?

A I didn't give you the red figure for the Sawyer B. I believe it amounts to $474,000. On the fourth well for which I gave you figures we have a balance of the red figures and the black figures in the black at $45,964.80 for those four wells.

Q One question I asked you about a moment ago. How far above the water level in the Dessie Sawyer well as you first drilled it are your base perforations?

A I don't have the elevation on the well.

Q You will have some other geologist or engineer who can furnish that information for us?

MR. SPURRIER: Does anyone else have a question?

By MR. WHITE:

Q I would like to ask some questions first. I might like to explain myself. It has been stated by expert testimony before this Commission before that the words porosity and permeability were coined by geologists merely to confuse lawyers. I am neither a geologist or engineer and I am confused. For example, in your testimony you state that drilling of one well on 80-acre tract could effectively drain the 80 acres. Others have testified it would adequately. Do you use the term effectively drain in the economic sense or in regard to the per cent of the oil initially in place?

A In regard to the recoverable oil in place.

Q Would that be in the economic sense or term?

A That would be in the performance sense of the term. In the economic sense, you mean dollar wise with respect to the drilling costs?

Q Yes.

A No. I believe that in this particular reservoir that one well will recover a very high percentage of the oil in place. I believe you will find in my past testimony that I stated it could be as high as 80 per cent of the oil.

Q Well, can you recover the same percentage of oil initially in place by drilling one well on every 80 as you can by drilling on 40-acre tract?

MR. McKELLAR: In this particular reservoir?

A In this particular reservoir?

Q Yes.

A I believe the difference would be very slight.

Q What would that difference be a less percentage by drilling the 80?

A Slightly so, yes, I believe.

Q What percentage would you place on there?

A I can't place a percentage on there.

Q Then I take it from your testimony that you cannot drain the same percentage of oil initially in place on it by drilling one well on 80 as you can on 40.

A I believe that most engineers will concede that if we drilled two wells on a 40 we would drain more than if there were one well, and if there were four wells on forty we would drain more than if there was one well.

Q Is it not true that 40-acre spacing in a majority of fields

is considered as wide spacing?

A I can only answer that by saying that each particular field has a problem in itself.

Q What would you estimate the number of barrels of oil in place to be in the Crossroads Pool?

A We hadn't presented that data in the past as we considered it as confidential information. If my company wishes to release it, I would be glad to do so. I would like to clear that with them.

Q Would that also be true as to the approximate number of barrels per acre?

A Yes.

Q And also as to the net?

A Yes.

Q How long a period of time would you estimate that it would take to drain the pool on an 80-acre pattern?

A At the present allowable?

Q Yes.

A I would expect that the last well might be plugged within 20 years.

Q What is your basis for that conclusion?

A The engineering studies that we have made of the reservoir.

Q How long would it take to drain the pool on a 40-acre pattern?

A The same period of time.

Q Well, if that be true you have testified that you can get twice as much oil off the ground on 40-acre pattern than on the 80.

A Beg your pardon.

Q Didn't you testify a moment ago that you could get twice as much oil out of the ground on the 40?

A No.

Q If you have a well on every 40-acre tract you say it would take as long to drain that pool as it would if you had a well on every 80 acres?

A I believe you are a little confused.

Q I think possibly I am.

A When you ask me whether or not we would get any more oil by drilling a well on a 40-acre tract I understood you to mean would we get any more oil out of an 80-acre tract if we drilled two wells on it than we would if we drilled one well on it. I said we might get slightly more oil by drilling two wells on an 80-acre tract than if we drilled one well, likewise we might get more oil if we drilled 8 wells on an 80-acre tract than if we drilled one well. Now you ask me when will the pool be depleted. I said I would expect that the last well might be plugged within 20 years. Then you asked me how long would it take to get the oil out if the pool were drilled on 40-acre spacing. I said the same period of time. At this point I would like to add that we have an engineer

who will testify further on that particular point which I believe will clarify this matter in your mind.

Q How long would you say it would take to effectively drain this pool upon an 80-acre pattern?

A I said I thought --

Q (Interrupting) You said 20 years?

A The last well would be plugged within 20 years.

Q Now how long do you say it would take to drain this pool if there were a well on every 40-acre tract?

A Same length of time.

Q Are your wells meeting the allowables at the present time?

A No, not all of them.

Q In your opinion --

A (Interrupting) Let me correct that by saying that all our wells aren't producing at top allowable.

Q Would you be able to get your top allowable if you drilled a well on every 40-acre tract?

A No. We have an engineer that will show that the pool is being produced at the present time, we believe, at just a little above the proper rate of production at which this field should be produced. That is a little less than 2,000 barrels a day. If we drill more wells in the field the field should still be produced as a prudent operation at 2,000 barrels a day. There is just so much energy to produce the oil in that field without waste

according to the law and its definition. Regardless of how many wells you drill in the field you are still going to have to produce the reservoir without waste and to produce the reservoir without waste we have to make proper use of the energy that is available. That energy that is available indicates to us that the field should be produced at a rate a little less than 2,000 barrels a day. In other words, I say that if we had twice as many wells in a field the top allowable for each well would be cut in half. We have approximately 350 barrels top allowable per well now. If you had twice as many wells the top allowable would be 175 barrels a day.

Q How much undrilled acreage does your company have in this pool?

A I believe we have one 80-acre tract that doesn't have a well completed or drilling on it. That is the south half of the southwest of Section 27.

Q In other words, you have been carrying out your development program in a proper and efficient manner?

A Yes, sir.

Q Do you know what the acreage is of the other companies?

A No, sir, I am afraid I don't know what I consider to be productive. You would qualify your statement by productive acreage I believe.

Q Yes. Can it be said then as far as your company is concerned

that your development has met the implied and expressed covenants of your leases and you have been carrying out your development in a proper manner?

A Yes, sir.

Q Alright.

A May I correct one statement. You asked me how much of our acreage was undeveloped. The only 80-acre tract on which we don't have a well either drilled or drilling is the south half of the southwest of 27.

Q As to this water drive is this a horizontal or vertical water drive?

A Not knowing which it is I will say it is a combination of both. We have no evidence to indicate which it is.

MR. WHITE: I think that is all I have.

MR. SPURRIER: We will recess until 1:30.

(Recess.)

AFTERNOON SESSION, WEDNESDAY, DECEMBER 19, 1951

MR. SPURRIER: We will come to order.

RECROSS EXAMINATION

By MR. HANNERS:

Q Mr. Penn, just before lunch you were asked some questions by Mr. White as to the undeveloped Sawyer acreage. I believe you answered on the basis of 80-acre spacing, did you not?

A Yes, sir.

Q So that if you had answered on the basis of 40-acre spacing you would have testified that out of the 480-acre Sawyer lease you have developed five 40's and have seven of their 40's undeveloped.

A That is right with the drilling well and the eighth one.

Q You were also asked if you had complied with the implied covenants of the oil and gas lease. Isn't it true, Mr. Penn, that in July of 1949 Magnolia completed a Pennsylvanian well in the northeast quarter of the southeast quarter of 28 and that you people have not yet offset that well on the Sawyer lands?

MR. McKELLAR: You mean has he not drilled a Pennsylvanian well?

MR. HANNERS: Yes.

MR. McKELLAR: You can answer.

A We have no Pennsylvanian producers.

Q My question is you have not complied with the implied covenants of the lease to drill an offset well on the Sawyer land to protect them from the drainage of the Pennsylvanian well of the Magnolia.

A I believe that is a legal question. As far as it looks to me you are probably right.

Q Are you familiar with a demand that was made on your company in July of 1950 for the drilling of that well?

MR. McKELLAR: If you are going into that --

MR. CROCKER: Isn't this hearing confined to the Devonian matter. If you want to talk about the Pennsylvanian matter the Court House door is open to you on that.

Q Are you familiar with the fact that in July 1950 a demand was made on your company for the drilling of the well?

A No.

MR. McKELLAR: I am going to have to object to any question dealing with the Pennsylvanian wells because we are dealing with Devonian.

Q Would it be fair to say, Mr. Witness, about compliance with implied covenants that you limit your answer.

MR. WHITE: I directed that question in reference to the Crossroads Pool.

MR. McKELLAR: Crossroad Devonian.

MR. HANNERS: Then his answer was limited to the Crossroads Devonian Pool. That is all.

REDIRECT EXAMINATION

By MR. McKELLAR:

Q The only question I have, you told in answer to Mr. White's question that two wells on the 40 drilled to the Crossroads Devonian would drill more than one well, two wells to the 80 would drain --

A (Interrupting) I said they might.

Q In your opinion would the additional oil that would be recovered by drilling this second well on the same 80 be sufficient amount to pay for the additional cost and expenditure of drilling the second well?

A At the present time with the addition, with the information we have in this particular reservoir, my answer would be no.

MR. McKELLAR: I have no further questions.

MR. SPURRIER: Mr. Hanners?

MR. HANNERS: Nothing further.

By MR. WHITE:

Q Upon what information do you base your conclusion?

A Mr. White, I don't believe you were here last time when we presented information regarding an interference test in which we showed evidence of drainage over a distance of 1,866 feet. That indicates to me that one well will drain more than 80 acres. It is possible that well could drain the oil if it were located in the center of a circle that had a radius of 1,866 feet. My second reason for making the statement that I have can be explained better if you will look at the exhibit I presented in the form of a map. You will observe, please, that the new well drilled by Magnolia Petroleum Company, their 1-B well, is located a half a mile east of our 1-D well, a half a mile north of the 1-C well, and 1,866 feet from our 1-C well. When the bottom hole pressure static bottom hole pressure was measured on that well following

its completion they didn't find they had drilled into virgin reservoir there. They found that they had drilled into a reservoir from which some of the fluid had been drained because they found a bottom hole pressure of 4,853 pounds. We found the bottom hole pressure --

Q (Interrupting) That is static pressure?

A Yes, we found the initial reservoir pressure to be 4,874 pounds which indicates that there was drainage from that location and the nearest well was 1,866 feet away. That is my reason for making that statement.

Q Has any attempt been made to unitize this pool?

A Not to my knowledge.

MR. WHITE: That is all.

MR. SPURRIER: Anyone else have a question of Mr. Penn? If not, the witness may be excused.

(Witness excused.)

MR. McKELLAR: We call not as our witness but Mr. Bob Murphy for any information you may want to ask him. He is our geologist. He can tell you, I think, where our B well struck the Devonian and struck the Betenbaugh lime.

MR. HAMMERS: Perhaps we can do that during a recess. All I want to do is complete the chart.

MR. McKELLAR: I wouldn't call him then. I will call Mr. Frank Purdum.

F R A N K P U R D U M,

having been duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. McKELLAR:

Q Mr. Purdum, will you please state your name, sir?

A My name is Frank Purdum.

Q What is your position?

A I am the owner of Subsurface Engineering Company.

Q That is a consulting firm specializing in engineering work?

A Yes, for the oil industry.

Q I think, Mr. Purdum's qualifications have been presented to the Commission before, unless there is some --

MR. HANNERS: (Interrupting) There is no objection, we admit the qualifications.

Q Has your Subsurface Engineering Company conducted bottom hole pressure surveys of the Crossroads Devonian Reservoir throughout the history of the field?

A Yes, sir, starting shortly after the Mid-Continent Sawyer 1-A well was completed and periodically from then on.

Q Does this datum pressure curve which appears on our exhibit 9A reflect the results of these bottom hole pressure surveys?

A Yes, this 9A or 9.

Q 9B?

A Yes, these curves show the results of the several tests that

were made.

Q There are six points which appear, six little circles which appear on the datum pressure line. Will you please explain to the Commission what each one of these points indicate?

A The first point which is in June of 1948 is initial reservoir pressure which we secured by running tests in the Mid-Continent Sawyer 1-A well. The next pressure point that is shown that I called No. 2 here is an average of three tests that was in December of 1949 and to secure that pressure we tested all of the wells that we could get into at that time, Mid-Continent wells which was UD Sawyer A-1, UD Sawyer D-1, and Dessie Sawyer No. 1. The pressure of 4,861 pounds, and I might state all of these are calculated to a subsea datum of minus 8,141 feet. The 4,861 pounds is an average of the three tests run at that time. Then the next point which is in November of 1950, which is the third point, is just one test that was run in the Oil Development Santa Fe 2-27 well shortly after it was completed. That pressure was 4,854 pounds. The fourth point is an average of two wells, the Mid-Continent UD Sawyer D-1 well and the Dessie Sawyer No. 1 well. That pressure is 4,862 pounds. Then shortly after that in March of 1951 the Mid-Continent C-1 Sawyer well was completed and we ran a static pressure on that which is the fifth point which showed to be 4,860 pounds. Then in October of this year we ran a static bottom hole pressure on five wells. The Magnolia or, yes, rather the Magnolia

Santa Fe Pacific B-1. The Oil Development Santa Fe Pacific 27-2. The Mid-Continent Dessie Sawyer No. 1, UD Sawyer D-1, UD Sawyer D-1 the average of which was 4,864 pounds.

Q Mr. Purdum, this last test included five wells that has been run since we had the last hearing this past October, is that correct?

A Yes, the hearing was in March, was it not?

Q Yes, you run it this past October?

A Yes, and it is, the five wells was since that hearing.

Q Why didn't you test all seven of the wells on that test?

A There are two other Devonian wells in the field, UD Sawyer A-1 which was the discovery well of the field and the Magnolia Santa Fe Pacific C-1 both of those wells are pumping wells, the rods weren't pulled, we couldn't test those.

Q Were these two wells shut in or were they producing when you conducted the tests?

A In order to limit any interference they were shut in at approximately the same time the other wells were shut in so that we would get a correct static pressure.

Q Have you compiled the result of this October 1951 bottom hole pressure survey?

A Yes, we have compiled these results. We have the individual data sheets and the tabulation.

Q I have three copies of this. I would like to mark it as our

Exhibit 9C for the record.

(Marked Exhibit 9C.)

Q Mr. Purdum, will you please explain this exhibit which we marked 9C?

A This Exhibit 9C shows on the cover page the tabulation of the three Mid-Continent wells and the Magnolia well and the Oil Development Company well in which we ran static bottom hole pressures as of that date. The pages following are the individual data sheets showing the calculations and the pressures at different depths for each of the wells tested.

Q From this report that you have submitted the average compiled, the average bottom hole pressure for this reservoir is now 4,846 pounds, is that correct?

A Yes, numerical average of those individual tests calculates out to be 4,846 pounds.

Q I understand from your report that the average reservoir pressure is now only 2,800 pounds, less than it was on the original survey when the test was conducted.

A We measured 4,874 pounds in May of 1948 on the discovery well shortly after it was completed. The average now is 4846 of the Devonian wells that we could test which is 4,876, 28 pounds, yes, 28 pounds loss in reservoir pressure in that length of time.

Q How do you explain this comparative small loss in bottom hole pressure over this period of time and after over a million

barrels of oil have been produced from the reservoir?

A This small loss in reservoir pressure is explained by the very active water drive which has been shown to exist by earlier testing and further substantiated by the recent field-wide bottom hole pressure that we are now talking about.

Q Is it your opinion that the reservoir pressure in this pool is being effectively maintained by the present plan of operation?

A It is my opinion that no other plan of operation could more effectively conserve the reservoir energy as shown by the reservoir pressure.

Q Does this loss of 28 pounds in bottom hole pressure over the period of time and after this much production show appreciable loss for a reservoir of this type or any reservoir for that matter?

A A loss of only 28 pounds with an original pressure of over, well it is almost 4,900 pounds, is a very small loss, in fact it is only one pound for each 40,000 barrels approximately of oil produced. That is a small loss in pressure for this or any other reservoir for that amount of production and over this length of time.

Q Does this small loss in reservoir pressure indicate to you that the water drive in this field is effective, very effective, or not effective at all, or just what does it indicate in that respect?

A The small loss in reservoir pressure shows conclusively that

the pressure is being maintained almost but not quite as there has been some loss in bottom hole pressure, 28 pounds, in the last three years, a little over three years.

Q Which is a very small loss for this much oil, in your opinion?

A Yes, it is a small loss for that amount of production.

Q Mr. Purdum, is there any other information which you deem important to the Commission in the determination of the issues which are presented in this case?

A Yes, there are several important factors that must be considered, it seems to me, and that they are quite apparent from the tests and studies made of this data and such as, one, the loss of the reservoir pressure during the time only a few wells were being produced as compared to the loss in the reservoir pressure after the field was further developed; two, the effect of increased field withdrawals of oil on the rate of energy loss if additional wells are drilled and the present per well allowable maintained; three, the necessary reduction in per well allowable that must be made when additional wells are drilled if the present efficient natural pressure maintenance is to be continued. I believe that we will all agree that as there has been 28 pounds loss in reservoir pressure during the life of the field and that approximately half of the loss has occurred in the last seven months that the present field withdrawal right now, it is with the completion of the Magnolia wells itself approximately 2,000 barrels per day

1,700 barrels without the Magnolia well. That is the B-1 well that has recently been completed. It seems quite apparent that the 2,000 barrels per day is a maximum that can be produced without a more rapid decline in reservoir pressure.

Q I believe that is all the questions I have of the witness. Excuse me.

A Well, there, if this rate of pressure decline is increased then there is going to be a result of waste of reservoir energy and a reduced ultimate recovery due to the fact that the pressure will go down and there isn't much reserve left that is within two or three hundred pounds we are now on those wells of when they will cease to flow static pressure. Should more wells be drilled in this reservoir and as the field withdrawals must remain constant, there will be no other choice but to reduce the allowable of the well. The income from the reservoir can be increased only at the expense of physical waste of the reservoir energy which it seems that we are all obligated to conserve.

Q Is that all your thoughts on this?

A Yes, that pretty well sums my studies of these tests that we have made on the reservoir over the life of the field.

Q Mr. Purdum, one other question I had. You stated that you were in the consultant business?

A Yes.

Q You are not employed solely by the Mid-Continent, Magnolia,

or the Oil Development Company of Texas?

A No.

Q Approximately what per cent of your overall business do you receive from the Mid-Continent Petroleum?

A One per cent, I expect.

Q One per cent of your overall business?

A I imagine. I haven't actually figured it up but it is not a large percentage.

MR. McKELLAR: I have no further questions.

CROSS EXAMINATION

By MR. HANNERS:

Q Your second point on the pressure charts we have has the figure 4861 as the average of three tests. Those three tests being on the A-1, D-1, and Dessie well. Can you give us the figures on each of those three wells rather than the average?

A Yes, I have them here. If you don't mind I will take them off this, I have just tabulated them. For UD Sawyer A-1 4860, 4860 or UD Sawyer A-1; for UD Sawyer D-1 is 4875, and for --

Q (Interrupting) I didn't understand you.

A Excuse me. 4875 for the UD Sawyer D-1, for Dessie Sawyer No. 1 4849.

Q How long were each of those wells shut in, Mr. Purdum, for the taking of those tests?

A I will have to refer to this. Well, I don't have that in

front of me, but it was a series of tests in most cases and we did test them until a maximum was secured.

Q Approximately how long?

A I would say mostly 48, in the neighborhood of 48, say from 24 to 48 hours average.

Q Your next average figure that you have is on your fourth point where you took the figure 4862 as the average of the test taken on the Sawyer D-1 and on the Dessie Sawyer. Will you give us the individual figure yourself rather than the average?

A Yes. The UD Sawyer D-1 was 4872. The Dessie Sawyer No. 1 was 4853.

Q I believe you testified that one of the factors that led you to your present conclusion is the loss of reservoir pressure. That was what you gave as the first one. If I have understood you correctly I note that the UD Sawyer had a pressure test of 4872 as compared to an original pressure on the discovery well of 4874. That would be a slight variation, would it not?

A Yes. That is not much.

Q On the test that you averaged as your point it would test where you got an average of 4861, the pressure test on the Sawyer D well at the time was 4875 which was one pound greater than your original test on your discovery well, isn't that true?

A Yes, sir.

Q Mr. Purdum, there is a map by the side of you marked Mid-

Continent Exhibit 1. You recall at the earlier hearing where you testified similarly from your pressure tests that in your opinion all of the wells then drilled would drain effectively and efficiently the entire Crossroads Devonian formation.

A I don't remember if that was the exact wording.

Q I want to be fair, I will read you your answer from page 42.

A Alright.

Q "It also shows that there is an active and forceful water drive that has been maintained bottom hole pressure. This natural drive should flood the reservoir in a natural manner and allow the present wells to produce substantially all of the recoverable oil."

A I think, I still think that is true.

Q How do you explain the drilling of the well by the Magnolia in the northwest southwest of the northwest of Section 26?

A That is the B-1?

Q Yes, which was outside the map you had before you at the time you gave the testimony. How do you explain the Mid-Continent E well in the northeast of 27 which is outside the limits of the map you had before you when you gave that testimony?

A Well, there has been considerable agitation for further development in the field and those locations were made. I had nothing to do with making the locations but it is entirely possible that the decision there was in order to be sure that the field was adequately drilled and there always is a possibility of

extensions to fields.

Q Do you feel, Mr. Purdum, that the drilling of those wells will obtain additional production of oil?

A In no substantial amount, no.

Q Don't you believe the companies expect to recover substantial production from those wells?

A Yes. I think they expected to get some oil from them.

Q At the time we testified before would you concede that the statement you made that all the wells then in existence were efficiently draining the entire Devonian Reservoir is in error?

A No, it isn't in error but this lease wouldn't have secured much benefit from the oil that would migrate over to the Sawyer.

MR. McKELLAR: That is Magnolia Santa Fe Pacific lease?

A Yes, and they have certain rights that need to be protected. I didn't make that location, as I say, but I think that the royalty owners and the company that had the property here in 26, they probably wanted to produce part of the reservoir oil from their lease, too.

Q One other thing, and I don't think you were asked this on direct examination, but there has been testimony of water encroachment in the Dessie Sawyer well. Did you hear that testimony this morning?

A Yes, I did hear it.

Q From that testimony do you conclude that there is uniformity

or lack of uniformity in the movement of water through the field?

A I think the fact that this Dessie Sawyer well is drilled in the close proximity to a fault, and again I am not testifying to the fault because I don't know but that has been conceded there is a fault there, and that the Dessie Sawyer No. 2 --

MR. McKELLAR: (Interrupting) No. 1.

A No. 1 is drilled close to the fault and the behavior of that well has no bearing on the action of the other wells in the field as shown by the UD Sawyer A-1, that is a low well and it is producing water. The Santa Fe Pacific Magnolia is a low well and it is producing water. The other wells are all higher and they aren't producing water. So I can't see that the fact that the Dessie Sawyer well is in that faulted section makes any difference with the conclusions that you can draw in the other part of the field.

Q You have no knowledge of your own, do you, Mr. Purdum, as to the fault?

A No, I mentioned that. I am just saying that it was mentioned today that everyone conceded there was a fault through there and that that would explain the water coming in from the edges and up through the cracks and crevices of the fault.

Q Mr. Purdum, I want to be absolutely fair but there are two statements I have trouble understanding. You stated today that one of the prime factors for your conclusion is the loss of

reservoir pressure. In the answer I read you a moment ago from the transcript of your testimony in March you said this, "It also shows that there is an active and forceful water drive that has maintained the bottom hole pressure." Are both of those statements necessarily true?

A Yes, you can, it is all a matter of degree. Here the reservoir pressure is being maintained, in fact it has lost only 28 pounds in the whole life of the field.

Q That is not true?

A That is substantially --

Q (Interrupting) That is not true as to each of the wells?

A Of course, when there is only one well in the field then you can only measure one well and that is the numerical average of the one well. As you drill more wells the only possible way that each well could drop in pressure, the loss would be exactly the same, would be to have the same amount of pay section, exactly the same amount of oil produced from each well. It is physically impossible to produce a field and have all of the wells show exactly the same pressure through the life of the field.

Q And the fact that the wells do not show the same pressure indicates a lack of uniformity, does it not, in the movement of water through the formation?

A Yes, I think that is true that it would to that small degree

a variation of a few pounds out of 4900 pounds, I think that would be true to that small degree.

MR. HANNERS: That is all, Mr. Purdum.

REDIRECT EXAMINATION

By MR. McKELLAR:

Q Mr. Purdum, there has been much said in this hearing in this case about the uniformity and lack of uniformity of this well. As I understand your testimony it would be impossible practically to have a lime stone reservoir which was completely uniform which was just like an open tank, is that correct?

A We seldom find one in wells that we test, in fact I don't know of any reservoir that we have ever tested either sand or lime stone but what there was a certain variation in the pressure throughout the field at a certain time.

Q On a comparative basis when your engineers speak of a uniform reservoir and a non-uniform reservoir on a comparative basis, would you speak of this as a relative uniform reservoir the performance of the wells while they are not all exactly the same, no, but on a comparative basis are they relatively uniform?

A That is quite apparent. In looking at the tabulation that I have here of the recent survey that we made and calling attention to the Dessie Sawyer No. 1 which has a bottom hole pressure at that time of 4,822 pounds and that is a well that is different than the others due to the fact that it is drilled presumably up

against that fault.

Q In the industry, in the terminology of your engineers, that would be known as a uniform reservoir or not?

A That is right, because the others, just let me read the pressures that we measured in the other wells of the reservoir without calling their names: 4847, 4849, 4852, and I said 4853 a while ago, I misread the number, and 4859, there is a variation of only, let's say, from 47 to 59, or 12 pounds in four wells, and the only one that is any different is the Dessie Sawyer well that we think is effected by the fault. The others are very uniform, within 12 pounds. Let me also call attention to the fact that these wells have been drilled at different times. Now the one well, the Magnolia Santa Fe B-1 well, has 4852 and again I will mention that I said 4853 a while ago, but it really is 4852 and that is a lower pressure than in the Oil Development Company Santa Fe 27-2 but still it is only 7 pounds difference.

MR. McKELLAR: That is all the questions I have.

MR. HANNERS: Nothing further.

By MR. SPURRIER:

Q I don't remember who testified, I think it might have been Mr. Penn, on interference tests between wells. What was the differential, do you remember that or should I ask Mr. Penn?

MR. McKELLAR: I think I can remember. I believe the difference between the draw down in one well due to flowing the others,

I believe, is 10 pounds. It was a small amount.

MR. SPURRIER: That is all. Anyone else have a question of Mr. Purdum.

By MR. WHITE:

Q On these static tests, through those tests you can ascertain what the approximate permeability is?

A Not through the static test but the combination of tests that we have run.

Q The draw down?

A The draw down and build up, it is done in different manners. It can be done in different ways but those tests do give you an indication of the effective permeability in the well.

Q But the static test does not?

A The static test gives you only an indication of the loss of reservoir energy.

Q Were any additional tests made such as draw down tests to show what the permeability might be in these wells?

A Since the test that we have previously testified to, no, not to my knowledge.

Q Were any corresponding analyses taken to determine porosity?

A That is a little out of my sphere. I don't know.

MR. McKELLAR: We put all that on at the last hearing and had the actual correspondence there. I think all that would be in the record as to the corresponding analyses and this porosity

and permeability.

A The tests that we have run in the past I have a record.

MR. McKELLAR: Those drawn down tests and interference?

A Not the permeability but the productive index test which is a measure of the permeability. I could give you those figures on some of the wells. The wells that we tested, if you wish.

MR. HANNERS: Mr. White, I believe those figures might be helpful. The productivity indeces.

A Yes, I have them.

MR. HANNERS: Would you give them, please.

A On the UD Sawyer D-1 we measured the productivity index up to 3.92 and that is barrels per day per pound drop in bottom hole pressure. On the Dessie Sawyer No. 1 that value is 2.16. On UD Sawyer C-1 in the neighborhood of 19. That is barrels per day per pound drop. On the UD Sawyer A-1 the productivity index was approximately 20. I believe that is all that we have tested this for P.I.'s in the field.

MR. HANNERS: You spoke of the interference test you had taken on two wells. What were those two wells?

A I believe I will have to refer to my notes.

MR. McKELLAR: That was those that he testified to at the last hearing.

A The three wells involved were the UD Sawyer D-1 and Dessie Sawyer No. 1.

Q Which of those two wells was shut in and which was producing when you took the test?

A Well, I am going to have to refresh my memory a little bit. I have looked at some things since then.

MR. McKELLAR: Just take your time. The whole thing is in the record.

A That is on page 40.

Q In your testimony then did you give us the two wells from which you took the interference test?

A Let's see, the two Mid-Continent wells we shut both of these wells in. That was the UD Sawyer D-1 and Dessie Sawyer No. 1.

Q What well were you producing at the time you had those two shut in for the purpose of the interference test?

A As I say, I will have to --

Q (Interrupting) Mr. Purdum, we did not have the information in the record of the last hearing is the reason for my inquiry now.

A I want to apologize for not having it on the tip of my tongue, but I don't. We left one of the wells shut in.

Q Which one?

A The Dessie Sawyer.

Q How long did you produce from the D-1 well in making the test at the time when the Dessie Sawyer well was shut in. It is not in the transcript, Mr. Purdum. You will have to refer to your notes.

A Well, if it is not in the transcript --

MR. McKELLAR: You testified that you flowed it until you picked up a distinct drop, until you had a measureable drop.

MR. HANNERS: I don't find that.

Q What I want to know, the purpose of my question is which well you produced and for how long and at what rate and which well you had shut in while you were making the interference test, how many barrels of oil you produced in order to accomplish the test and how many times you ran your testing device to get that ten pound drop in pressure you testified about.

A I can't tell you that unless I have my, the copy of the test. I don't read it in there.

MR. McKELLAR: It is not in there.

MR. HANNERS: It is not in the transcript.

MR. WHITE: That is all then, Mr. Purdum.

A Alright, thank you.

REDIRECT EXAMINATION

By MR. McKELLAR:

Q If the interference test had never been run could you from the additional data which we have obtained since the last hearing when we presented these interference tests, could you from additional data that you have obtained since then concluded that there is inter-communication within the reservoir?

A Well, it is, someone might object to the small interference

that we had. To me it is in the interference test the ten pound for that high permeability in the reservoir that is conclusive in my mind.

Q Assuming that you had never ran any?

A If we hadn't run those at all and we go to the reservoir and drill a new well and then we find that instead of being 4874 or 75 pounds, 1474 pounds was the original reservoir pressure, and when we ran a test on a brand new well and find that the reservoir pressure at that point is only 4853 pounds that shows that something has happened to the reservoir pressure. In other words, at that point in the reservoir there is less pressure than there was originally.

Q That is the Magnolia B?

A That is the B-1.

Q That is conclusive even if you had not run the interference test?

A That is right, the interference test is another indication which is substantiated in full by the fact that the pressure does go down in the part of the reservoir that hasn't been produced.

MR. McKELLAR: That is all.

RECROSS EXAMINATION

By MR. HANNERS:

Q The ten pound drop which you testified about was ten pounds

out of 4874 pounds of pressure?

A That is right.

Q Would that be one-tenth or one per cent on one hundred of one per cent?

A Well, out of 50 pounds would be one per cent of five thousand, so it is less than one per cent.

MR. HANNERS: That is all.

A But it is still indicative that there is a drop.

MR. SPURRIER: Anyone else have a question. If not, the witness may be excused.

(Witness excused.)

J O H N W. S T R A Y H O R N,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. McKELLAR:

Q Will you please state your name?

A John W. Strayhorn.

Q What is your position, Mr. Strayhorn, by whom are you employed?

A Petroleum Engineer by Magnolia Petroleum.

Q Where are you located?

A Buckeye, New Mexico.

Q Are you a graduate petroleum engineer?

A Yes, I am, from the University of Oklahoma.

Q When did you finish at the University of Oklahoma?

A In May of 1948.

Q You have been employed by the Magnolia --

MR. HANNERS: We will admit his qualifications.

Q Have you had experience in making an engineering study of the Crossroads Devonian Reservoir, Mr. Strayhorn?

A Yes.

Q How long have you been working in this reservoir as an engineer?

A About three years.

Q You were there when Magnolia first began their operation, then, in the Devonian?

A No, immediately after.

Q How many production wells does the Magnolia now have in this reservoir?

A Two.

Q Approximately what is the daily oil and water production from the two wells?

A The Magnolia Santa Fe Pacific C No. 1 makes about 260 barrels of oil and 400 barrels of water. Santa Fe Pacific 1-B, top allowable making 350 barrels.

Q Have you made an engineering study of this reservoir with particular emphasis on the type of energy present?

A Yes.

Q Do you agree with the other engineers that it is a water drive?

A Yes.

Q Is it your opinion that one well will efficiently drain 80 acres in this reservoir?

A I think so.

Q Do you think that by drilling two wells on the same 80 we would recover enough additional oil from the second well to pay for the drilling of the well?

A No, I don't.

Q Upon what do you base your conclusion?

A Well, my conclusions are based primarily upon this bottom hole pressure of Magnolia's new well and the Santa Fe Pacific 1-B where its bottom hole pressure during the last survey was 4252 pounds which is only six pounds above the field average pressure at that time. If the wells previously completed were not draining the entire reservoir prior to this well being completed, I think that if they were draining the entire reservoir they would be draining more than 80 acres of well. I think that the well would have had a pressure near the original pressure of 4864 pounds.

Q Is it your opinion that this reservoir pressure is being effectively maintained in this pool?

A Yes, sir.

Q Is it your opinion where there is a loss of only 28 pounds of reservoir pressure over the life of the pool it is indicative that any waste is occurring?

A In fact the loss of only 28 while producing over, slightly over a million barrels of oil, would indicate the reservoir is being produced efficiently.

Q Do you find any evidence of coning or flooding out of any of the formations is occurring in the pool?

A On the basis of Magnolia and Santa Fe Pacific C No. 1 I would say no. The well was completed from only about 20 feet of pay and very near the water table as indicated by the almost immediate production of water after completion and this well has continued to produce for a period of approximately three years now. I think in the neighborhood of 150,000 barrels of oil and water percentage has gradually increased as you would expect on an edge well in a water drive field. But the well, as I said before, is making 265 barrels a day at the present time and it is evidently not flooded out. I think if there was any appreciable coning it would have been flooded out by this time.

MR. McKELLAR: I have no further questions.

CROSS EXAMINATION

By MR. HANNERS:

Q As I understand, Mr. Strayhorn, your first Magnolia well was the C-1 in southwest southwest of 26.

A That is right.

Q It was completed above the water and produced without making water for a period of some months?

A No, approximately two days I think, something like that.

Q Has the water increased in that well through the months and years since it was first put on production?

A Gradually, yes.

Q So now then you have 400 barrels of water to 260 barrels of oil?

A That is right.

Q Does that indicate to you that there might be a coning up of the water under the well?

A No, it indicates to me that the water is gradually flushing the oil from the zone adjacent to this well possibly or possibly below it but it is gradually flushing the oil and replacing the oil and some of the water is coming in behind the oil and being produced with the oil.

Q Have you at different times produced a higher ratio of water than 400 to 260 as you are now producing?

A I couldn't answer that accurately.

Q You had your well, the 1-C well, shut in for a month or two while you were treating the water, didn't you?

A Not while we were treating for water, no. We installed a pump there at one time that took some time.

Q Isn't it true that you have had a water ratio to the oil higher than your 400 to 260 or did you not?

A I don't believe our percentage has been any higher than that. It might have been slightly higher at some time. That isn't over any extended period, though.

REDIRECT EXAMINATION

By MR. McKELLAR:

Q A couple of months ago Magnolia went in there and did some re-completion work on the well and changed their equipment up to where we increased our fluid withdrawal from the well, increased both our oil production and water production but did not substantially change the oil water ratio? We simply increased the production of both oil and water?

A I think that is right.

Q We did do that. This well, constant increase of the oil water ratio throughout the life of this well is that what you engineers expect and is that what your experience in practically all the low structure wells in the field where a strong active water drive is present?

A Yes, especially in this field, not especially in the field, there is no gas to produce the oil unless the water comes in to force the oil out, there is no way to produce it.

Q There is a normal situation, nothing unusual?

A That is right, in a water drive type field.

By MR. WHITE:

Q Mr. Strayhorn, is it true that a coning condition is less likely to arise if you take the oil from under the 80 acres by the medium of two wells than it would be for one well because of the pressure differential?

A Well, it would depend on the pressure differential around each well, I would think.

Q I have reference to just the drilling of two wells on 80-acre tract, taking oil out of two wells as against the one well and the coning condition less likely on a rise if you have two wells.

A Are you speaking of this reservoir?

Q Yes.

A I don't believe so, no.

Q What is your reason for that?

A Well, one thing it is a good permeability in the reservoir which more or less I think would allow, you would have a very small draw down as noticed from the PI tests there because during the production it would cause a small draw down in bottom hole pressure. I think that is your criteria.

Q You stated that it was, that you considered it economically unsound to drill two wells on 80-acre tract, is that correct?

A I believe that you would not recover enough oil from the second well, additional oil from the second well, to pay for the

well.

Q If the Commission were to require 40-acre spacing would you consider it so unsound economically as to be disposed to recommend to your company to relinquish their leases?

A That is not in my realm.

MR. McKELLAR: The geologist's realm is location. The engineering wouldn't have anything to do with it.

A The thing you are getting at, I might bring this up, it would depend on the time. I wouldn't say that the other well wouldn't produce enough oil to pay out. It wouldn't produce enough additional oil over what one well would produce on the 80 acres.

MR. SPURRIER: Anyone else have a question of Mr. Strayhorn?

(Witness excused.)

MR. HANNERS: As I understand Mid-Continent and Magnolia have concluded their testimony.

MR. SPURRIER: That is what I understand.

MR. HANNERS: I have one witness, Mr. Fitting.

MR. McKELLAR: We waive his qualifications.

R A L P H U. F I T T I N G,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. HANNERS:

Q Your name is R. U. Fitting?

A Ralph U. Fitting.

Q From Midland?

A Yes.

Q You are the same Mr. Fitting who testified in this case previously?

A Yes, sir.

Q In your testimony in March you testified, I am speaking generally now, that the employment of the 80-acre spacing pattern in the Crossroads Devonian field, in your opinion, was conducive to waste. That one well would not efficiently drain 80 acres and that the proper and practical drilling pattern to be employed in the Devonian reservoir was one well to 40 acres.

You likewise testified that the limits of the Devonian Reservoir as established by other witnesses were in your opinion in error in that they were improperly enclosed on the north and on the east. Since your testimony there have been two wells drilled in the area that you had then testified would be productive. After hearing the testimony today have you changed your opinion and conclusions in any way as to the recommendation you would make to the Commission as to the proper spacing pattern to be employed in the Crossroads Devonian field?

A No, sir, I have not. The combination of the strong water drive which is freely admitted by the witness and non-uniform permeability which has developed in the field has the inherent

danger of channeling of water at highly daily per well rates. The drilling of additional wells would permit the continued producing capacity of this reservoir at lower per well rates, would reduce tendency toward channeling or coning of water, and danger of trapping of oil. There has been evidence that there is irregular encroachment of water in two wells and possibly three. These two are the Mid-Continent Dessie well and in which well the bottom of the perforation is 442 feet above the original water oil contact. That is evidence of an irregular encroachment of water by whatever means it is explained that the water is in the well. The Mid-Continent 1-A Sawyer similarly being the discovery well, went to water in about three months after the completion of the well and certainly evidences that water irregularly encroached into that well. The same thing may possibly be true of the Magnolia 1-C well which went to water in just a couple of days after it was completed. Certainly the development of the Magnolia 1-B well which found the top of the Devonian at minus 8037 or 207 feet above the water level, if you assume the bottom of the Magnolia 1-C well was the water level, evidences that there is a great deal more productive land in the Crossroads Devonian field than has now been developed.

Q On the map which was introduced at the first hearing and is marked as Mid-Continent Exhibit 1 there is various contour lines including one pencilled in red pencil, what have you to say now,

Mr. Fitting, as to the correctness of those contour lines?

A They are obviously incorrect insofar as the new Magnolia 1-B well is concerned and the same objection that I had at the previous hearing as to enclosing them south of the Pennsylvanian producers on the Oil Development Santa Fe Railroad lease and Magnolia Santa Fe 1-D, that argument still applies.

Q From the testimony you have heard today, Mr. Fitting, are there any particular factors that have been mentioned today that in your opinion have any particular significance on this question? In the testimony which you have heard today has there been any part of it that has particularly impressed you in coming to the conclusion that you have voiced at the March hearing and which you have reiterated today?

A I see no reason for change of opinion as to this matter.

Q In your opinion has the fact that the two wells have been developed outside the pattern demonstrated the truth of the statement that you made in March?

A Well, the facts are that one well has been drilled outside that pattern and found the Devonian above the water level. If the other is still drilling --

Q (Interrupting) What other observations would you make today, Mr. Fitting, having heard the testimony of the gentlemen who have testified?

A I believe I have nothing further.

Q It is still your opinion that the 80-acre pattern if employed

in the Devonian Reservoir would be productive of waste or conducive to waste?

A Yes, sir.

Q And that the practical normal 40-acre pattern is the best one to employ in the reservoir?

A It is certainly the practical pattern to employ in this reservoir for the reason it merits a uniform spacing of wells and a tendency toward the uniform and encroachment of water into this field.

Q Do you think of anything further, Mr. Fitting, that we should discuss?

A No, sir.

CROSS EXAMINATION

By MR. McKELLAR:

Q Mr. Fitting, you have testified at both hearings, the last one and this one, about the inherent danger of channeling a reservoir of this type if drilled on a spacing pattern of 80 acres one well to 80 acres. Now admitting for the sake of argument, that may be true, what wells in this field have you concluded that there is actually channeling or coning of water existing in today, which of these 70 producing wells?

A I already mentioned that there are three of them producing water at depths considerably above the original water level, two considerably above, one slightly above.

Q The Magnolia 1-C which produced water is at or near the oil water contact line?

A Probably, yes, sir.

Q So it is nothing unusual in a field of this type with the water drive of this type in that well producing water?

A Yes, it is unusual for a well to start making water after producing two days clean.

Q If it is completed right at or near the oil water contact?

A Well, it simply means that water comes through a permeable layer more rapidly than it has through the rest of the rock.

Q If it was completed right at or near the oil water contact line where only a small amount of clean oil existed between the well bore and the line it would be expected would it not?

A Yes.

Q That is what our geologists have testified where this well was completed, is it not?

A I believe he did.

Q And you yourself admitted that it was relatively near the oil water content?

A That is correct.

Q So there is nothing unusual about the Magnolia 1-C well making this water?

A Well, I think your geologist has inferred that it was close to the oil water contact by virtue of the fact that it did go to

water rapidly. So we are arguing in circles in that I will state this, I think that was completed close to the oil water contact rather than the minus 8200 which was shown on the previous exhibit.

Q No question. There has been some explanation for the water in the Dessie well, the mere fact that the well makes water in a water drive field is not conclusive that it is actually coning, is it?

A It depends on the definition of coning. By whatever source this water has entered the Dessie well it is the bottom of the perforations in that well are 442 feet above the depth that the Magnolia 1-C was originally completed clean and so that it would be an irregular incursion of water into the field whether you call it coning or came up the fault.

Q This produced clean some 32,000 barrels of oil recently?

A I know the substantial quality of oil.

Q For a substantital period of time also?

A Yes.

Q Some year and a half or two years before it began making?

A Also you must remember that the Dessie is the highest on the field. Others have produced more than that and are not making water.

Q It is the well that is closest to the fault line, right?

A That has been assumed. I guess it is closest to a fault.

Q Didn't you admit there was a fault line in the field?

A I did but I did not admit how close the well was to the fault because I didn't know.

Q Well, now, as I understand your testimony you testified here today that if we drilled two wells on 80 we would reduce the allowable per well and that would by a slower withdrawl per well reduce the inherent danger of coning, is that the substance of what your testimony was?

A Yes, sir.

Q I take it then that you are somewhat agreed with Mr. Purdum when he testified that the overall reservoir withdrawl daily is approximately 2,000 barrels of oil a day?

A No, I don't agree with that. He has left out the water production in the field.

Q At any rate if we drill these wells two wells to the 80 we would have to cut the per well allowable?

A Not necessarily.

Q You just testified that if we drilled two to 80.

A That it would reduce the inherent danger.

Q And reduce the allowable and reduce the chances of coning?

A That is correct. But that doesn't mean that you have to take half the allowable which I presently have.

Q You don't know how much we would have to produce it?

A I see no danger of the field running out of energy, it looks like a strong water drive. The dangers are that it is going through

only portions of the section. In view of the wide range of permeability observed in the field and evidenced by the core analysis submitted by Mid --

Q (Interrupting) We have lost 28 pounds in reservoir pressure which is an indication that we have withdrawn fluid from the reservoir at the rate slightly higher than it would be replaced.

A It doesn't follow there is a certain differential in pressure necessary to cause water to move into a field of this kind. I wouldn't be alarmed over the pressure loss.

Q We point to it with pride, it is an indication that the withdrawal rate has just about been reached, wouldn't you say?

A No, sir.

Q What would you say would be a safe loss in reservoir pressure?

A You are substantially above the bubble point I don't think there is any danger unless you reach the bubble point. There is an inherent loss by virtue of by-passing of oil through water going through the more permeable layers and not completely flushing out the entire section.

Q Do you know what the bubble point would be with the gas-oil ratio we have?

A Less than a thousand pounds.

Q Considerably less than a thousand. If we got rid of that there would be nothing left to lift oil to the surface?

A That is why I see no danger in the 2728 point loss.

Q It is an indication that we are withdrawing fluid at slightly higher rates than it could be replaced.

A If you could drill a well a mile from the field you would find virgin conditions.

Q You imagine it, but you have no studies with which to substantiate that.

A No, I don't have, but that is my picture of the water pressures around the field.

Q Magnolia didn't find it in the B well when they went half a mile from the nearest production.

A They found substantially the virgin pressure.

Q They found the average reservoir pressure did they not which was substantially the virgin pressure if --

A (Interrupting) They found 22 pounds less than the original pressure on the discovery well. I must point out though that we are dealing with very small differences in pressure, as a matter of fact one of the pressure determination on 1-D after it had been produced two years was one pound higher than the original pressure. We are dealing with minute differences.

Q We are dealing with measurable differences from an engineer's standpoint.

A There is some question about that. Actually the pressure determinations that have been made by Mr. Purdum were not made at the datum but were made several hundred feet above the datum

and calculated down the hole in oil whereas there is water in some of the wells. There is some calculations as to the pressures as he has done it.

Q But had he done it any other way the pressures would have been still higher, would they not?

A Yes, they would.

Q It would have shown that we had even less drop in the reservoir.

A Yes, sir.

Q Less loss?

A That is right.

Q It would have shown that we produced the field even more efficiently.

A I don't believe that the index of pressure loss is the principle one to determine whether this field is being efficiently produced or not.

Q But it is an important one.

A It is one on which I agree. There is no reason for alarm.

Q Certainly it is one that all companies in operating a field keep their eyes on the reservoir pressure at all times.

A For good reason.

Q It is the one that various oil and gas conservation boards watch closely in the production from any given pool, does it not?

A Yes, and if I may expand my answer just a bit, the real

danger that I see is indicated by the production of water from wells that are completed hundreds of feet above the original water-oil contact. That is the danger that exists in this field and which is being increased by the high withdrawal rates from widely scattered wells.

Q Have you ever in your experience of a fault ever noticed that where a well was near a fault although it was high up on the structure it made considerable water well before it ever ceased to produce oil entirely.

A Yes, I think of one illustration of that.

Q The Dessie well, assuming simply for my argument and not for your testimony, that it is located near the fault as our witnesses have testified then you have experienced that same condition in other fields where they made water as the Dessie well?

A Yes.

Q That created no waste in your opinion, or did it?

A I believe that there is a danger of waste the way that well is going to water.

Q There is also danger of waste but getting down to brass tacks in this one well.

A I believe it is.

Q In your opinion it is indicative of waste?

A Because I believe that what I would do is perforate the well over a thicker section and not subject the thin section which is

now open in the well to the draw down in pressure that is necessary to produce the well. I don't believe the water has coned uniformly from below into that well. I think it has come through these permeable layers by torturous paths and the well can be clean up.

Q You spoke of additional land for development, additional acreage that this pool hasn't been completely developed. Of course last year you testified to Section 34 and the section lying south of that which still hasn't been leased. You testified that you as a prudent operator would recommend a location there, would prefer to drill it. Of course none of the other prudent operators in New Mexico agreed with you since no one leased the land or drilled on it, but that is neither here nor there.

A It is to me, if I may say what I said before. You said that I would recommend to a prudent operator the drilling of the well there. That is not exactly a quotation of what I said. I said this, if I may answer, sir. That if someone wanted to drill a well on the north part of Section 34, the most attractive location would not be the one that would be permitted to be drilled under the 80-acre pattern setup in there at that time.

Q In answer to the question you did state that in substance but Mr. Hanner's question, coming down to the south of the map in Section 34 would a prudent operator owning a lease in the northeast quarter of Section 34 conduct any drilling operation.

A I believe I would prefer to drill, if I propose to drill in New Mexico, which would be in the northwest of the northeast.

Q Do you agree that the development of this pool has been concluded on the west side?

A To the west of the fault?

Q To the west of the fault.

A I believe it probably has, yes.

Q In other words, we can strike out further enlargement to the west. Coming to the south where there is a dry hole, how do you feel about the south?

A That Mid-Continent well in Section 34.

Q You testified the pool hadn't been developed now. I am just trying to get what exact direction had not been developed.

A If I knew what direction hadn't been developed, I would go out and buy the leases myself, if I could buy them. It stands to reason that there has been a well drilled since the last hearing which indicates that the field wasn't at that time developed no matter what the direction be. I think at the last hearing I indicated that it was principally to the north that I thought the field remained undeveloped. I still feel that way and there is evidence that the field remains undeveloped to the northeast.

Q Development is proceeding in a regular 80-acre spacing pattern, one well just concluded and one now being drilled.

A There is quite a lapse of time between the completion of the

well Magnolia 1-B and the commencement of the well.

Q Three months you mean. Completed in September, October, now being drilled in December.

A What I said the well prior to the Magnolia 1-B. That well was completed in February 1951. Magnolia 1-B was started in April 1951.

Q One month.

A During a period of three years there has been six wells drilled.

Q Yes. Do you think that is orderly development?

A It is pretty slow, isn't it?

Q It is. It absolutely is slow. You know what it costs to drill alone? It is admittedly slow.

MR. McKELLAR: That is all the questions I have.

MR. WHITE: No questions.

MR. HANNERS: Do you think of anything further?

A I would like to introduce one exhibit here which is a graphic illustration of the core data submitted by Mid-Continent showing the rank of permeability.

(Marked Exhibit Sawyer No. 1 for identification.)

By MR. WHITE:

Q From your testimony is it true that if they were to drill a well on 40-acre spacing that would not necessarily mean, due to the high water drive, that the royalty owner would receive a

quicker return on his mineral interest?

A Oh, I expect he would receive a slightly quicker return, but that isn't the object of recommending the additional development in here. It is one to prevent the waste of oil that in my opinion is occurring as a result of erratic incursion of water into the field, if by drilling the additional wells there would be a greater recovery of oil to the field, to the royalty owner, operator, and to the state.

MR. HANNERS: Mr. Fitting, the instrument that you just referred to is marked as Sawyer Exhibit 1, graphic core analysis data. Please explain to the Commission what the chart shows.

A That is a graphic illustration of the core analysis data that was submitted by Mid-Continent either at the prior hearing or by letter between the two prior hearings. It shows the range of permeability from one-tenth of one millidarcy up to 4,620 millidarcy. These have been plotted with reference to the top of the Devonian at certain distances from the top as they occur in the wells from which these cores were obtained. The cores are principally from the UD Sawyer A No. 1 and from the Dessie Sawyer No. 1. The cores from the Dessie Sawyer No. 1 were obtained 200 feet below the top of the Devonian and that is the way they are shown on the graph. The cores from UD Sawyer A-1 were from about 70 feet of the top of the Devonian to 110. There are not many samples but a wide range of permeability and porosity indicated

that is the reason I thought this would be helpful to the Commission.

MR. HANNERS: We offer the exhibit.

MR. McKELLAR: I have no objection. I have one question.

By MR. McKELLAR:

Q Does that permeable graph taking into consideration the fractures and cracks which run through the formation which go to make up the overall permeable --

A (Interrupting) I am merely graphing the data that was presented in the hearings. I was advised by Mr. Penn that the samples that were analyzed covered large pieces of rock and so in part it may have fractures in it and in parts it doesn't have probably.

Q You testified just before you introduced this chart in answer to Mr. White's question that in your opinion additional oil would be recovered by the drilling of two wells on an acre. How much oil do you estimate, how much additional oil by the second well?

A I don't have an estimate of that. I would like to explain the answer on it. We are faced here with a field that there is going to be a high percentage of recovery from a very small part of the pay. We may get close to 100 per cent from some of the tortuous channels that are in the field, in other parts of the field where they are permeable there are going to be recoveries

that are less than 10 per cent. If the movement of water can be made more uniform through the permeable channels there is certain deducible evidence there that we increased recovery of oil. It is not unlikely by proper handling of the field of this kind to double the oil recovery by gutting the field at high rates with widely spaced wells.

Q In your answer you don't intend to infer that you are gutting the field by high rates, or do you? If you do, answer yes.

A I am giving you the two variations that could be obtained.

Q I am getting the Crossroads Devonian in Lea County.

A I am 1,000 barrels a well a day. There would be erratic water incursion even more so than evidenced.

Q You made no concrete estimation as to how much this additional well on the 80 would bring in, would produce, as I understand your answer.

A I don't, I can't give you the figure in barrels.

Q Can you give it in dollars and cents?

A I think it will be substantially more than the cost of the well.

Q You can't give it in barrels but you can give it in dollars and cents. I don't quite follow you.

A I can give it to as being appreciable and more than the cost of the well. As to the number of barrels, I don't know. Percentage wise I can see it would be possible.

Q On what do you base your answer on --

A (Interrupting) I am basing it on the fact that we are getting evidence of water coming into the field without the complete flushing out of oil.

Q How much time have you spent on this preparation for this study of this field?

A About two days.

Q Plus ten days you spent previously?

A Yes, sir.

Q A total of 12 days?

A Yes, sir.

MR. McKELLAR: That is all.

MR. SPURRIER: Any one?

A I have one other thing that I would like to add. I spent 18 years studying the oil business in addition to those 12 days.

MR. McKELLAR: That is all.

MR. HANNERS: That is all.

MR. SPURRIER: I had one question of Mr. Fitting. In your experience, Mr. Fitting, what do you think is an average or a reasonable pay-out time for various kinds of wells or various depth wells?

A That is a hard question to answer because obviously the operators want it usually as fast as possible. I can illustrate what the pay-out times are for various wells in both Texas and

New Mexico. They vary from less than a year on some of the shallow wells to as much as four years, on one field I know where extension wells were secured in a tightly prorated field in west Texas. I consider the pay-out time in New Mexico fields to be good.

MR. SPURRIER: As I remember when the hearings were held to determine this deep well allowable factor pay-out time in Lea County of those shallower wells was probably three to four years. Does that sound correct to you?

A I recall those early hearings on the deep well factor, in fact, I participated in them. I think that it was two and a half to three and a half years. The factor was based largely on economics.

MR. SPURRIER: That is all.

By MR. McKELLAR:

Q One question on the old hearings. Of course economics has been increased since then and oil is worth more money. Do you remember the hearings in which you participated what spacing you recommended for the deep Devonian pools?

A I don't believe I recommended any spacing. In fact there wasn't any deep Devonian pools at that time.

MR. HANNERS: We have nothing further.

MR. SPURRIER: Does anyone have anything further?

(Witness excused.)

MR. DOW: I simply wanted in closing to stress this thought with the Commission that this has been an unsual procedure. I believe the law is that when the Commission makes an order after hearing and findings that it should support the order and that anyone who is dissatisfied with it or complains that waste is being committed should carry the burden of showing what the waste is and correlative rights are being impaired. It has been the reverse in this, upon mere letter or information that was filed with the Commission.

Of course, if the Commission on its own initiative issues an order effecting prior order why then it can designate who has the burden or both parties. But in this case if proceeded regularly certainly the complainant would have had the burden to show to the Commission that waste is being committed or that correlative rights are impaired. On the other hand, they produce one witness when we produced several, and we have all gone along in the spirit of cooperation with the Commission and came in, assumed the burden in showing that we are producing the Crossroads Pool in a manner as to maintain the pressure and that we are not committing waste and that correlative rights are not impaired. I think our testimony by preponderance shows that to be true. I think we went beyond what we were required to go. As to this spacing problem, and I realize that it would be a fine thing if the Commission could get rid of this thing and say let's just go to a 40-acre

spacing all over the state, but the Commission can't do that as long as the law is as it is because they are going to have to face the thing on account of the fact that the law provides that companies shall not be required to drill unnecessary wells, giving them reasons for it. It is just one of the things that the Commission is going to have to face as long as the law stands. It just can't brush it off by saying we are just going to do away with all 80-acre and go to a 40-acre spacing. These applications are going to come up and of course they are going to have to be dealt with each on its own merits. I think considering the merits of this cause Order 779 having been issued having been acted upon in good faith, that we shouldn't have been called upon to show cause why they shouldn't consider that the other party complaining should have been required to submit evidence first that waste was being committed or that correlative rights were being adversely effected. Which certainly they haven't carried the burden of doing. I want to make the few observations but on the technical part of the testimony Mr. McKellar would like to discuss that.

MR. IDEN: I don't think I have anything.

MR. McKELLAR: I have a few words I would like to bring out on No. 6 which is part of the grounds on which the order was predicated. The finding reads that there was no showing that pressure maintenance or other secondary recovery methods were under consideration by the operators in a pool as a matter of

preventing waste and protecting correlative rights. This finding says pressure maintenance or other secondary recovery methods.

I want to point out that the terms secondary recovery refers to method of fluid injection, gas, or water applied after the so-called primary method of flowing or pumping have reached or approached the economic limits of the wells, have reached what we commonly call the stripping stage. Pressure maintenance on the other hand refers to the operation of injecting fluid at the beginning or near the beginning of the development of the pool well in advance of the stripping state, when the operators of Crossroads have not undertaken any secondary recovery operation in the pool. Of course this fact does not preclude such consideration as if and when the well reaches that stage.

If the reservoir is produced properly there may be little oil to be recovered by these measures. The basic issue I want to point out is on the finding has the pressure been maintained, if it has not the operators are guilty of poor production practices. If it has been maintained, then certainly one must concede that a pressure maintenance operation if in effect is functioning properly. We have shown that the original bottom hole pressure average was 4874, that as of October 1st of this year it is 4846, or a loss of 28 pounds, or a loss of about one pound per every 40,000 barrels of oil. I think that this was admitted by all the witnesses and I can conceive of no one geologist, engineer,

royalty owner, lawyer, or what not that could ask for a better example of pressure maintenance in operation than we have shown in the operation in Crossroads Devonian. I want the Commission to bear that in mind because I think it does conclusively show that the findings No. 6 was either drafted through a misunderstanding of the true meaning of these terms or through a misinterpretation of what we actually have here. Thank you.

MR. SPURRIER: Mr. Hanners.

MR. HANNERS: If the Commission please, I believe the record shows that previous statements by Mr. Dow as to their position in the matter and I believe it discloses our position but to restate it most briefly, the order which was adopted in 1948 immediately after the discovery of the first well and prior to the drilling of any second well was bottomed on the proposition that a four section area would be productive of oil from the Devonian formation.

Sometime later the Santa Fe Railroad and its oil associate filed an application to abandon the 80-acre pattern because they had encountered a dry hole in one well they drilled. At that time the Sawyer royalty owners merely filed an information to the Commission calling attention to the fact that the first order had been adopted as an exception to our state wide 40-acre pattern and that subsequent facts had not demonstrated in and of themselves it ought to be continued.

We merely called attention to certain information of the Commission. The order then was issued for the hearing at which the petitioners in the first matter, that is Mid-Continent and Magnolia, were required to show cause, if any, they might have why the order should not be cancelled as an exception. As Mr. Dow said he feels that they went further than we should. We feel we went further than we should. We came with witnesses to show not only that the Mid-Continent and its associates had failed to demonstrate that the order should be continued but we showed that waste was occurring by reason of and in all events it should be cancelled. The Commission then made as its finding of fact No. 5 in the present order cancelling the 80-acre pattern. There has been substantial evidence though controverted to some extent that waste and impairment of core will result if the 80-acre spacing provided by 779 is continued in effect. We think that was a correct finding of fact. We believe there has been a change of condition that supports the jurisdiction of the Commission under the reserve paragraph to take up the hearing as we did in October and the one in March and the one we had today.

We therefore respectfully submit that not once has its associates failed to demonstrate the 80-acre pattern should be continued, not only have they failed to do that but we have affirmatively shown it should be cancelled. We therefore submit that the application for rehearing should be denied and the order

of October 15 rescinding order No. 779 and putting the Devonian back on the normal statewide 40-acre pattern should stand as first made by the Commission.

MR. DOW: Only one question on Mr. Hanner's statement. The Santa Fe Pacific didn't abandon the 80-acre spacing. They got an extension by reason of a default?

MR. HANNERS: That is correct. I did not intend to misstate it. They changed the pattern without abandoning the 80-acre order.

MR. CROCKER: I believe Mr. Hanners says that Order 779 was bottomed on an exception to the statewide spacing order that then prevailed at the time. I submit to the Commission that in the preamble, the findings that the Commission made, I believe it found specifically that conditions brought about by this discovery well at the depth which it was bottomed called for an amplification or change in the basic policy on account of cost, time, hazards, and materials required.

I don't believe that the Commission at that time merely says we are just going to grant you an exception here. It looks to me like as I read the preamble a basic policy was considered. Now then with respect to reserve powers in Section 8 of the Order 779, that is not an unusual provision in this order. I know of no Commission or regulatory body, and I haven't been before all of them, but I think in Texas, I think in Oklahoma, I think in Kansas, I think in Arkansas, and I think in Louisiana these orders as

issued by the regulatory body is naturally reserved and retains jurisdiction to correct any inequity or any changed condition. It normally and naturally follows, I think, that when the regulatory body makes an order at the inception of a pool they undertake to delineate upon their map the probable definition of the pool, the extent of it. That cannot always be true, as we know.

In the development under these orders you will eventually come to the edge of the pool. It brings about, as in the Santa Fe case, in this particular pool they drilled in good faith on a conventional location and it so happened, apparently, from the evidence, that they were on the wrong side of the fault. They spent their money and got a barren well. It was quite natural that inasmuch as they owned the entire northwest quarter in view of development that had been had in the southeast quarter I believe that they had some inequities. They probably had some production in that pool and they were being deprived of the reasonable right to secure it. They came before this Commission under that Section 8, and the Commission, I think, rightfully considered the matter from the standpoint of an exception. Ordinarily these exceptions are granted where the Commission has cogent and compelling reasons submitted to it. Now the Commission in that case, it didn't strike down 80-acre spacing rights, substantive rights had been created, money spent. The Commission came to the conclusion that the equities of the Santa Fe Pacific

or the Oil Development Company could be preserved by granting an exception to the order, and any time a Commission makes an order, if it has authority to make an order, it has authority to grant exceptions to it, if it makes an order and creates substantive rights, it should not strike down the entire order where equities can be preserved through the medium of an exception. You act as quasi judicial body. You are bound by the ordinary rules of evidence. I think that those are factors that should be considered by the Commission.

MR. JACK CAMPBELL: If the Commission please, speaking only for myself, I would like to have you clarify a point there, Mr. Crocker. Is it your conception that when the Commission enters an order, as it did in this case, and you speak of substantive rights coming into existence, is it your conception that thereafter the power of the Commission is limited to acting upon requests for exceptions to that order?

MR. CROCKER: No, I don't mean that quite. I think this, Mr. Campbell, if the Commission makes an order that it is obviously proved later and development later obviously shows that it is destructive of conservation, it is provocative of waste and invades correlative rights to such an extent that that order cannot be cured by exception when those jurisdictional facts are laid, I think the exception then has inherent power on its own motion to go into the thing. I believe that.

MR. CAMPBELL: Your statement as to property rights being created assumes the continued existence of the same facts?

MR. CROCKER: I make this assertion that a sovereign state should sustain its orders and have high respect for the substantive rights of their creator and not strike them down if any inequity can be preserved or taken care of through the medium of exceptions under the reserve power.

MR. SPURRIER: If nothing further.

MR. R. S. CHRISTIE: Representing Amerada Petroleum Corporation. We have no production in the Crossroads Pool but as the Commission well knows we are interested in several other pools which now have 80-acre proration units. After listening to the testimony in this case I think it is quite similar to some of the other pools which have been developed on the 80-acre spacing program. To me the important point in this case in other fields which have 80-acre units is will one well drain 80 acres. I think the evidence in this case, as far as my own opinion is concerned, is that one well will drain 80 acres. I just merely want to state in behalf of Amerada we concur in the findings of the applicant and suggest that the Commission consider this case very seriously in other fields that have 80-acre units.

MR. SPURRIER: Anyone else?

MR. BUCKLER: Representing Sinclair Oil and Gas Company. We have nothing in this particular Crossroads field. We are generally

interested in 80-acre spacing in the state of New Mexico wherever it can be possibly done and the rights of all parties that are interested protected, correlative rights protected. We think that the Commission should establish a policy as well as one they have heretofore had 80-acre spacing it shouldn't be an exception to the 40-acre. It should come as a matter of course where the facts fit as the 80-acre spacing, the only thing to be determined and to be determined from a proceeding in this case and others whether it is applicable or isn't and we dislike to see the Commission shy away from the 80-acre policy but would like to see it and are here to show our interest in that policy to be adopted if possible.

MR. SPURRIER: Anyone else? Would you by the same token recommend that the Commission consider anything less than 40-acre spacing?

MR. BUCKLER: If the Commission found that it was necessary to proper development and protection of correlative rights in order to have conservation for the state, I would see no objection to it. I think the facts of everything would have to sit on just such a state of facts.

MR. WHITE: With Leonard Oil. If you did consider less than 40-acre spacing how would you feel about the allowable?

MR. BUCKLER: I should think that would have to be based on the facts of the pool as it was developed, on what the porosity and the conservation loss would be if it were necessary to grant

an allowable on proration basis.

MR. SPURRIER: Anyone else? If not, the hearing is closed and the case will be taken under advisement.

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STATE OF NEW MEXICO)
:
COUNTY OF BERNALILLO)

I HEREBY CERTIFY that the foregoing and attached transcript of rehearing in Case No. 149 before the Oil Conservation Commission, State of New Mexico, at Santa Fe, on December 19th, 1951, is a true and correct record of the same to the best of my knowledge, skill and ability.

DATED at Albuquerque, New Mexico, this 8th day of January, 1952.

REPORTER