CASE FILES

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SMALL Exhibits Etc

CASE 1016: Sinclair application for dual completion of wells in Dean-Devonian Pool & proposed Dean-Pennsylvanian Pool.

BEFORE THE

Oil Conservation Commission

SANTA FE, NEW MEXICO

IN THE MATTER OF:

CASE NO. 1016 & 1017

TRANSCRIPT OF PROCEEDINGS

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BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
February 15, 1956

IN THE MATTER OF:

CASE 1016: Application of Sinclair Oil and Gas Company in compliance with Rule 112 (a) for an order authorizing the dual completion of wells in the Dean - Devonian Pool, a common source of supply, and the proposed Dean - Pennsylvanian Pool, a common source of supply in Lea County, New Mexico. Applicant, in the above - styled cause, seeks an order authorizing the dual completion of wells in the Dean-Devonian Pool, a common source of supply, and the proposed Dean-Pennsylvanian Pool, a common source of supply, underlying the E/2 NE/4 and SE/4 of Section 34, all of Sections 26 and 35, Township 15 South, Range 36 East, and Lots 1 through 8, Section 5 and Lots 1, 2, 7 and 8 Section 6, Township 16 South, Range 37 East 37 East, Lea County, New Mexico.

CASE 1017: Application of Sinclair Oil and Gas Company for an order establishing the Dean-Pennsylvanian Pool in Lea County, New Mexico, and establishing a uniform 40 acre well spacing in said pool. Applicant, in the above-styled cause, seeks an order creating the Dean-Pennsylvanian Pool consisting of all of Section 26, all of Section 35, E/2 NE/4, SE/4 Section 34, Township 15 South, Range 36 East, and Lots 1, 2, 3, 4, 5, 6, 7 and 8 Section 5, Lots 1, 2, 7 and 8 Section 6, Township 16 South, Range 37 East, Lea County, New Mexico. Applicant further seeks the establishment of a uniform 40 acre well spacing within said common source of supply discovered by its State Lease No. 735 Well No. 1, located in tha center of the SW/4 NE/4 Section26, Township 15 South, Range 36 East, Lea County, New Mexico; said wells to be located in the center of each quarter-quarter section or lot with a tolerance of 200 feet to avoid surface obstructions.

BEFORE:

Honorable John F. Simms, Jr.,
Mr. E. S. (Johnny) Walker,
William B. Macey.

TRANSCRIPT OF PROCEEDINGS

MR. MACEY: The next case on the docket is 1016.

MR. McGOWAN: If the Commission please, Sinclair is ready in that case, and, if I may say so, we are also ready in Case 1017. Now, No. 1017 is set here for the purpose only of defining and establishing the Dean-Pennsylvanian Pool, and in view of the fact that the testimony which would be introduced in connection with the establishment of the Dean-Pennsylvanian Pool in Case 1017 would necessarily have to be repeated in the dual completion case, which is 1016, and in order to save the time of the Commission and all parties concerned, I would like to move the Commission, at this time, if it is not in conflict with your procedure, to consolidate 1016 and 1017 and hear them as one case.

MR. MACEY: Is there any objection? Without objection, we will consolidate Cases 1016 and 1017 for the purpose of testimony in this case.

MR. McGOWAN: I would like to enter my appearance in the record; James H. McGowan, Tulsa Oklahoma, for Sinclair Oil and Gas Company.

If it please the Commission, a brief statement might be in order. We will have three witnesses in the two consolidated cases. The first witness will introduce three exhibits and testify concerning the geology and nomenclature of the Dean - Pennsylvanian Pool for the purpose of identifying it. The same exhibits will then be used by the subsequent two witnesses in Case 1016, and I believe they can both be consolidated for exhibits and testimony for this purpose, and we will have particular points of our case to make by each witness.. When we get through, we feel we will have made a complete case.

Now, the Commission understands this is, in addition to the nomen-

clature hearing, an application of Sinclair to allow dual completion of oil to oil in the Dean Pool in the Devonian common source of supply and the Pennsylvanian common source of supply. We are well aware of the Commission's position heretofore on oil and oil dual completions. We have no quarrel with it whatsoever, and we are not at this time advocating state-wide oil and oil dual completions by any method or advocating that they should now or in the future be adopted, but we are here in this case asking that the Commission allow oil and oil completion in the Dean Pool for the Devonian and Pennsylvanian by the dual completion method which we are proposing and which we hope to convince the Commission and its staff today is completely feasible and will result in protecting the natural resources of the State of New Mexico, and will actually further the conservation of those rather than being a detriment to them.

We wish the Commission to think in the term of our case and testimony in the light of dual completions in these methods in the Dean Pool alone and not what other dual completions have been proposed or have heretofore been proposed for other areas in the state.

We have three witnesses, if you desire to swear them all at one time.

(Witnesses sworn.)

MR. MACEY: Mr. McGowan, before you begin with your witness, I think it would be advisable for the record to show that in Case 1017 that portion of your application pertaining to pool rules and anything else other than the pool nomenclature has been -- your application has been amended to do away with that portion.

MR. McGOWAN: Yes, sir. The only part of the application that remains is to determine the nomenclature of the Dean-Pennsylvanian

Pool, and we would also like at this time to further amend our application to allow the Commission, if they so deisre, to extend that pool beyond the confines of our application if they feel the testimony warrants it.

H. A. M E R R I L L,

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

DIRECT EXAMINATION,

BY MR. McGOWAN:

Q State your name, please. A H. A. Merrill.

Q And by whom are you employed?

A Sinclair Oil and Gas Company.

Q In what capacity?

A District Geologist in Roswell.

Q And the area covered by the applications in Cases 1016 and 1017 before this Commission lies within your district, is that right?

A That is right.

Q Have you previously qualified before this Commission as a geologist? A Yes, I have.

MR. McGOWAN: Are his qualifications accepted?

MR. MACEY: Yes, sir.

Q Now, Mr. Merrill, we needone more map up there; let's get this big one over here, too.

(Sinclair Exhibits 1, 2 and 3 marked for identification.)

Q Mr. Merrill, the Exhibits that are on the wall here, and have been identified by the Commission as Sinclair's Exhibits 1, 2 and 3 were all prepared by you or under your supervision in conjunction with your efforts, is that right? A That is right.

Q And you are satisfied in your own mind that each are correct to represent what is represented on each? A Yes.

Q Will you briefly explain to the Commission what each exhibit depicts or shows in connection with these applications?

A Well, the first exhibit outlines the area of the proposed Dean - Pennsylvanian Pool.

Q That is identical, is it not, with the Dean - Devonian Pool already spaced and determined by the Commission?

A I believe it is.

Q And that is the area outlined in red on Exhibit 1, that is the area covered by Sinclair's application, is that correct?

A That is right.

Q Now, Exhibit No. 2.

A All right. This is a sub-surface structural map of the proposed area contoured on the top of the Strawn Lime.

Q And No. 3.

A It is a cross section, north to south through the proposed area.

Q Will you point out to the Commission the wells that are contained in that cross section on the structure map, please, on Exhibit No. 2?

A All right. The discovery well, Sinclair Oil and Gas Company's Number 1 State 735 is located here and the section runs south through the Humble No. 1State A. J. through the Sinclair No. 1 State 396 and through the Sinclair No. 1 Dean, and terminates in the Magnolia Anderson State.

Q Now, I see several lines drawn across the Exhibit No. 3, or cross section. Will you identify those lines and advise the Commis-

sion what they purport to show?

A The lines identify the top of the Pennsylvanian Formation; in the discovery well, at a depth of 10,658. The formation extends to the top of the Mississippian at 12,896. The center line on the exhibit indicates the top of the Strawn Lime which is the pay zone in the discovery well.

Q What is the bottom line?

A The bottom line is the Devonian throughout the field.

Q Now, the Pennsylvanian zone, as I understand it, is a rather erratic zone, is that right, throughout the area?

A It is proven as such.

Q Now, in your opinion, does the Pennsylvanian zone or common source of supply underly the entire area covered by the application of Sinclair in Cause No. 1017?

A I think the cross section indicates it does.

Q And it is your opinion that it does? A Yes.

Q Is it likely that it extends beyond the area, at least in certain portions, or certain directions?

A It has been identified beyond the limits of the field.

Q On Exhibit No. 1, would you indicate to the Commission where it is likely, or where you have information to indicate that the Pennsylvanian Zone does extend on beyond the area outlined in red or covered by our application?

A The Sinclair Oil and Gas Company's No. 1 State Lea 758 is a recent completion beyond the limits designated.

Q Which would indicate that the Pennsylvanian common source of supply does extend eastward beyond the boundaries covered by our application? A That is right.

MR. McGOWAN: I believe that is all I have of this witness.

MR. MACEY: Any questions of the witness?

EXAMINATION BY MR. MACEY:

Q Will you tell me what the overall thickness of the Pennsylvanian is as described there?

A The cross section shows twenty-two hundred and a few odd feet, and it is fairly consistent over the structure.

Q Is there any zone that has been tested in any of the wells within the pool or adjacent to the pool in the Pennsylvanian that has been tested in any other well, other than the Strawn that might indicate commercial production?

A In the Pennsylvanian?

Q Yes. A Yes.

Q What I am driving at is whether or not we should confine the name of the pool to the Dean - Strawn rather than tie it to the entire Pennsylvanian zone, because you may run into another Pennsylvanian producing zone.

A Now, there is a zone right in the very top of the Pennsylvanian which carries oil.

Q All of the wells which are completed, at the present time, are completed in the Strawn? A That is right.

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

EXAMINATION BY MR. MONTGOMERY:

Q Is there any particular controversy as to the top of the Pennsylvanian?

A It is not an iron-clad point.

Q Are there some operators that put the top of the Pennsylvanian

below this oil pay that is indicated in Humble's State A. J. No. 1?

A I believe there are.

Q Some companies would call that Wolfcamp?

A Yes.

Q Do you have any other suggestions?

A Well, I don't believe there is any point which could be agreed upon by all parties.

Q Do you feel that these reservoirs warrant the drilling of extra wells to these different pay zones? A No, I don't.

MR. MONTGOMERY: That is all.

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

EXAMINATION BY MR. MANKIN:

Q In connection with Mr. Montgomery and Mr. Macey's questions, the advertisement, of course, showed this is related to the Pennsylvanian and in many instances you referred to it as Strawn; would you suggest that the name be left as Pennsylvanian so that each of these separate stringers or what you might call zones in the Strawn or Pennsylvanian would actually be thrown together as one zone from the reservoir standpoint? A Yes.

MR. MACEY: Anyone else?

EXAMINATION BY MR. MONTGOMERY:

Q There is some confusion there; if some of the operators insist on calling this upper pay Wolfcamp, how would you suggest that we name the pool if the Commission so desires to take this, take in this full interval?

A That would be rather difficult to say. I believe it should be determined from the discovery well.

Q Would you intend to complete throughout these three different horizons?

A I doubt if that would be practical, but in the event the Strawn pay is missing, it might be possible to complete in the upper zone.

Q What would you suggest that we call the pool, if the Commission so desires to call it?

A Dean - Pennsylvanian Pool.

Q Regardless of some operators considering that upper portion to be Wolfcamp? A That is right.

Q Would Permeo - Pennsylvanian be a suitable name?

A I don't believe it would be advisable in this case.

Q Well, I don't want to labor the point, but we are concerned with restricting it due to formation name, and if it does turn out that this upper pay is Wolfcamp, then we would have the pool named incorrectly. Why would you not want it called Permeo - Pennsylvanian?

A I believe the Permeo - Pennsylvanian designation as used usually covers a very thin pay section, doesn't it, shorter interval from top to bottom of the pay?

Q You are speaking of some of our pools?

A Our present pools, yes.

Q Well, they are designated Permeo - Pennsylvanian due to this controversy, exactly where the top of the Pennsylvanian is.

A I don't know that they have any pay developed as deep in the Pennsylvanian as this particular area.

MR. MONTGOMERY: No, they do not. That is all.

MR. MACEY: Any one else have a question of the witness?

MR. NUTTER: I have a couple.

EXAMINATION BY MR. NUTTER:

Q What is the difference between the Pennsylvanian and the Strawn?

A Approximately a thousand feet.

Q What is that stuff in there above and in the middle of the interval where the lines on the cross section connect together, what is that in there?

A I don't understand your question.

Q What kind of stuff is it, what kind of material?

A It is broken lime and shale.

Q Is it sort of a lime, shale in there? A Yes, it is.

MR. NUTTER: That is what I meant.

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

EXAMINATION BY MR. REEDER:

Q Mr. Spellman, is it not so that you intend that most of the completions should be in the Strawn, is that correct, and that would be your intention?

A Did you say most completions?

Q Yes, sir. A Yes, sir.

Q Your completions will be mostly in the Strawn?

A Yes.

Q And would you not think that it would be possible, at this time, in view of the question of the Wolfcamp production and the extent and quality of it, that it might be advisable to limit the completions, whether it be called the Pennsylvanian Pool, or Strawn Pool, for the time to the Strawn line?

A I don't see any need for that.

Q Would you consider it possible that if the Wolfcamp should develop into a commercial horizon, that we could cut down considerably on the confusion as to pool names and completion?

A The development to the present time hasn't indicated any strong production prospects in the Wolfcamp.

MR. REEDER: That is all.

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

MR. McGOWAN: I would like to ask a question or two on redirect examination.

REDIRECT EXAMINATION

BY MR. McGOWAN:

Q Mr. Spellman, based on your information and study of this pool and upon the exhibits which we have exhibited here to the Commission, it is your opinion, I believe, that the zone between the top line on the cross section and the third line from the top is all generally the Pennsylvanian zone, is that correct?

A I believe that is generally accepted, yes.

Q The information you have would so indicate?

A Yes.

Q And it is your recommendation, at this time, that the entire zone between those two lines be classified by the Commission as the Dean - Pennsylvanian zone or common source of supply?

A That is right.

Q You are aware that should subsequent development prove that part of it is a different zone that at that time the Commission could enter whatever order necessary to establish that zone if it should be proved by subsequent drilling? A Yes.

MR. McGOWAN: I believe that is all.

MR. MACEY: Does anyone else have a question of the witness? If not, this witness may be excused.

(Witness excused.)

MR. McGOWAN: At this time, I introduce Exhibits 1, 2, and 3 in evidence.

MR. MACEY: Without objection, they will be received.

(Sinclair's Exhibit No. 4 marked for identification.)

MR. MACEY: We are now going to take a recess until 1:00 o'clock, and, during the noon hour, this room is being used by the Highway Department for movies. So I suggest that you take your brief cases and any other personal belongings and leave them in our office.

(Recess.)

AFTERNOON SESSION:

MR. MACEY: The hearing will come to order, please.

MR. McGOWAN: At this time, in connection with our proposed Exhibit No. 4, I would like to have marked Exhibit No. 5.

(Sinclair's Exhibit No. 5 marked for identification.)

C. L. WILSON,

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

DIRECT EXAMINATION

BY MR. McGOWAN:

Q Mr. Wilson, would you state your name to the Commission?

A C. L. Wilson.

Q By whom are you employed?

A Sinclair Oil and Gas Company.

Q In what capacity? A Staff engineer.

Q And how many years of experience have you had as a petroleum engineer?

A Fifteen years.

Q And what educational qualifications do you have as a petroleum engineer?

A I graduated from Texas A & M College in 1941 with a B. S. degree in Petroleum production.

MR. McGOWAN: Is the witness' qualifications acceptable to the Commission?

MR. MACEY: Yes, sir.

Q Now, Mr. Wilson, you say you are a staff engineer; does that mean you work on the overall company problems and help form and are familiar with overall Sinclair Company policies and activities on a broad scale, whole company generally?

A Yes, sir, that is right.

Q You are not familiar in detail with any particular activity except as you are asked to study that, but generally with the ~~inter~~ activities of the company?

A That is right.

Q Particularly from a production and producing angle?

A Correct.

Q Now in your capacity as staff engineer, have you been asked by the management of Sinclair Oil and Gas Company to make a study and recommendations in connection with the Dean Pool in New Mexico as to both the Pennsylvanian and Devonian sources of supply?

A Yes, sir.

Q Now, Exhibit 4 and 5 were prepared by you or under your supervision and you know that both are correct?

A Yes, sir, they were prepared under my supervision and I am confident that they are correct.

Q Now, as to Exhibits 1, 2, and 3, which have been previously introduced, you are also familiar with those, are you not, and helped in the preparation of those? A Yes, sir.

Q And you are also familiar with the correctness of them?

A Yes, sir.

Q Explain to the Commission what Exhibit 4 is and what we will attempt to show from it.

A Exhibit four shows the economics of dual completion versus twin wells for the Pennsylvanian Reservoir in the Dean Field.

Q Exhibit No. 5, is that not a detailed breakdown of the various cost figures used in Exhibit 4 to show how the totals used in Exhibit 4 were arrived at?

A Yes, sir, that is correct.

Q Now, in your study of this area, you have studied both the Devonian and Pennsylvanian separately? A Yes, sir.

Q Will you briefly describe to the Commission, first, the Devonian and Pennsylvanian zone as to the type of reservoir, producing source, and just a general description of the reservoirs and their various characteristics?

A The Devonian Reservoir is encountered at approximately 13,600 feet, it is a vugular type, it has a vugular-type porosity in it. The original pressure in the Devonian was 5,504 pounds at a datum of minus 9808 after being shut in for 72 hours. We have a sub-pressure. That sub-pressure, by the way, was taken on 8-21-55. We have a sub-pressure taken 12-30-55, at the same datum, after a shut-in time of 48 hours, and the pressure was 5501 pounds per square inch gauge. Production at the first when the well was shut in the first time, accumulative production was approximately 4,000 barrels;

at the second, it was approximately 48,000 barrels, which indicates that there has been very little pressure drop in producing the Dean No. 1 Well. It is indicative of a water-~~dry~~ field, and coupled with drillstem tests that we have available in the Devonian, it would appear that the Devonian is a water-~~dry~~ field. Now, the Devonian fluid is highly undersaturated, the gravity is quite high, it is 53 degrees A.P.I., but the saturation pressure is only 463 pounds PSI gauge. In other words, the pressure in this reservoir could drop 5504 to ~~4663~~ 463 and no gas would come out of solution in the reservoir, would be liquid gas; while the gravity is quite high, the gas-oil ratio is low. By flash liberation, there is 110 cubic feet in solution in each barrel of stock tank fluid.

As far as the Pennsylvanian is concerned, the Pennsylvanian is at a depth of approximately 11,400 feet, and it is also quite vugular in nature, it is pin point porosity. The permeability is quite a bit higher in the Pennsylvanian than it is in the Devonian. The fluid has a large amount of gas in solution. We have taken a bottom hole sample on the Sinclair State Lea 735 No. 1, which was the discovery well in the Pennsylvanian formation, which shows a gas in solution of 2,334 cubic feet per barrel, per stock tank barrel. The bubble point of that fluid was 3859. Original pressure, taken on the State Lease 735 No. 1, on January 30, 1956, was 4,008 pounds after being shut in for 72 hours. The fluid appears to be saturated at original conditions. With this large amount of gas in solution you have tremendous advantage of reservoir oil. The reservoir oil factor, that is the barrels necessary to equal one barrel of stock tank oil on the surface is 2 point 315. Now, with a small drop in pressure in a reservoir of this type, large volumes of gas will come

out of solution and start migrating, flowing to the bore and going to the well bore, of course, will drag some oil with it, but with this high shrinkage -- shrinkage is well over fifty per cent -- recovery will be quite low, and, also because of high shrinkage, and in addition to the eratic nature of the Pennsylvanian pay, it is believed -- at least I believe -- strongly that the Pennsylvanian reservoir will be a solution gas type, dry.

Q Now, turning your attention directly, Mr. Wilson, to Exhibit 4. I believe that you said that was the economics of recovery from an economic payout standpoint, based upon the Pennsylvanian. Now, you, I believe, stated that the Pennsylvanian zone was found approximately 11,600 feet. Now, in doing that, you are talking about the effective pay portion of the Pennsylvanian?

A That is right, the Strawn section of the Pennsylvanian.

Q You are in agreement with the testimony of the geologist this morning that the entire area between the top and third line from the top on Exhibit No. 3 is the Pennsylvanian zone, it is all Pennsylvanian zone?

A Yes, sir, that is correct.

Q And you are talking, now, for your purpose here on recovery of the effective pay on that zone? A Yes, sir.

Q Now, is exhibit four based upon one well, or is it based upon your calculated average of the Pennsylvanian zone throughout?

A Under Roman Numeral 1, on Exhibit 4, we have the factors that were used in computing the Pennsylvanian reserves. The "A" under Roman Numeral 1 shows porosity of six point four seven per cent, based on Core analysis from two wells, Sinclair State 735 No. 1, and Atlantic's Federal Dow No. 1.

Q You feel that would be fairly uniform throughout the area?

A Yes, I think the porosity we have from those two wells would be representative of the area. Now, for the effective pay thickness of 33 feet, that would be under Roman Numeral 1, Exhibit 4, was determined from electric logs, mica log, radioactive logs and Core analysis on seven wells, Sinclair Dean No. 1, Sinclair State Lea 396 No. 1, State Lea, Sinclair State Lea 735 No. 1, State Lea 758 No. 1, Humble A. J. No. 1, Magnolia Anderson No. 1, and Atlantic Federal Dow No. 1. Under C, the formation volume factor, as I said before, was obtained from a reservoir sample, analysis on Sinclair State Lease 735 No. 1, contained water of 16 psr cent, estimated by use of electric logs, Core analysis and the oil recovery of 20 per cent estimated from the bottom hole sample analysis.

Q From that, then, you arrived at the conclusion that the rest of that exhibit -- A Yes, sir.

Q Applying in there, applying to the whole Pennsylvanian zone underlying the area covered by our application?

A Yes, sir.

Q Now, go ahead and briefly advise the Commission what those conclusions are and what they mean.

A On Exhibit 4, under No. 2, using the factors we have stated above, first the stock tank oil in place per acre of 6,000 gross barrels. Under Roman Number 3, the stock tank oil reserve from the Pennsylvanian reservoir, using 20 per cent recovery, equals 1,200 barrels per acre, or 48,000 barrels for 40 acres. Roman Numeral 4, just the price of oil in this area, $2.83 per barrel. From these figures, we show the economics of a Pennsylvanian well located on 40 acres. That shows up under Roman Numeral 5 on our Exhibit 4. We

have two columns, one for a twin well drilled to the Pennsylvanian and one for a dual completion in the Pennsylvanian. Now, a --

Q There, Mr. Wilson, let me clear up something. You are talking about, in your left-hand column, those figures are either income and cost figures that would be applicable if a well was drilled solely to the Pennsylvanian, is that right?

A In the left-hand column, that is correct.

Q And those in the right-hand column, those income and cost figures are those that would be the additional cost of dually completed wells drilled to the Devonian to produce also out of the Pennsylvanian, is that correct?

A The cost of the well is the additional cost to dually complete the well, that is right, in the Pennsylvanian.

Q Not the drilling cost, but what it would cost to complete the well to produce out of the Pennsylvanian after it had been drilled to the Devonian? A That is correct.

Q Go ahead.

A Under "A," gross value of the probable stock tank oil is shown to be $135,840; against that, we must take the royalty of $16,980, direct taxes of $7,320, operating expense of $28,800 for a twin well, for dual completion, $32,800, which leaves a net revenue after the deductions,of $82,740 for a twin well, and $78,740 for a dual completion. The cost of a twin well, or single well to the Pennsylvanian is $221,080, and the additional cost of drilling a well to the Devonian and dually completing in the Pennsylvanian is $58,300, which leaves a net profit or net loss for the twin well of $138,340, which is a loss, and a net profit of $20,440 for the dual completion.

Q Mr. Wilson, is the conclusions that you have reached here from this exhibit that if we were forced to drill a well, twin well, to the Pennsylvanian alone, that the average location in this area, would result in a net loss to the operator on that twin well of approximately $138,000? A That is correct.

Q But that if we already have, or hereafter drill, a well to the Devonian and then can dually complete that well, the operator can expect a profit of around $20,000 on his Pennsylvanian production over and against the additional cost of dually completing to produce that well? A That is correct.

Q Now, does this indicate, in your opinion, then, that a twin well, or a separate well drilled solely for the Pennsylvanian zone is not economical? A That is true.

Q And, therefore, is it your opinion that very few of the locations would be drilled, if it was necessary to drill a twin or separate well to obtain only the Pennsylvanian production?

A I don't believe the field would be completely drilled if you had to do that.

Q Now, if I understand you correctly, you are saying there is probably a well area in the field where a Pennsylvanian well would pay out, if it is not all drilled up?

A If it is not all drilled up and a well can drain more than 40 acres, it is possible.

Q But there is not recoverable oil in sufficient amount in a given 40 acre tract in the Pennsylvanian zone to pay for the drilling of a well to that zone, is that correct?

A No, sir, there is not, on the information we have available at this time.

Q Therefore, from an economical standpoint, it is completely impractical to fully develop and recover all the oil from the Pennsylvanian through a separate well to that zone?

A That is right.

Q Now, going from the economic picture just a minute, Mr. Wilson, does Sinclair Oil and Gas Company usually make a pretty thorough study of procedures before they adopt them as a company-wide policy?

A Yes, sir. We investigate them very thoroughly and we try them out on a small scale,and,after we have gained sufficient experience, then we feel we can go ahead and adopt something on more or less a policy nature.

Q Now, do you mean by that that we take the information and experience that our production people in the field have and then the knowledge and judgment of our staff people and combine it all and determine that in given areas or given things are to be true in certain areas, then a particular operating policy there is desirable?

A Yes, sir.

Q Now, have we given that kind of study and thought to the type of dual completion that we are proposing here in this application?

A Yes, sir, we have.

Q Is it, at the present time, the opinion of Sinclair and your individual opinion as a staff engineer for that company, that when the necessary factors exist in the field to warrant it, that the type of dual completion we are proposing is feasible and desirable?

A Yes, sir.

Q Do you feel that the -- do you feel that substantially the same amount of oil that could be recovered from the pool through twin wells can and will be recovered through one well dually completed in

the manner we are proposing?

A Yes, sir, I believe that a dual completion would recover as much oil as twin wells.

Q And, under the method of dual completion that we propose, it is your opinion, is it not, that the oil that can be pumped through twin wells can and will be pumped through the dually completed wells?

A Yes, sir.

Q Looking toward the program that will recover the greatest amount of oil from both the Devonian and Pennsylvanian zones, which is the desire, I think, of everyone, is it logical to assume that as these, this field is developed more fully, that you will hit particular forty acre tracts where a Devonian well will, say, be a very marginal well and will be doubtful if that well will pay out if the well is drilled in the Devonian formation? In other words, you hit places in your formations where the Devonian will be right on the margin and would not possibly justify drilling of that well there for Devonian alone?

A Yes, and going to the edge of any field, you get to the point where the formation does not recover as much as it does in the center of the field, and that point will probably be reached in this field.

Q Now, should the Commission see fit to grant our application, and on that particular hypothetical location we are now discussing, if there happened to be the Pennsylvanian zone present under that same forty acres with a given amount of recoverable oil in it, is it not possible that on a given forty acres, the total recovery from the Devonian and Pennsylvanian might well show a profit on a dually completed well where neither zone would warrant the drilling of a separate well to that zone?

A I can't point out the location right now. The field is not developed sufficiently to do that. There may be points in the field where you could not drill a well to the Devonian for its reserves, or a well, separate well, ~~the~~ the Pennsylvanian for its reserve, but drilling a dual well to both reservoirs would be warranted.

Q Now, the only alternative to drilling such a dual well in such an instance, the only alternative would be to drill a well to one zone and take somewhere from eight, ten or fifteen years to produce it dry and plug back and then eventially produce the other dry, is that not corrat?

A Yes, if the volume of producing the Devonian, if the Pennsylvanian wasn't depleated when you plugged back.

Q So, actually, under such a circumstance such as we are now discussing, assuming you develop as this field is, the dual wells would actually recover oil that would not probably be recoverable without the dual wells?

A On a specific tract that is probably true.

Q Is there anything else you feel the Commission should be advised about concerning the economics or overall picture of either of these reservoirs, Mr. Wilson?

A No, sir, I don't believe there is.

MR. McGOWAN: That is all I have.

MR. MACEY: Any questions of the witness?

EXAMINATION BY MR. MANKIN:

Q Mr. Wilson, I don't believe I heard your remark as to what the permeability of the Pennsylvanian was.

A I didn't -- the permeability that we obtained from a build up pressure test, which is the average permeability over the majority

of the drainage area was calculated to be 30 millidarcies for the Pennsylvanian and about 9 millidarcies for the Devonian. Now, that doesn't compare with core analysis, this is an average permeability over the entire drainage area obtained from float tests and pressure buildup.

Q From that, were any productivity tests build up tests?

A Yes.

Q What kind of P.I.?

A On the Devonian Formation, the J. P. Dean No. 1 had a P. I. of two point oh four barrels per day per pound drop; the P. I. of the Pennsylvanian on State Lea 735 No. 1, was point five six barrels per day per pound drop. Of course, the Devonian was much thicker than the Pennsylvanian.

Q That was the main reason you have much thicker Devonian, therefore you got higher P. I.'s? A Yes.

Q You remarked at the beginning of your testimony that the porosity of the Devonian was ten, and in your testimony later, you showed it to be six point four seven.

A I don't recall saying the porosity of the Devonian; you say Pennsylvanian?

Q Pennsylvanian.

A Pennsylvanian was ten per cent? If I did say so, I would like to retract it, because our figure is six point four seven per cent.

Q You didn't estimate a porosity for the Devonian?

A We have a core analysis on the Devonian. Yes, we have a core analysis on our J. P. Dean No. 1, and this core analysis showed that it --

Q You found it to be erratic?

A Not any more than most Devonian fields; it was five point one five per cent porosity for the Devonian.

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

EXAMINATION BY MR. NUTTER:

Q Mr. Wilson, the porosity used in your Exhibit 4 came from Sinclair State No. 1 and the Atlantic Federal Dow No. 1; are those the only two you have core analyses on?

A It is the only one we have core analyses available. I understand there are others that cored them and no doubt ran the analysis, but we don't have them.

Q This figure, six point four seven per cent, is that the average of the porosity of the two wells? A Yes.

Q What was the porosity at the -- in each of those two wells?

A The porosity at the State Lea 735 No. 1 in the north end of the field was five point one eight per cent; the porosity in Atlantic Federal Dow No. 1, south end of the field was seven point seven six per cent.

Q How about your pay thickness, do you have electro and radio active logs on each well?

A I don't know that we have on all those wells.

Q The two particular wells that you have the core analysis on?

A We had, as I recall, the micro and the electric log on 735, and I believe we had the same information on Federal Dow. We did not have a radioactive log, as I recall, on those two.

Q Does this affect the pay thickness, the average of those two wells?

A The average pay thickness?

Q Yes, sir.

A No, sir, we took in the seven wells which indicated that they might be productive in the Pennsylvanian to obtain our average sand thickness.

Q In other words, this 33 feet average thickness was based on seven? A Yes.

Q But the porosities were based on two wells?

A That is correct.

Q How did you arrive at an oil recovery factor of twenty per cent?

A Well, as I stated, I believe that the recovery mechanism will be a solution gas dry field from the data we have, electric logs. The Pennsylvanian appears to be erratic and I can't visualize a very big water contact with it. In addition to that, your formation volume factor is extremely high, this fluid is not far removed from the gaseous phase, it is a crude oil, it has a bubble point, but the viscosity is only point one six centipoises, much less than water. It is very similar to a -- the fluid is not far removed from the gaseous stage. When you produce a one barrel of this Pennsylvanian oil, you are removing two point three one five barrels of reservoir medley;with a small drop in pressure, this gas will come out of solution and you will be losing very large volumes of free gas. It is a very inefficient recovery mechanism. I think the 20 per cent is a maximum that you could estimate for recovery from this particular type of fluid.

Q Well, if it is a solution ~~dry~~ reservoir, twenty per cent is ~~a reasonable figure, I am sure.~~

A Well, it would be if you didn't have such a large formation volume factor.

Q Another thing, the viscosity of this fluid is so low, is there a chance that this fluid would be able to migrate more than the distance required to migrate in a forty-acre spacing pattern?

A I think this fluid would flow very easily through the pores, certainly it would move large distances.

Q Do you think eighty acre spacing would have a better chance of paying out than the forty acres?

A Undoubtedly you would get more recovery from eighty acres.

Q You think eighty acres would pay a well out?

A No, sir, not on these figures I have, you could not pay a well out on an average of eighty acres.

Q Is this fluid sour in any respect?

A No, sir. It is considered an intermediate type fluid, both Devonian and Pennsylvanian; as I recall, the Pennsylvanian has just a trace of hydrogen sulfide in the gas. Seemed like it was point five tenths grains per hundred cubic feet.

Q Point five tenths? A Yes, sir.

Q How about the Devonian, how did that do?

A The reservoir fluid, since it has very little gas in solution, did not indicate any hydrogen sulfide from a reservoir fluid analysis. However, we went out and obtained a sample of gas, and the gas indicated there was some hydrogen sulfide in it. We have a figure of 290 grains per 100 cubic feet.

Q That is for your Devonian? A Devonian gas.

Q And no indication of hydrogen sulfide in the fluid?

A No. It was in such minute quantities for that that we weren't

able to pick it up. Just a normal-type low-temperature reservoir carbon alalysis.

MR. NUTTER: That's all.

MR. MACEY: Any further questions of the witness?

EXAMINATION BY MR. MANKIN:

Q Mr. Wilson, you indicated the pay thickness in the Pennsylvanian to be approximately 33 feet. I presumed that you are talking about the pay section which is indicated on Exhibit No. 2 to be right at the top of the Strawn, is that correct?

A No, sir, we took the Strawn pay and we estimated a thickness of that, and we also threw in any other possible net pay that occurred in the Pennsylvanian limestone, so we --

Q In other words, you took this 2200 foot of section and anything that looked commercial or would produce and included that in --

A Yes, sir.

Q -- your net pay section?

A Yes, sir, that is correct. However, the majority of it was in the Strawn pay.

Q Do you believe that this should all be thrown together as one zone and the -- from the reservoir standpoint as the most efficient system of producing it?

A Well, with this very thin section and very low recoveries, there isn't much else you can do with it.

Q It is a question of economics?

A It is a question of economics.

Q Do you feel any of these zones would be deep zones?

A No, sir, I don't. I don't feel that they will be.

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

Mr. Montgomery?

EXAMINATION BY MR. MONTGOMERY:

Q Give us the maximum pay thicknesses that you have?

A The maximum that we found on any of these wells is on the Humble State A. J. No. 1, and it was fifty-six feet. The minimum that we found on the Magnolia Anderson No. 1 was 11 feet. Of course, there were some wells in there that hadn't zero pay, but they weren't included in the average.

EXAMINATION BY MR. NUTTER:

Q There is no correlation between the porosity and effect of the pay thickness. Have you attempted to correlate those?

A Yes, sir. We, of course, we didn't have core analyses on every well. Now, on the two that we had, the State Lea 735 No. 1, we took the core analysis and picked the net pay. The net pay that we picked from core analysis and which we used to get our porosity average was identical to the net pay that we got from the micro log, it checked right to the foot, practically, and the Atlantic Federal Dow was also similar to that, --

Q You feel --

A -- because we did have a correlation between the porosity usage and net feet.

Q This six point four seven per cent affects the porosity through the thirty-three feet of pay?

A Yes, sir, we feel it does.

Q No more and no less?

A Using the information we have available; of course, if we had the other core analyses --

Q Well, --

A I think it is certainly high enough. I believe it is.

Q In other words, you feel that 33 feet of net pay has a porosity, an average of 33 feet of net pay in these 7 wells has an average porosity of six point four seven.

Q Yes, sir, I think it does, and we have looked at the electric logs, and all of them, and compared them back against the two we had Core analyses on and they all were very similar. There was nothing to indicate that these two wells happened to be in the poorest parts of the reservoir, nothing at all to indicate that. They were average wells.

MR. MACEY: Anyone else have a question?

EXAMINATION BY MR. MONTGOMERY:

Q I understand you want to dually complete into the Strawn and Pennsylvanian and Devonian, yet you use the figures for these other pays to indicate that they are probably productive.

A Yes, sir.

Q Do those other pays bring down the average, affect the pay thickness?

A No. On those other pays, we did not have those, this upper, or the little pay sections in the top of the Pennsylvanian on either the State Lea 735 or the Atlantic Federal Dow No. 1, on which we obtained the porosity, so it didn't affect the porosity. It did, now, add feet to your net pay, so anything that you got by this extra pay was an increase in the recovery, not a decrease. Now, if you take that out, of course, your recoveries will be less.

Q Do you plan on meeting the offset, the Humble State A. J. Well?

A Well, we don't have a direct offset -- oh, you mean Humble 1?

Q Yes, sir.

A I see. The A. J. No. 1. I'm not -- Iusually don't pass on the recommendations to drill these wells, and I don't know whether we have a recommendation in to drill this one or not.

EXAMINATION BY MR. NUTTER:

Q Mr. Wilson, do you have your analysis sheet there in which you determined your volume factors, effective pay thickness and so forth? I just wonder if you have that computation and if you would submit that as an exhibit so we can have a chance to look that over later on.

A We have a letter from Core Laboratories who ran the bottom hole sample analysis. They gave us the reservoir volume factor and the gas in solution as a preliminary analysis. Complete reservoir analysis has not been completed, but we have that if you would like it.

Q I would like to see the report of the Core Lab on those wells, and also, if we don't have the complete micro logs --

MR. MACEY: Can you furnish that information?

A We can, certainly.

MR. McGOWAN: We don't have it right here in the courtroom, but it will be furnished as quickly as possible to the Commission.

EXAMINATION BY MR. UTZ:

Q Mr. Wilson, do you have an opinion as to how much more oil you would recover on eighty acre spacing than on forty in the Pennsylvanian?

A I have an estimate of what I would consider the recovery for eighty acres and what I would consider the recovery on 240 acres.

Q Percentagewise, how much more oil would you recover on eighty-

acre spacing?

A Well, with this very fluid crude, the good permeability we have, the thin section, I believe that we would recover the same amount of oil on one well to eighty acres as you would recover on two wells on eighty acres in the Pennsylvanian formation.

Q Well, then, you would recover twice as much oil on one well with eighty acres as on forty?

A Well, 240-acre wells, -- in other words, the recovery per acre would be identical in the two cases

Q That being true, then a well would be profitable on eighty acres?

A No, I don't show a payout on eighty acres. Now, of course, you can't double your gross value because you have to take out oil royalty, you have to take out direct taxes, your operating expenses are somewhat higher, your life of your well is longer, so that I show actually a loss on eighty acres of some forty-one thousand dollars.

MR. NUTTER: As compared to the single well?

A Yes, or the one on forty acres.

MR. MACEY: Anyone else have a question?

EXAMINATION BY MR. MANKIN:

Q Mr. Wilson, what you are asking for here is for blanket dual completion in the Dean - Pennsylvanian Field, is that correct?

A For a type, a particular type of dual completion, not for any type of dual completion, but one with parallel ~~strains~~ strings.

Q In other words, it is a blanket -- what I mean by that, in other words, it would apply to any well to be drilled in the field, is what the application so states, isn't that correct?

~~A Well, I think we would prefer to limit it to parallel strains.~~

Q I guess you missed my point. In Texas and other places, they speak of blanket duals as authorising any well to be dual, regardless of its particular location in the field.

A Provided you notify all of the separate operators and no one objects, that is right.

Q In that respect, do you feel it would be better, instead of making a blanket, that it would be on each individual case, as economics might present it?

A I think any operator, or even the Commission can look at these individually, because they will be submitted individually, and if there is any objection by anybody, a public hearing will be required before that dual completion is authorized.

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

EXAMINATION BY MR. MACEY:

Q Mr. Wilson, are you familiar with the allowables that are assigned to the socalled Dean - Pennsylvanian Pool?

A Yes, sir.

Q Do you know whether all the wells that have been completed today are still producing the top allowable assigned for oil?

A The only two -- of course, this is a very new field, and the only two wells producing in December were our two, the 735 No. 1 Pennsylvanian Well, and J. P. Dean, and those two wells were capable of producing the allowable at that time, and, of course, I know about our own wells that they are capable.

Q How about the Magnolia Anderson?

A I don't have a figure on that. The last figure I have is December, and it was not producing at that time, or at least it didn't show up on the records. Might have been producing.

Q The Magnolia Anderson was completed last December, so it didn't produce any more than potential in December. Would you say, based on your analysis of the pay thickness of the Magnolia Anderson, which, I believe, you said was 11,000 feet, would you say the total recoverable volume of oil in that well was one third of what you estimate here?

A No, sir, I wouldn't say that. It was in early in the life of the field, and due to the nature of the fluid, permeability, I think the only thing you can talk about is an average recovery, because I think that the recovery from these wells that we have listed will be very similar. They all have enough pay thickness that they will probably recover very close to the same amount. Now, I don't think the Anderson No. 1 will probably recover as much as the Humble No. 1 which has the larger thickness, but they won't be in exact ratio to those pay thicknesses.

Q The reason I ask the question if the Magnolia Anderson had been producing its allowable rate, it would have already produced twenty-five per cent of its ultimate recovery in forty-five days.

A That's right. That fluid will move, it's got a high fluidity, low viscosity and the permeability is good.

EXAMINATION BY MR. NUTTER:

Q Have you produced quite a bit of gas with this fluid in the Pennsylvanian?

A It is quite a bit of gas. Now, I don't believe we have produced any free gas, it's all solution, but the ratio that you get from your leads would probably be around 1,800 cubic feet per barrel due to the flashing through the separators.

Q There would be a little value to that gas?

A Yes, sir, if you could sell it.

Q That gas value hasn't been included in the economics?

A No, sir, there is no market for the gas in the field at this time.

EXAMINATION BY MR. MANKIN:

Q You mean the gas is being flared?

A Flared or popped, it's not connected, however.

Q Do you anticipate connection to it and the Devonian field?

A Gosh, I just don't know.

Q In regard to the allowables, I think the Commission's schedule shows that the Atlantic well has an allowable of 303 barrels per day. Now, whether that well can make it or not, I don't know. The Sinclair, I believe, has a top of 233, and the Humble Well of 233; do you believe that is equitable reservoir withdrawals from wells offsetting each other?

A Well, they are all Pennsylvanian allowables.

Q All Pennsylvanian wells. The reason is acreage value, 330 for the Magnolia well because of one point three value, do you believe that is a proper reservoir withdrawal for offset wells?

A Well, I believe it has some basis, in fact, in being calculated on an acreage factor. I don't see anything grossly --

Q You feel that will give you unequal withdrawals?

A Pardon?

Q Do you feel that will give you unequal withdrawals from offset wells?

A Well, of course, they are contributing more acreage than the off set wells.

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

EXAMINATION BY MR. NUTTER:

Q What do you think the producing life of this Pennsylvanian field is at the present allowables?

A I would estimate its producing life at eight years.

Q How many barrels have we got in there, 48,000 barrels?

A Yes, sir.

Q The present allowable of 233 barrels a day, it would only take a little over 200 producing days.

A Your ratios will go up to astronomical figures, your capacities will drop off, you can't produce the oil under any kind of limiting gas-oil ratio, it will go largely to gas, and so the biggest part of those eight years will be at very low rates. Of course, it will be producing gas, but we have had fields very similar to this in the Permenian Basin, recoveries very similar to this, and they produce about eight years.

Q Most distillate oil?

A The thing approaches a distillate reservoir, but it is actually a crude oil, has a bubble point on the sample we took.

EXAMINATION BY MR. MACEY:

Q Mr. Wilson, was it your testimony that large portions of the Pennsylvanian zone on the flange of the pool that will be produced in a dual completion well that wouldn't be produced under normal operations by the specific drilling of a well to that?

A No, sir, I don't believe that there would be oil in the field that would be left there if you drilled twin wells as compared to dual wells. I think your recovery would be almost identical in each case as on the field as a whole. Now, any special tract, if you can't

develop your tract, that tract will not be able to recover.

Q What do you feel is the heart of the field? In other words, like say the gravy of the field, the good area?

A Well, the information we have today is the Humble well, the Humble State A. J. No 1, and the Sinclair 396 and the J. P. Dean No. 1.

Q Isn't that the same area as the socalled area which the Dean - Devonian is going to produce in? A Yes, sir.

Q In the flange of the pool which are somewhat already condemned as far as Devonian production is concerned by the dry holes in the Devonian, they will never see any Devonian there?

A That is right. I don't believe they will drill too many wells around the edges of the Devonian structure.

Q Therefore, the advantage of dual completion insofar as marginal Pennsylvanian acreage is concerned is already out the window, because they are not ever going to drill any wells to the Devonian?

A Of course, you have quite a lot of larger area that would have Devonian in that particular part of it. That is the juicy part of the Pennsylvanian. However, the thing isn't exactly juicy, I don't think it will recover any more than about 1,200 barrels per acre.

Q You have more or less already condemned a good portion of Section 5 for Devonian production, haven't you?

A Section 5? That's right, there may be one Devonian location there.

Q How about Section 36, 15, 30?

A It has various meagre Devonian possibilities.

Q And the same is true of 26?

A The E/2 of 26 doesn't have much Devonian possibilities.

Q And the fact that the well in Section 34 is a very questionable venture, rules out the SE/4 of Section 34, doesn't it?

A Yes, sir.

Q It looks, therefore, to me like the place where the dual is going to take place is Section 35 and possibly to the northwest?

A To the northwest. Of course, that looks like it will be the reservoir in both cases, most of it. They largely overlap. Now, there is some sections that do not have Devonian that have Pennsylvanian, but I believe the bigger portion of the field will probably have the two zones.

Q Does your company contemplate coreing the two wells in Section 35 on the State 396 Lease?

A I don't know whether the recommendation is to core or not. I don't have it, but if you desire, --

Q I am not going to ask you to core it, but I just wondered if it was part of your contemplated expenditure on the well. Actually, if you don't have any core information on the heart of the pool, do you?

A Well, we have the -- I don't know this heart; if you are talking about this area, we might get up here and point to the map. This area, we do not have any core information. Now, we do have electric logs and we have compared the porosity that we got from these electric logs in this section for porosities in this well and this well, and they are very similar.

MR. MACEY: Does anyone else have a question of the witness? Mr. Harrington?

EXAMINATION BY MR. HARRINGTON:

Q Mr. Wilson, I think you made the statement awhile ago that in your opinion total pay thickness wouldn't appreciably affect the recovery of this ~~Strong~~ Shannon Reservoir? A Oh, I --

Q I mean your recovery break or foot wouldn't largely influence this twelve-hundred barrels per acre.

A As between wells. Now, of course, your net pay thickness, your recovery is a direct -- varies directly as your net pay thickens on a field-wide basis, but I don't think that you can caluclate recovery on each individual well using the thickness under that well due to the high fluidity of the fluid.

MR. MACEY: Does anyone else have a question of the witness? If not, the witness may be -- pardon me, Mr. Gray.

MR. GRAY: Mr. Wilson, there is one point I was wondering about. You mention that you expect to recover as much fluid in one eighty-acre unit as two forties; I am wondering if that is purely theoretical viewpoint and maybe not really a very practical application of that theory. In other words, if it came down to an actual fact of prodding those, would you be able to recover your fluids from the eighty-acre units, say, within a reasonable time, or is it your contention that your statement was just purely theoretical without regard to the time element involved?

A No, sir, I definitely took in time on that estimate, because even dualing your recovery does not increase your time substantially. It might increase your time by fifty per cent, but that would still be just twelve years to depletion of an eighty-acre unit, so the addiditional expense, operating expense -- of course, there wouldn't be as much operating expense as if you would have on two wells on

two wells on eighty acres.

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

EXAMINATION BY MR. MACEY:

Q Mr. Wilson, have you made any estimate of the total volume of total recoverable casing head gas in connection with your analysis here?

A No, sir. I could give you a pretty quick estimate. I haven't done it.

Q How quick?

A Well, it would be -- you have got 6,000 barrels per acre, and your gas in solution is 2334. I think you would probably recover about eighty per cent of the gas in place, eighty per cent of the 2334, then times the 6,000 barrels per acre. About, roughly, eleven-million cubic feet per acre.

Q Off hand, do you know whether or not the Magnolia Harkrider Well obtained a favorable test in the Strawn on a drill stem test?

A I don't believe the Harkrider tested the Strawn, because they had no show of it.

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

MR. MANKIN: I have one last question. Mr. Wilson, of course what you are asking for here is -- how soon do you envision that the average well in the Pennsylvanian will have a ratio of a hundred thousand to one and become a categorized gas well over a hundred thousand to one and therefore be a gas-oil dual rather than an oil?

A It is kind of hard to say, because those ratios will get awfullhigh and they will approach a hundred thousand to one in the later life of the field. I would say it would be right at the end of the life of the field that they got that high. That is just an

offhand statement.

MR. MANKIN: It would be near the end?

A Near the end of the life of the field.

MR. MACEY: Any further questions of the witness?

MR. McGOWAN: I have a couple of points that I would like to bring up.

REDIRECT EXAMINATION

BY MR. McGOWAN:

Q Mr. Wilson, in calculating your economics on the Pennsylvanian zone, as I understand it, you included all of the possible pay through the entire 2200 feet of what we have classed here — or termed — the Pennsylvanian zone, did you not? A Yes, sir.

Q So that in eliminating or cutting down of that would actually make the economic picture worse in connection with paying out of a well on the Pennsylvanian zone, would it not?

A Yes, sir, that is correct.

Q Now, without taking a position — which we are not, directly or indirectly — concerning eighty acre spacing in the Pennsylvanian, because it is not part of our application and we are not taking any position in it, did you, nevertheless, figure what would be the possible payout status of a well in the Pennsylvanian on eighty acres? A Yes, sir.

Q And it is still true that a loss would be suffered by the operator throughout the field on an average even of eighty acres on the Pennsylvanian zone by drilling a separate well for the Pennsylvanian, is that not true?

A Yes, sir, that is right.

Q In summary, do we not come down to this, that to drill two wells on a given location, one to the Pennsylvanian and one to the Devonian, and this information is reflected on Exhibit 5, it would cost a total of $537,000, just to drill and complete those two wells for production? A Yes, sir.

Q And one well could be drilled through both zones and dually completed for $344,659? A Yes, sir.

Q That means that by using a dual completion method as we propose to use, the operator can save $162,000 plus, over drilling twin wells? A Yes, sir.

Q And it is your opinion, is it not, by the dual wells, that the same amount or equal amounts will be recovered by one dual well with parallel strings of tubing as we have proposed, as would be through two twin wells? A Yes, sir.

Q It is your opinion, is it not, that the same amount of oil will be produced through a dual completed well by the method we propose in our application, on the same location, as would be produced from twin wells? A Yes, sir.

Q And doing this through a dual well, the operator can save approximately $163,000 in drilling and equiping costs alone?

A Yes, sir, that's right.

Q And it is your opinion that the Pennsylvanian zone cannot be economically developed as a whole except by the use of dual completed wells, is that correct?

A Yes, sir. That is my opinion.

MR. McGOWAN: That is all I have.

MR. MACEY: Does anyone else have a question of the witness? If not, the witness may be excused.

(Witness excused.)

W. J. ROGERS

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

DIRECT EXAMINATION

BY MR. McGOWAN:

Q State your name, please. A W. J. Rogers.

Q And by whom are you employed?

A Sinclair Oil and Gas Company.

Q In what capacity?

A Division Petroleum Engineer.

Q The area covered by our application, the Dean Pool, is within your division, is it not? A Yes, sir.

Q And, as Division Engineer for that Division, you have general supervision over the activities within your division, and while it is actually carried on by the district people in the field, you are familiar with it and are what we would term a Field Production Engineer, is that true?

A From an engineering standpoint, yes.

Q You have previously qualified, have you, before the Commission? A Yes, sir.

MR. McGOWAN: Are his qualifications acceptable?

MR. MACEY: Yes, sir.

Q As Division Engineer for Sinclair Oil and Gas Company for the division encompassing the Dean Pool, you have made detailed studies and kept up to date on that pool? A Yes, sir.

Q And participated in the various studies and crecommendations

made to management in development thereof? A That is correct.

Q Has it become your conclusion that dually completed wells, such as suggested in our application, are feasible in this pool?

A Yes, sir. In my opinion, that is correct.

Q Now, when an engineer, or production people of your company determine whether to recommend a pool be -- that we utilise dual completions in a particular pool or not, are there certain general requirements that you now more or less set out to satisfy yourself on before such a recommendation is made?

A Yes, sir, that is correct.

Q Advise the Commission what those are that we consider necessary to be now satisfied before we dually complete an area.

A There are five of those. First, that the produced oil would be confined to separate tubing strings; secondly, this reliable zone separation would be provided; third, adaptability to conventional artificial lift of both zones simultaneously and independently; fourth, sufficient lift capacity for satisfactory oil production rates to depletion; fifth, safe protection against possible corrosion.

Q Now, will you give to the Commission, briefly, the characteristics of the two formations which we are concerned with here? I know they have been put in, but briefly, so we will all be talking about the same thing.

A Mr. Wilson noted that the initial reservoir pressure in the Devonian Formation was 5504 pounds. He also noted that the saturation pressure, 463 PSIG, or, in other words, pounds per square inch gauge. This is important in that it indicates an extremely undersaturated reservoir fluid, and that is the -- that the reservoir pressure, therefore, would have to drop extremely before the gas - oil ratios

would ever increase. The third item concerning the Devonian was the solution gas - oil ratio of 110 cubic feet per barrel. This is important in that it reflects that we will not be concerned in the Devonian with high ratios. The fourth item is the gravity of the crude, thirty-five degrees API. This is specially important when we compare it to the gravity of the Pennsylvanian crude. The fifth item was hydrogen sulfide content of the gas, being 290 grains per 100 cubic feet. That is important in that it could indicate that there could possibly be corrosion due to the effects of that. Mr. Wilson indicated that the recovery mechanism would be a water drive, and in summing those six factors up, we anticipate that the producing conditions in the Devonian reservoir will be relatively high fluid levels, extremely low volumes of gas and possible ultimately large water volumes. Now, in respect to the Pennsylvanian Formation, was noted, first, that the initial reservoir pressure was 4008 pounds; the second items noted was saturation pressure of 3859 PSI. This is important in that the reservoir fluid is saturated, and that only a small drop in reservoir pressure will result in high gas-oil ratios. The third item was the solution gas - oil ratio, being 2334 cubic feet per barrel. In other words, already we have a relatively high gas - oil ratio, and it means that in an installation which we make for dual completions, that we should provide some means of letting this gas escape other than through the pump. The gravity of the crude in the Pennsylvanian formation is 44 degrees API; that is some nine degrees less than the gravity of the crude in the Devonian. The hydrogen sulfide content of the Pennsylvanian gas is only five tenths of a grain per hundred cubic feet, and with the concentration

of only five tenths of a grain, we would not expect any corrosion due to hydrogen sulfide gas in the produced fluid. Sixth item was the recovery mechanism, we anticipate a solution gas drive, and, to sum those six items up, we anticipate that in the Pennsylvanian formation, we will have relatively low fluid levels, and large volumes of gas, and probably small water volumes.

Now, those are essentially the producing conditions which we anticipate in these two formations.

Q Now, Mr. Rogers, at this point, would you take the copies of the exhibits that you have in front of you there and briefly identify, to the Commission, exactly what they depict? Just go through them.

A Exhibit No. 6 would be a dual completion showing both zones flowing through the parallel strains.

Q A schematic drawing of this with both zones flowing?

A Yes, sir.

Q Exhibit 7, then, is a schematic drawing of our proposed dual completion when both zones have gone to the pump?

A Yes.

Q Exhibit 8, detailed drawing of the head on the top of the ground of the well when both zones are flowing?

A And both are pumping.

Q And both are pumping. Exhibit No. 9 is a schematic drawing of the head of the well when both are flowing? A That is correct.

Q And ten, what is that?

A One zone flowing and one pumping.

Q A schematic drawing of the head of one -- the well on the ground when one zone is flowing and one is pumping?

A That is correct.

Q And No. 11?

A No. 11 is a detailed drawing showing the mechanism in the bottom of the hole.

Q Now, all of these drawings were made by you or under your supervision, and you know them to be correct, is that right?

A Well, some of these exhibits, notably the detailed drawings showing the heads and the down-hole equipment, were prepared by the concern manufacturing the equipment.

Q But they are the equipment we propose to use in the completion?

A That's right.

MR. McGOWAN: At this time, I would like to offer these exhibits, 6 through 11, in evidence, and also Nos. 4 and 5.

MR. MACEY: Without objection, they will be received.

Q Now, Mr. Rogers, at this time, both the Pennsylvanian and Devonian zones are flowing zones, at least insofar as we are aware at this time, is that not true? A That is correct.

Q So our present dual completion proposal is for two flowing zones and that is depicted by the first exhibit, is that correct?

A That is correct.

Q Explain to the Commission just how this dual completion will function when both zones are flowing, using this large drawing.

A Well, the first requirement we should satisfy is the use of parallel strings of tubing. Now, in this proposal, one of the tubing strings would be conventional two-inch up set API tubing, which will extend down into and through the packer separating the two producing horizons. In other words, the Devonian fluid will be through the two-inch up set tubing; the other string in this proposal

consists of two-inch interbral joint tubing which is run parallel to the other string, and it extends to the Pennsylvanian formation, and, of course, is above the packer that separates the producing zones. This is seven-inch OD casing, two strings of two-inch tubing.

Q Now, that will result, will it not, Mr. Rogers, in the fluids from each zone flowing through a separate string of tubing so that it is, at all times, separate, produced, measured and stored at the surface out of each string, the same as if you had two wells side by side, with one string of tubing for each well?

A I believe that is correct.

Q Now, the packer shown there at the bottom of the string, the purpose for that is to keep the two zones separate, is that correct?

A That is correct. That is the second general requirement, that we have reliability on zone separation. The particular type of packer which we are proposing is a retainer type production packer which has been proven by years of oilfield work. It is made of materials which is highly resistant to corrosion.

Q Has it been your experience, Mr. Rogers, that before that packer would corrode and deteriorate, that the casing in which it is placed would --

A That is one of the factors of this packer, it is made, the metal parts are castiron.

Q It removes any possibility of the two zones mixing in the bore hole?

A I wouldn't say "any possibility," but certainly to a safe degree.

Q All right. Now, as we move to your general requirement in

No. 3, adaptability to lift of both zones simultaneously and independently. Can this method of dual completion be easily so adapted?

A Yes, sir. We are proposing a conventional rod pumping equipment with a beam type unit at the surface. There is nothing more conventional than that type.

Q Does the drawing on the board, Exhibit 7, adequately represent just what the dual completion with both zones pumping look like?

A Yes, sir, I think it does.

Q It is the same as Exhibit 6, except you have now a conventional pump going through each tubing and pumping each separately, being produced, measured and stored separately? A That is right.

Q Will you go on and show where this will also satisfy your general requirements?

A The fourth requirement is that we should have sufficient lift capacity for satisfactory oil production rates to depletion, and we have chosen for this a pumping unit at the surface, having a peak torque rating of 640,000 inch pounds, and a sixteen foot stroke. We have made detailed calculations of the capacities under various operating depths, and, as stated before, we expect to have relatively high fluid levels in the Devonian, and more or less -- we have made calculations to show what we could expect in the way of daily production from the extreme of 13,500. We have also made those calculations assuming that the lift depth would be from 11,500 to 9,500 and 7,500. For example, if we were lifting from a depth of 7,500 feet, and operating that unit, a stroke of eleven strokes per minute, we could expect to get 445 barrels of fluid per day.

Q That is through each string of tubing?

A Yes. At a depth of 9,500 feet, operating at eleven strokes

per minute, we would have 319 barrels per day; from a depth of 11,500, operating at nine strokes per minute, we would have 235 barrels of fluid per day; from the depth of 13,500, operating at seven strokes per minute, we would have 145 barrels of fluid per day.

Q Does this lead you to the conclusion, Mr. Rogers, that an equivalent amount of oil can be pumped from each zone simultaneously and independently through the method we propose as could be pumped from each zone through twin wells? A Yes, sir.

Q Does Sinclair Oil and Gas Company have any of these type of completions in operation in other states at the present time?

A Yes, we have four in operation.

Q Have they proved successful? A Yes, sir.

Q Do we have any of them that are on the pump, pumping both zones? A We have one.

Q And it has proved successful? A Yes, sir.

Q You have found you can pump through the dually completed wells as if you had twin wells? A Yes, sir.

Q Then, is it your opinion that if — that at any depth you can pump this oil through twin wells that you can pump it through twin strings of tubing in one well? A Yes, sir.

Q That, therefore, then the dual completion would not in any way limit the pumping of either of these or the amount of oil that would ultimately be recovered from either zone?

A No, sir.

Q We would put a pump on it by having it dually completed under the same circumstances we would put a pump on it if it were a single

well to a single zone?

A Yes, sir.

Q Now, the other exhibits that we have introduced here, I believe you stated were merely detailed sketches of certain portions of this proposed dual completion type; is there any of those particular exhibits that you feel should be explained to the Commission further, or do you think they pretty well speak for themselves?

A Well, the purpose of Exhibits Nos. 8, 9 and 10, which were the tubing head sketches, are offered solely to show that these well equipment companies are manufacturing conventional head equipment to take care of these dual completions. Exhibit No. 11 shows schematically the retainer type production packer at the bottom, and the parallel strain anchor by which the string of tubing is anchored to the long string to prevent moving of the short string. The long string is latched into the retainer type production packer to prevent movement there, too.

Q Now, should it prove necessary with a well dually completed in the method we propose, can you go in and work over either one or both of the zones without running any danger or unusual danger of damage to that zone or the other zone of the well?

A Yes, sir, I think there are satisfactory procedures for those workovers.

Q Is that a relatively new method of dual completion?

A Yes, it is. Most of the development has been in the, oh, past year or so, I would say.

Q Has it seemed to catch on and be used in great numbers very rapidly by the various companies producing oil in the United States?

A Yes, sir, I think the number of dual completions is increasing rapidly.

Q Do you think that the reason for that might possibly be that this method of dual completion is greatly superior to the method in use before this was developed?

A Yes, I think that is right.

Q Does this method of dual completion minimize, or do away with, to a practical certainty, the various objections that existed as to the other methods that were used prior to the development of this method?

A I think so.

Q Is it your opinion, as a production engineer, and your experience, that you can take a well with a seven-inch casing in it and put your two strings of tubing in as you are proposing here and you can operate each zone almost the same and accomplish the same purposes within this as if you had twin wells sitting side by side and one going to each zone?

A Yes, sir, I think so.

Q Is there anything else you would like to add?

A Well, we might mention that fifth requirement, safe protection against possible corrosion. I think the installation of the packer is very adequate protection against possible corrosion, especially in the sense that if the fluid from the Devonian is corrosive. They would be confined to the tubing strings, and therefore the tubing can be repaired and replaced easily enough, so that is probably the best protection that you could have. We do not expect any corrosion from the Pennsylvanian at all. So, in other words, you have your casing from the packer up protected by sweet oil.

Q Now, actually the Devonian now is not a corrosive fluid?

A I don't anticipate any.

Q But in the event it should become corrosive, the installation is adequately protected? A Yes, sir.

MR. McGOWAN: That is all.

MR. MACEY: Any questions of the witness?

EXAMINATION BY MR. MANKIN:

Q Mr. Rogers, I tried to follow you on your fluid that would be produced by pumping equipment from each of the two zones. Did you say that from the Devonian from 13,000 that you could lift over 300 barrels per day through this two inch hydro-tubing and likewise over 200 barrels from the Pennsylvanian per day?

A I don't believe those capacities that you mentioned correspond with the depths that I gave. At 7500 feet, we could expect to lift 445 barrels per day; at 9500, 319 barrels per day; at 11,500, 235 barrels per day; at 13,500, 154 barrels per day.

Q That is my point. In other words, you could not lift the allowable from either the Pennsylvanian or the Devonian?

A In the first place, we don't anticipate that we would ever have to pump from 13,500 in the Devonian. Certainly we don't expect to have to pump from a depth greater than 7500, and at that depth, we have more than the allowable capacity.

Q You were speaking of your fluid levels; in one case, your fluid level is high, and the other is low?

A That is correct. Now, in the Pennsylvanian, we are expecting low fluid levels, but large volumes of gas, and I think the rate of productivity from the Pennsylvanian will decline to the point that we can handle all the well will be able to produce with the pumping equipment.

Q Then the Devonian, you would expect no difficulty because of the high fluid levels? A That is right.

Q But in the Pennsylvanian you might have that, however, the productivity will be lower and drop off so fast that you don't feel that you will be producing this 300 barrels a day very long?

A That is correct.

Q That is, when it goes to pumping, in other words?

A That, is right.

Q I call your attention to your exhibit eleven in regards to the production packer model; is that all castiron, or partly cast-iron parts? A There are some --

Q This is a corrosive fluid, the gas in the Devonian, is that correct?

A It is a -- the gas in the Devonian fluid indicated high hydrogen sulfide, and it could possibly be corrosive, that is right.

Q You feel this one model D packer retainer production packer would actively contain the fluid and gas within the Devonian, or do you feel that maybe sometime there should be some additional method put in there to keep from having corrosion eating up the packer and going into the upper strings?

A No, sir, I believe this packer will withstand any possible corrosion in the Devonian fluids.

Q Then you don't feel the two zones will ever communicate, between the Devonian and Pennsylvanian, -- A No, sir.

Q -- under the most adverse conditions? A That is right.

MR. MACEY: Anyone else? Mr. Nutter.

EXAMINATION BY MR. NUTTER:

Q Mr. Rogers, when you were talking about your capacities there

as you lift from certain levels. You said you could lift 155 barrels of fluid -- or 154, rather -- from the 13,500 level. What kind of fluid were you taking into consideration?

A That would be fluid with a water gradient. On the other hand, —

Q What weight of fluid did you use in that calculation, oil or water?

A No, it would be a water gradient of point 434 pounds per square inch per foot.

MR. MACEY: The calculations are based on pure water, is that correct?

A Yes, sir.

Q You said that Sinclair Oil Company has four dual installations in operation today, is that correct?

A We have four, that is correct. Three of them are flowing, and one is pumping in both sections.

Q What depth is that one particular one pumping from?

A That one is pumping one section at approximately 8600 feet and the other at approximately 9100 feet.

Q Is Sinclair today pumping wells that are 13,000 feet deep?

A No, sir, I don't know of an installation.

Q What is the standard policy when they have to put a well on pump and it is a deep well, do they lift it with a beam pump, or go to gas lift, or --

A We use the conventional beam type rod equipment, that is right.

Q What size pumps were you basing those calculations on?

A I have a complete tablation of all these calcualtions, and,

course, I will answer your question, but if you would like to have a copy of the calculations, you are certainly welcome to them.

Q I don't think that would be necessary.

A Now, in the 13,500 foot depth, we were using a one one quarter inch pipe, with a combination rod ~~vein~~ of seven eighths, three quarters and five eighths. The length of the stroke was, of course, at the surface, 192 inches, the speed was seven strokes per minute.

Q Just a curiosity, what horsepower is that equipment, or do you have that part of it?

A No, I don't have the engine requirements or horsepower requirements for the engine.

Q Mr. Rogers, in the event of a workover there, would this equipment permit you to work over a well without killing both zones?

A In the --

Q Simple workover.

A. A simple workover in the Pennsylvanian could be accomplished without disturbing the Devonian, because,you can, having an annular space in the Pennsylvanian, as well as a tubing string, there is certain jobs you can do, acidizing and so forth, without disturbing the Devonian. You could also pump down the Devonian tubing without disturbing the Pennsylvanian.

Q Pull one without disturbing the other with this type of string, this type of installation?

A You could pull the shorter string; you could not pull the longer string without first pulling the short string.

Q So that if you had to work over the Devonian formation, you would have to kill the Pennsylvanian formation?

A That's correct.

Q Is it your experience, Mr. Rogers, that a well that is dually completed in two reservoirs has more workovers necessary than a well that is completed in one reservoir?

A Not especially, no.

Q I imagine, probably, just as an observation, that your workover ratio would be about double, because you have got two reservoirs open there.

A Well, I'm -- perhaps I misinterpreted your question, but I'm thinking that in a Pennsylvanian formation, you would have a workover, whether it were a dually completed well, or a single completion, and that the same would apply to the other formation. I don't see where you would have twice as many workovers in a given zone.

Q But the hole would have twice as many --

A Yes, per well, in the individual well, yes.

Q So the other zone would be subject to twice as much --

A I see what you are driving at.

Q In other words, when you have got a dual completion, you have twice as many workovers, and every time you work it over, you are subjecting the other reservoir, which isn't involved in the workover, to pressures ~~of~~ of mud or salt water or some medium used to fill that well.

A That is true, especially if you are working in the lower formation.

Q What do you think about the economics of working, workovers, on dual completions, do you think they are more expensive than single completed wells?

A Yes, we have made a calculation that would indicate that they are more expensive in the dual completion wells.

Q If a workover is more expensive, there is a possibility that when you get down to a marginal operation that maybe a workover won't pay out on a dual completion where it would on a single, is that correct?

A Well, we have to have the formation to work on, first, and if we can't dually complete them we won't have anything to work on.

Q But if you had the well completed singly and the work was almost a marginal operation, you might be able to work it over?

A If it was a single completion it probably wouldn't pay out in the first place, much less justify a workover.

Q You mean you may never have a well there to work over?

A That's right.

Q Well, if you have to kill one zone, the workover on the other zone, is there a possibility of damaging the zone not involved in that workover?

A I think using the proper oil-base muds with low circulation material, if necessary, that it would be safe.

Q You can subject a reservoir to killing it and not damage that reservoir? A Yes.

Q On a single completion, Mr. Rogers, is there ever any danger of communication between the two reservoirs, say, for instance, leakage past the cement on the outside of the pipe, communication between two reservoirs in which the well is drilled through one into the other, is there that damage inherent?

A There is that possibility, yes.

Q Would that possibility also exist in a well that would be dually completed? A Yes, sir.

Q So, you have the possibility of communication between the

reservoir outside the casing?

A That is true in either type of completion.

Q There is more danger of communication between the reservoirs in the case of a dual completion?

A Yes, I think the danger is more pronounced in the dual than the single in that you have removed the mudcake and so forth from the producing formation, and make it more susceptible to fluid entry.

Q How about communication within the pipes themselves, is there that danger present in a dual?

A I think in the equipment we have today that that danger is very small within the pipe.

Q You are referring, I guess, to your packer pipe? Baker packer?

A Yes, sir.

Q Is one of those packers a pretty reliable piece of equipment?

A Yes, sir, I believe it is, and I might mention, too, in this particular field, and in this particular dual completion installation, if you did have communication within the pipe, that should be readily detected by some four methods, first, there is a nine degree difference in the gravities, that should show up immediately if there is communication. There is also this difference in hydrogen sulfide content in the gas. If the Devonian gas were sufficiently sour and should be easily detected by the odor. Third, the communication should be readily detected by gas - oil ratio tests. Here, we have one reservoir producing with a ratio of 110 cubic feet, and the other with ratios on the order of 2,000 cubic feet per barrel, and, fourth, any routine pressure test should readily establish whether or not you have communication.

Q Will Baker Company guarantee that packing?

A I can't speak for Baker.

Q Are you able to get a guarantee from the maker?

A I haven't tried to.

Q There is a possibility, then, that it might be, they recognize that, I guess?

A There is a possibility of almost anything happening, I guess, but certainly I believe that this packer has been proven by use, by years of use, and in my opinion, it is a safe reliable installation.

MR. MACEY: Does anyone else have any questions of the witness? Mr. Utz.

EXAMINATION BY MR. UTZ:

Q Could you tell me, Mr. Rogers, what the pressure differentials are that the packer is designed to withstand?

A I have seen tests, testimony, that they have been tested with a 9,000 PSI differential without failure.

Q You don't know of any operations of that much differential?

A No, I don't know of any.

Q How much differential do you know of in your personal experience in this type packer?

A I would say in excess of 3,000 pounds.

Q Well, at the present time when you complete this well, you will have approximately 1500 pounds differential?

A That is the present difference in the reservoir pressures between the two zones.

Q And the Devonian being a water, and the other being a solution drive, that is --

A It may have a -- it may reach a stage where you can have

3500 or even 4,000 pounds differential.

MR. UTZ: That is all.

EXAMINATION BY MR. MANKIN:

Q Mr. Rogers, the question Mr. Nutter asked you there about a possible communication between the Pennsylvanian and the Devonian, that isn't very probable, is it, unless you have some, oh, 1800 to 2,000 feet between the zone there where you should have a cement boom which would be more than adequate in these two reservoirs?

A Yes, sir.

Q It is not a probable communication, then?

A No, sir.

MR. MANKIN: That is all.

MR. MACEY: Does anyone else have a question of the witness? If not, the witness may be excused.

MR. McGOWAN: I have a couple of questions I would like to bring out.

REDIRECT EXAMINATION

BY MR. McGOWAN:

Q In discussing the amount of fluid that can be lifted by these pumps, by the time these go on the pumps, even if we had to produce them from the deepest zone, is it your personal opinion that wells usually make their allowables when they go on the pump in reservoirs of this type?

A Yes, initially, at least.

Q Is the amount of oil that can be lifted from a given depth through this type of completion the same as could be lifted from that depth through a single well?

A Yes, I think it is, yes, sir.

Q So, in fact, the fact that it is dually completed would have no limitation on the amount, but a limitation on the pumping ability?

A I think so, yes.

Q We introduced Exhibit No. 12, which is a calculation, I think, of yours concerning pump potentials. Did you perform those or have them done under your supervision? A Yes, sir.

Q I will hand you what has been marked as Exhibit No. 13, and ask you to advise the Commission what that is.

A That is a picture of our dual completion facilities on the H. M. Ford Well No. 2, Parker - Wolfcamp and Parker - Pennsylvanian Pools, Andrews County, Texas. The picture shows the installation very similar to what Exhibit No. 7 shows. This is the actual producing of two units.

Q That well is actually equipped in the manner we are proposing to equip the wells in this pool and pumping from both zones?

A Yes.

Q And it is being done satisfactorily? A Yes, sir.

Q And the depths indicated on the picture is the depth from which those are being pumped? A That is right.

Q Is this well producing from each zone through the two pumps connected to it through each tubing and is producing comparable amounts of fluids as are being produced from twin wells offsetting it in separate zones where there is only one string of tubing and one pump in each well?

A Yes, sir. We do have an offset well producing from the upper formation, and based on our production in January, production from the dually completed well was equivalent to that of the single well.

Q ~~Thusly, experience in this, we have satisfied ourselves,~~ have

we not, that the pumping and producing through this medium of dual completion is just as efficient as the pumping and producing through twin wells into the two zones?

A Yes, sir, I think so.

MR. MCGOWAN: That is all.

MR. MACEY: Mr. Rogers, how long have you been operating your H. M. Ford No. 2 as a dual completion, pumping both zones?

A The well was completed early in December, the upper zone was put on the pump immediately. On December the 2nd, 1955; the lower pump, lower zone, was put on the pump December the 18th, 1955.

MR. MACEY: You have approximately a two month's history out of it?

A Yes, sir, that is right.

MR. MACEY: I have one other question. Is it practical to run three inch tubing in walls as deep as your Devonian production in this case?

A To gain capacity, where you expect to lift from depths of 13,000, I don't see -- our calculations would indicate that you wouldn't gain any capacity, any appreciable capacity, I'll put it that way.

MR. MACEY: Does anyone else have any questions of the witness?

EXAMINATION BY MR. MANKIN:

Q In that same connection, Mr. Rogers, in the Devonian where it is a water-drive reservoir, what do you feel will be the maximum amount of fluids you will have to lift throughout the latter part of the field?

A Oh, I'm looking at these 7500 foot calcualtions on the order of 450 barrels per day.

Q Which might be 75 per cent water, something like that?

A No, I think that we will go down to a higher water cut than that before depletion.

MR. MACEY: Does anyone else have a question of this witness? If not, the witness may be excused.

(Witness excused.)

We will take a short recess.

(Short recess.)

MR. MACEY: The hearing will come to order.

MR. McGOWAN: If it please the Commission, I would like one more question out of the witness that was on the stand when we closed.

MR. MACEY: All right.

W. J. ROGERS,

the witness who had previously testified herein, resumed the stand and testified further as follows:

DIRECT EXAMINATION

BY MR. McGOWAN:

Q In your discussions, Mr. Rogers, of pressure differential of the packer with members of the staff, the figures you gave were pressures of the zone, within the zones themselves?

A Yes. I think it was mentioned that the difference in reservoir pressures at the present time is some 1500 pounds.

Q That does not mean that there will be a 1500 pound differential on the packer itself?

A No. At the present time, those reservoir pressures correct that down, the differential will be in the order of eight or nine hundred.

Q Actually, the pressure above and below is not equal to the

pressure within the reservoir itself?

A No, it wouldn't be even.

MR. McGOWAN: That is all. I would like to move the admission of our exhibits, all that have not heretofore been admitted.

MR. MACEY: Without objection, they will be received.

MR. McGOWAN: If the Commission please, before we get into some closing statements, there was also some questions raised concerning the blanket type of order. We take no pride, particularly, in the type of order we have asked the Commission for. What we have in mind is the avoidance of further trips for producers and time consumed in hearing for the Commission, that, in the event you see fit to allow this, you do it on a pool basis, and that once an operator determines that he desires to make a dual completion, he give notice to the Commission and to the offset operators, showing a sketch of the proposed completion and how he proposes to do it. If neither the Commission or the operators object, he then be allowed to go ahead and do it, furnishing the information set out to the Commission plus any further information you want.

Now, if any of the offset operators or the Commission objects to it, then of course it would have to be handled under a separate hearing; but where it was done on the order of the Commission previously approved, we saw no use in doing it on an individual basis.

It is a feasible working plan as the State is aware. That is all we had in mind, and any information the Commission desires in addition to what we set out in our application, we certainly will agree with. For instance, you may desire a packer leakage test every six months or any such thing the Commission desires and solely under the direction of the Commission entirely and not that we ask

to go out there and dually complete any wells you want to without any notice at all, but we are trying to eliminate time in hearing of the Commission as well as the operators.

Now, as far as the evidence goes, the Applicant rests, unless there is something farther the Commission wants that we haven't furnished.

MR. MACEY: I don't know whether the record is clear or not, but I personally would like to have copies of the Core Laboratory tests, analyses of the cores.

MR. McGOWAN: I believe that is being furnished to the staff at the present time, and anything they want in that order, if they decide they want something tomorrow, next week, they can get in touch with us.

MR. NUTTER: Is Sinclair making any recommendations as to what packer tests should be run?

MR. McGOWAN: No. We feel the Commission and the staff is better qualified to determine what you need than we are. If you want us to, we can submit to you a recommendation. We didn't include any in the case, because we felt that was the prerogative of the Commission rather than ours. Any tests that the Commission or staff feels is necessary to protect the two zones and the natural resources of the State, we certainly will be glad to accept and go along with.

MR. MACEY: Do you wish to make a closing statement?

MR. McGOWAN: I would like to.

MR. MACEY: Does anyone have any evidence or testimony they wish to present in this case?

MR. VICKERY: J. H. Vickery, Atlantic Refining Company. Atlantic is an operator in the Dean Pool. We concur with the points

and the opinions offered by Sinclair in this case, and we recommend that their application be considered favorably.

MR. MACEY: Does anyone else have a statement?

MR. LOAR: William R. Loar, Sunray Mid Continent. We have oil and gas leases in the vicinity of the area subject to this hearing, and we wish to concur in the application of Sinclair and recommend the Commission adopt it.

MR. MACEY: Anyone else?

MR. CHRISTIE: R. S. Christie, Amerada. We have no interest in the Pennsylvanian or Devonian Field. However, we have been opposed to all oil duals in the past, but with the new development of improved mechanical devices, we are now of the opinion and feel that in certain instances dual completions are probably warranted. We think probably as new fields come along or new duals it will certainly be subject to hearing, but other than that, I think we would concur in Sinclair's recommendation.

MR. MACEY: Anyone else?

MR. GRAY: Ralph L. Gray, Buffalo Oil Company. In previous hearings before this Commission regarding dual oil - oil completions, the Buffalo Oil Company has been in opposition. However, since that time, we had an opportunity to study actual case histories, and we recognize the improvements that have been made in the eqipment, and we find ourselves now in the position of having to change our minds, and we now favor the dual oil - oil completions. I might say that we have two sub-leases in Texas which are similar in a lot respects to the Applicant's proposal, and we have found them to be entirely satisfactory up to this time, so we would strongly urge the Commission to grant the application.

MR. MACEY: Anyone else?

MR. COUCH: Terrell Couch, The Ohio Oil Company. Ohio, in the past, and still has, as a matter, disapproved oil - oil duals, but sometimes we recognize there are some circumstances in which they would be justified. Apparently, from evidence available at this time, this Dean - Devonian area and Pennsylvanian area under discussion -- and of course with this application -- are such that an exception should be made, and therefore subject to certain matters I will mention very very briefly, Ohio approves the release sought by Sinclair in this application.

Ohio thinks that the order, if granted, should not have any limitations on mechanical methods of completion other than parallel strings of tubing, but that in each case, when the application is made by the operator, the method to be used by him should be fully set forth and should be a matter for his decision subject to the approval of the Commission.

Of course, we therefore recommend that no further specific restrictions be included in the order, type of packer, or anything of that sort; furthermore, if the order is granted, Ohio definitely feels that provisions should be made in the order for periodic tests to establish the productive capacity of the two zones within the dually completed well, and tests also at regular periods to establish the fact that there is no communication occurring such as packer leakage tests.

And, in closing, I just want to say that in order to be -- I have got to concede that when Mr. Wilson commented about these possibilities of marginal Devonian and Pennsylvanian production out here on the edges of this pool, it seems like it is fitting just a little

too close to our situation in the northwest quarter of the northwest quarter of Section 35.

MR. MACEY: Anyone else?

MR. McGOWAN: If the Commission please:

First, we are glad to concur in Ohio's suggestion that the parallel strings of tubing be the only specific requirement. That was our intention; that is the heart of the system we propose. We simply illustrated other methods.

I am further authorized to advise the Commission that Cities Service Oil Company; Dan Auld, who represents various operators, operating interests in this pool; Mr. Jack L. Hammond, and Tidewater Associated Oil Company all of which own leases or will have wells in this area, have authorized me to announce that they support our application.

Now, to get into a very brief closing statement on this matter, we started out, as we told you today, recognizing the general policy of the Commission against oil and oil dual completions, and we have in the past had no particular quarrel with that and felt it was probably justified, and the method of dual completion of wells before the method we have produced and proposed here today was brought into play was probably not adequate to warrant the oil and oil dual completions in this State, and the State has seen fit to deny them and I think they were warranted in doing so.

We do feel, however, that here today we have shown with convincing evidence that the Pennsylvanian zone is not of sufficient value to be produced on its own, and that the only way a good portion of the oil in the Pennsylvanian zone will be produced is by allowing dual completions as we have suggested.

We feel that we have shown the economic necessity for these dual completions and we further feel that we have shown it is not feasible from a mechanical standpoint to accomplish these completions and eliminate the objections that have been heretofore on them; the zones can now be adequately separated, they can be adequately protected, the production can be measured and stored at the surface, the ultimate oil that can be recovered through two wells can be recovered now through one well.

If single wells or two wells to the two zones can be pumped from 11,000 or 13,000 or 15,000 feet, they can be pumped through a dually completed well. We don't say you can pump them that deep, necessarily, but there is no limitation that can be pumped because of this dual completion, it is a depth limitation that exists in all, whether they are dual or not.

Now, in reading through the New Mexico Statutes, the thought occurs to me that probably the Statutes this Commission is most concerned with in connection with this is Section 65-3-3A of your Conservacy Laws, which defines ways as being the underground ways and also the locating, spacing, drilling and equipping, operating or producing of any well or wells in a manner to tend to reduce the total quantity of crude oil or natural gas ultimately recovered from any pool. Reading that Statute, I can readily see why the Commission has been reluctant heretofore to grant these. I believe our evidence today has illustrated that to comply with that Statute now, the Commission should grant this application and that the granting of it will more nearly comply with that Statute than will the denying of the application and that is my purpose in bringing out the testimony that the gentleman representing The Ohio Oil Company men-

tioned awhile ago, because if we assume any particular given forty acreslocation, that it costs $286,000 plus to drill a Devonian well, and the best our engineers can figure is that there is only about $285,000 worth of oil in that structure, that will not be drilled. It is just uneconomical, we all recognize that.

Let's assume at the same time that our engineers could find what they felt would be $100,000 worth of oil in the Pennsylvanian, obviously a well is not going to be drilled to the Pennsylvanian for that $100,000 worth of oil, because it costs $200,000 to do it, but we can drill one to the Pennsylvanian and dually complete it for $244,000 cost, so the granting of this application, you will encourage the drilling of a well on that forty acre location and not only encourage and result in the recovery of the Pennsylvanian oil, but also get the Devonian recovered that will never be drilled for unless you can dually complete the well and make an overall profit.

And just exactly that circumstance brings us directly within the Statute that I am talking about in that we are operating, locating, spacing and producing those wells in the manner that will not reduce but will increase the amount of crude petroleum and/or natural gas that will be recovered from the Devonian and Pennsylvanian Pools, and so we just submit it to the Commission at this time, based upon this application for the Dean Pool in the Devonian and Pennsylvanian formations.

It is an economic necessity that they be dually completed, and that the mechanical operations of it today has advanced to the point that by the use of parallel strings of tubing, the objections no longer exist that have heretofore existed to other types of dual completions.

Now, this type of dual completion is not limited to the type of pump that we illustrated here today, as I think the staff brought out and as the Ohio Company gentleman did, but by use of the parallel strings of tubing, the mechanical objections have been eliminated and the production can be produced separately, kept separate, the zones can be kept separate and all of the recoverable oil recovered, and because of the economic features, wells will be drilled that would not have been drilled, so we respectfully request the Commission to grant our application.

MR. MACEY: If there is nothing further, we will take the case under advisement.

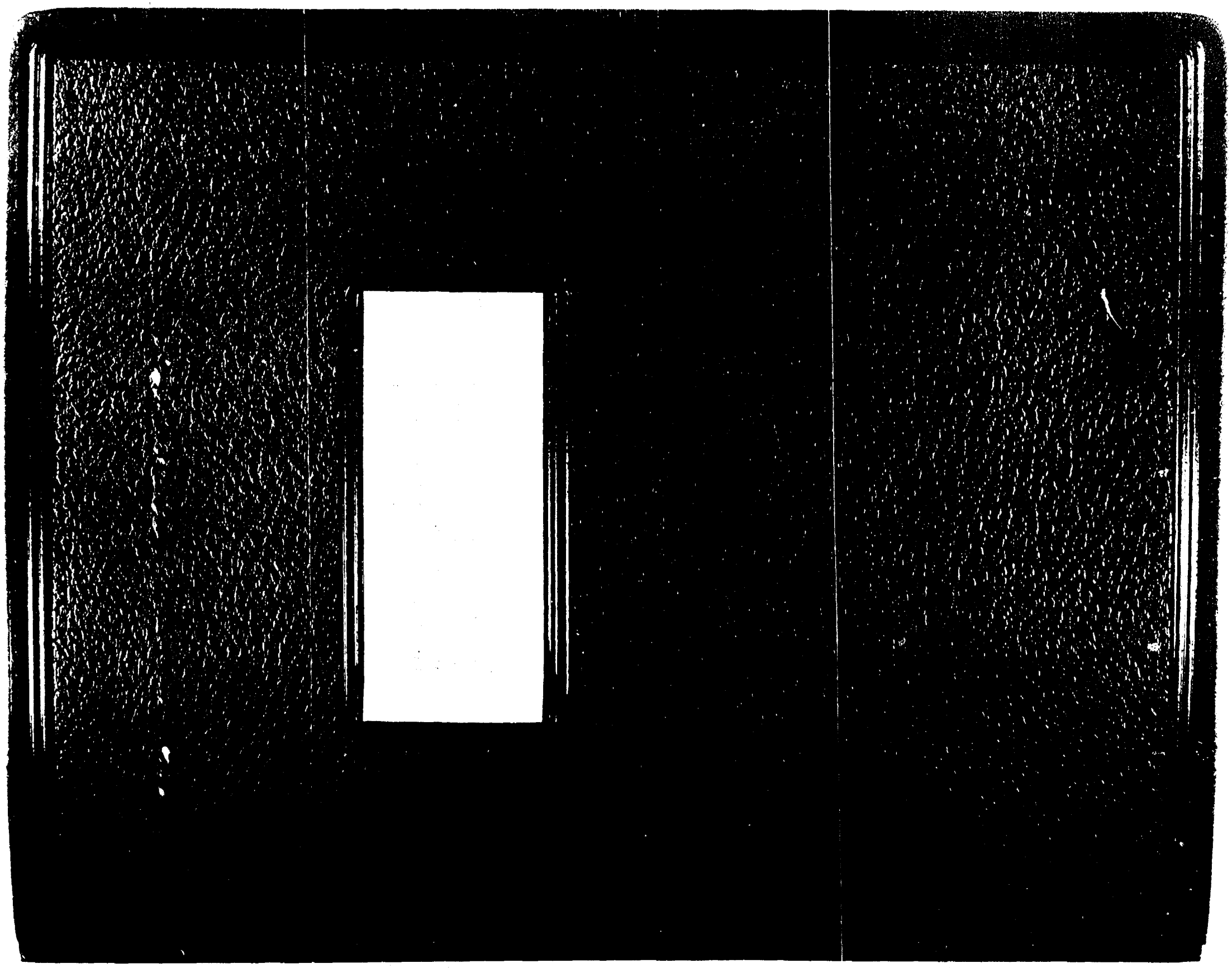
* * * *

STATE OF NEW MEXICO)
ss
COUNTY OF BERNALILLO)

I, THURMAN J. MOODY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission was taken by me at the time and place hereinbefore set forth, and that same is a true and correct transcript to the best of my knowledge, skill and ability.

WITNESS MY HAND, this, the 5th day of March, A. D. 1956.

Thurman J. Moody
Court Reporter.



REPORT ON

CASE 1016,

THE APPLICATION OF SINCLAIR OIL AND GAS COMPANY FOR AN ORDER AUTHORIZING THE DUAL COMPLETION OF WELLS IN THE DEAN PENNSYLVANIAN AND DEAN DEVONIAN POOLS, LEA COUNTY, NEW MEXICO.

* * *

Made by

DAN NUTTER

PETROLEUM ENGINEER

March 28, 1956

ABSTRACT

A study is made of the application of Sinclair Oil and Gas Company for an order authorizing the dual completion of wells in the Dean Devonian Pool and Dean Pennsylvanian Pool, in Lea County, New Mexico.

CONCLUSION

The oil and gas reserves in the Dean Pennsylvanian Pool are such that, considering the anticipated recovery rate of 20 percent, to drill a well into the Pennsylvanian formation would be an uneconomic venture, the wells would not be drilled, and waste would occur by reason of leaving these reserves in the ground.

RECOMMENDATIONS

That an order be entered in Case 1016 granting Sinclair's application for an order authorizing the dual completion of wells in the Dean Devonian Pool and the Dean Pennsylvanian Pool in Lea County, New Mexico.

DISCUSSION:

In the consideration of any application for authorization to dually complete two oil reservoirs into a common well bore, the advantages of such a dual completion must be weighed against the disadvantages.

There are two distinct advantages to be gained by dually completing a well. The first is a matter of economics: the operator will undoubtedly save money and materials by dualling any well. The second advantage is the possibility of recovering oil from a marginal or sub-marginal reservoir that might otherwise never be tapped without the benefit of a cheap dual completion.

The disadvantages, from a conservation standpoint, of dually completing two oil reservoirs into a common well-bore are numerous, but they may be consolidated into one fundamental effect: The dual completion of any well may lead to waste of our natural resources as a result of:

1. Communication between the reservoirs resulting in the higher pressure zone bleeding pressure, oil, and/or gas into the lower pressure zone.

2. Damage to one of the producing horizons caused by the subjection of that zone to drilling mud or other medium during workover operations on the second zone.

3. Premature abandonment of a zone because of the more expensive workover operations in a dual completion which may render what otherwise might be a profitable workover into a non-profitable job which could not be performed.

4. Premature abandonment of a zone because of the inadaptability of the mechanical installation to artificial lift.

The application of Sinclair Oil and Gas Company has been considered in the light of the several advantages and disadvantages enumerated above.

Consideration of the disadvantages and the methods by which Sinclair proposes to overcome them follows:

Communication between the reservoirs: Sinclair's application provides that seven inch pipe be set through both zones and perforated into the Devonian and Pennsylvanian Pools. Although they did not so specify in their application or testimony it is presumed that cement would be circulated to a point above the top of the Pennsylvanian. This should provide adequate protection against communication outside the casing.

Applicant's proposal also provides that parallel strings of tubing be used. Separation of the two zones within the casing would be achieved by a Baker Model "D" retainer type production packer. While this packer may not be completely exempt from the possibility of leakage, it has been tried and tested for many years in oil fields throughout the United States. It is generally recognized as a dependable piece of equipment which can be relied upon to do its job. The parallel strings of tubing and the Baker packer should provide adequate protection against communication between the zones within the casing. Although the Devonian section contains a corrosive gas, the Pennsylvanian contains sweet gas and oil, and the only portion of the casing which would be exposed to corrosion would be that section opposite the Devonian and below the packer. The bottom of the packer would also be so exposed.

With respect to communication between the reservoirs, either inside the casing or outside of it, it should be pointed out that each of the two reservoirs in question has several characteristics which would make the detection of communication comparatively simple and sure:

A. The Pennsylvanian zone has an original pressure of 4008 psi. The Devonian has an original pressure of 5504psi. Any abnormal pressure variation in either or both of the reservoirs might indicate communication.

B. The gravity of the crude in the Pennsylvanian is 44^{o} API, while that of the Devonian is 35^{o} API. A change in the gravity of production from either zone would be easily detected, and a very definite indication of possible communication.

C. The Pennsylvanian zone is "sweet" whereas there is H_2S gas in the Devonian. The sudden appearance of H_2S in the Pennsylvanian production would indicate communication.

D. There is considerable difference in the gas-oil ratios of the two reservoirs. The Pennsylvanian has a GOR of 2334 to 1 while the Devonian has a GOR of 110 to 1. Any sudden change in the GOR of either reservoir would be suspicious.

Insofar as damage to one of the producing horizons by subjecting it to drilling mud or other medium during workover operations on the other zone, Sinclair's witness stated that certain types of the more simple workovers could be performed on either zone without disturbing the other zone by use of the parallel tubing strings which are proposed. The witness further stated that in the more complex types of workovers where it would be necessary to kill both zones, with the use of "proper oil-base muds with lost circulation material, if necessary, that it would be safe." The writer concurs.

No defense was offered against the objection to dual completions on the grounds that dual workovers are more expensive and may result in premature abandonment of a zone in a marginal situation where a cheaper workover might prolong the producing life, except the statement that without the dual completion, there might not be any well to work on.

Insofar as disadvantage No. 4 is concerned, the possibility of premature abandonment because of the inadaptability of the mechanical installation to artificial lift, it is the belief of Sinclair's witnesses and also that of the writer that the parallel strings of tubing, together with the high fluid levels expected in the Devonian and the high GOR's in the Pennsylvanian, that artificial lift should present no particular problems not inherent in any wells of equal depth.

Consideration of the advantages of dual completion of the Dean Pennsylvanian and the Dean Devonian Pools follows:

There is no question that the dual completion of any well rather than twinning it is more economical. Not only would a savings be effected in actual drilling costs and other intangibles, but a savings would also be realized in such tangible items as pipe, well head equipment etc.

Waste of natural resources caused by leaving the oil and gas in the ground can be averted by dual completions in the case where the development of a pool is a marginal or sub-marginal operation that might never be attempted unless the cheaper dual completions could be made rather than drill the more expensive twin wells.

Sinclair, by its testimony and exhibits, has attempted to show the Dean Pennsylvanian to be such a case. By that company's calculations 33 net feet of pay with an average porosity of 6.47 percent and a recovery rate of 20 percent will yield 1200 stock tank barrels of oil per acre, or 48,000 stock tank barrels of oil per 40-acre well. The gross value of this oil is shown to be $135,840. After the deduction of some $53,100 for royalty, taxes and operating expense, the net revenue to be gained from a twin well in the Pennsylvanian would be $82,740. The company estimates the cost of drilling the well to be $221,080, resulting in a net loss of $138,340.

With the producible reserves remaining constant, the company has further shown that after the deduction of some $57,100 for royalty, taxes and operating expenses, the net revenue to be gained from a dually completed Pennsylvanian well would be $78,740. They estimate the cost of dually completing the well to be $58,300 resulting in a net profit of $20,440.

The accuracy of these estimates of reserves and the cost of producing them appears to be reasonable enough. Several additional factors could have been considered, however, although it is doubtful if the overall picture would have been changed. No consideration was given to the value of the gas, although the Pennsylvanian gas alone would have an estimated gross value of approximately $45,000.

CONCLUSIONS

In view of all of the above-described conditions and factors, and assuming the evidence to be correct or approximately correct, the writer is of the opinion:

1. That the reserves in the Dean Pennsylvanian Pool are such that a well drilled to the Pennsylvanian formation in this pool would probably not be an economically advisable venture.

2. That the operators owning leases in the Dean Pennsylvanian Pool will in all probability not see fit to drill wells to produce the oil and gas in said pool.

3. That unless means is provided to produce the reserves in the Dean Pennsylvanian Pool by some method other than drilling wells into said Pennsylvanian formation, waste will occur in that the known reserves will not be produced.

4. That the applicant, Sinclair Oil and Gas Company, has shown that to dually complete a well in the Dean Devonian Pool and the Dean Pennsylvanian would probably be an economically feasible venture, by virtue of which the reserves in the Pennsylvanian formation could be produced and waste thereby averted.

5. That the applicant has proposed a dual completion installation utilizing parallel strings of tubing and a retainer type production packer which will provide adequate separation of the fluids from the two reservoirs within the casing, and which may be readily adapted to the artificial lifting of the fluids from the two reservoirs if and when that becomes necessary.

6. That adequate separation of the reservoirs in the well-bore outside the casing can be accomplished only by setting the production casing string at the total depth of the well bore and cementing it from total depth to a point at least 500 feet above the top of the Pennsylvanian formation.

7. That provision should be made, if applicant's proposal in Case 1016 is approved, for the Secretary-Director of the Commission to have the authority to grant administrative approval for the dual completion in the Pennsylvanian and Devonian formations only of any well located within the horizontal limits of both pools, after operator has submitted application for such dual completion in triplicate together with evidence that all operators owning leases within the horizontal limits of either or both pools have been notified of the proposed dual completion. The Secretary-Director should then wait at least 20 days before granting said administrative approval and grant same only if no objection has been received. Provision should also be made for the Secretary to have authority to grant immediate approval upon receipt of written consent to proposed dual completions by all operators owning leases within the horizontal limits of either or both pools.

8. That any well so dually completed should be completed and thereafter produced in such a manner that there will be no commingling within the well-bore, either within or outside the casing, of gas, oil and gas, or oil produced from either or both of the separate strata.

9. That upon the actual dual completion of any such well the operator should submit to the District Office of the Commission at Hobbs, New Mexico, copies of Oil Conservation Commission Form C-103, Form C-104, Form C-110 [redacted] outlining the information required on those forms by existing Rules and Regulations, and two copies of the electric log of the well. Operator should also submit in duplicate evidence indicating that the cement around the production casing string was circulated to a point at least 500 feet above the top of the Pennsylvanian formation.

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

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

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

13. That any order granting approval of Sinclair's application in Case 1016 should provide that jurisdiction of that cause be retained by the Commission for such further order or orders as may seem necessary or convenient for the prevention

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

1

SINCLAIR OIL & GAS COMPANY

SINCLAIR BUILDING

TULSA, OKLAHOMA

H. B. SMITH
PRESIDENT

January 19, 1956

Mr. H. M. Bayor
Gulf Oil Corporation
Fort Worth, Texas

Mr. A. R. Chester
Magnolia Petroleum Company
Dallas, Texas

Mr. W. R. Loar
Sunray-DX Oil Company
Tulsa, Oklahoma

Mr. J. D. Wheeler
Ohio Oil Company
City National Bank Building
Houston, Texas

Mr. J. E. Roth
Tide Water Associated Oil Company
Tulsa, Oklahoma

Mr. L. A. Sunkel
Atlantic Refg. Co.
Dallas, Texas

Mr. C. E. Reistle
Humble Oil and Refg. Co.
Humble Building
Houston, Texas

Mr. J. A. Cleverley
Cities Service Oil Co.
Bartlesville, Okla.

Mr. Jake L. Hamon
501 First Nat'l Bank Bldg.
Dallas, Texas

Mr. Dan Auld, Sr.
Kerrville, Texas

Gentlemen:

All addressees herein are owners of leases or an interest in leases in the Dean Pool, 15-South, 36-East, Lea County, New Mexico.

In order to explore the possibility of securing authorization from the New Mexico Oil Conservation Commission for dual completions in the Pennsylvanian and Devonian to obviate the necessity of drilling individual wells to these horizons, Sinclair Oil & Gas Company is filing an application with the New Mexico Oil Conservation Commission seeking an order to permit dual completions in both the Devonian and Pennsylvanian formations, where wells are capable of producing from both horizons.

A copy of our proposed application should reach you within the next few days and we are calling a meeting to discuss this matter for 1:30 P.M. Friday, January 27, 1956, in the Sinclair office, 8th Floor, Fair Building, Fort Worth, Texas, and we would appreciate it very much if you would arrange to have a representative present.

Very truly yours,

COPY ORIGINAL SIGNED H. B. SMITH

LJF/MB
bcc- Messrs. P. C. Brooke
Floyd Brett
J. H. McGowan
Nat Harben
W. B. Macey,
New Mexico Oil Conserv. Comm.
Santa Fe, New Mex.

ECONOMICS OF DUAL COMPLETIONS VS TWIN WELLS
PENNSYLVANIAN RESERVOIR, DEAN FIELD
LEA COUNTY, NEW MEXICO

I. Factors Used in Computing Pennsylvanian Reserves

a. Porosity of 6.47% (Core analyses, Sinclair's State Lea 735 #1, and Atlantic's Federal Dow #1)
b. Effective Pay Thickness of 33 ft. (Electric-Micro-Radioactivity Logs)
c. Formation Volume Factor of 2.315 bbls. reservoir oil per bbl. st. tk. oil (bottom hole sample analysis Sinclair State Lea 735 #1)
d. Connate Water of 16%
e. Oil Recovery of 20%

II. Stock Tank Oil-in-place equals 6,000 gross bbls. per acre.

III. Pennsylvanian Stock Tank Oil Reserves

a. Gross barrels per acre equals 1,200
b. Gross barrels for 40 acres equals 48,000

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

V. Economics of Pennsylvanian 40 acre Unit.

	Twin Well	Dual Completion
a. Gross value of recoverable STO	$135,840	$135,840
b. Charges against well		
1. Royalty	16,980	16,980
2. Direct Taxes	7,320	7,320
3. Operating Expense	28,800	32,800
c. Net Revenue	82,740	78,740
d. Cost of well	221,080	58,300
e. Net Profit or (Loss)	(138,340)	20,440

CASE 1016-1017

COST ESTIMATE - SINGLE VERSUS DUAL
EUNICE FIELD, LEA COUNTY, N.MEXICO

	Devonian Single Completion	Pennsylvanian Single Completion	Devonian & Pennsylvanian Dual Completion
Footage	$146,200 (13,690' @ 10.75/ft.)	$104,400 (11,600' @ 9.00/ft.)	$146,200 (13,690' @ 10.75/ft.)
Day Work	20,823	13,250	30,323
Special Services (Logs, DST's, Perf., etc.)	9,035	10,170	14,975
Supplies (Mud, bits, etc.)	23,382	15,000	23,382
Cement & Cementing Services	8,528	6,300	8,528
Road, Location, Trucking	10,597	10,500	10,597
Wellhead, Shoes, etc.	4,042	4,042	6,562
Tank Battery & Lines	10,533	10,676	16,533
Surface Casing	1,154 (13 3/8")	1,154 (13 3/8")	1,154 (13 3/8")
Intermediate Casing	17,268 (9 5/8")	17,268 (9 5/8")	17,268 (9 5/8")
Production Casing	26,000 (5 1/2")	20,855 (5 1/2")	39,947 (7")
Tubing	8,800 (2")	7,381 (2")	25,070 (2" & 2" Hybrid)
TOTAL	$286,362	$221,076	$344,659

Cost of Devonian Single	$286,362	Cost of Devonian & Pennsylvanian Dual	$344,659
Cost of Pennsylvanian Single	221,076	Cost of Devonian Single	286,362
Total Cost of Two Wells	$507,438	Cost of Dual Completion	58,297
Cost of Dual Completion	344,659		
Difference	$162,779		

5

CORE ANALYSES

ENGINEERING & OPERATING LABORATORIES

THE ATLANTIC REFINING CO.

OPERATOR Atlantic LEASE & WELL NO. Ballard Dom #1 FIELD OR LOCATION (Undesignated) Dimmitt Pool COUNTY Lea

DATE SAMPLE RECEIVED 12-19-55 DATE ANALYSIS STARTED 12-20-55 DATE REPORTED 12-20-55 ELEVATION Not Given

TYPE OF CORE: Conventional ☐ WIRE LINE ☐ SIDE WALL ☐ HOW RECEIVED: Core Box ☐

SAMPLE NUMBER DEPTH FEET	CORE RECOVERY INCHES	PERMEABILITY TO AIR MILLIDARCYS	POROSITY PERCENT	RESIDUAL SATURATIONS IN % PORE SPACE			RESIDUAL CHLORIDES AS N.A.CL.	WT. % CRYSTALLIZED WATER*	A.P.I. GRAV. DEAD OIL @ 60° F.	FORMATION		REMARKS
		Horiz.	Vert.	Oil	Water	Mercury				Producing	Age	
CORE # — 11520 — 11551 Recovery 31"												
11,520 - 21	0	1.2	0.05	0	-	-						Dense limestone with [illegible]
11,521 - 22	0	1.0 1.1	0.05	0	-	-						Ditto
11,522 - 23	0	1.1 0.9	0.05	0	-	-						Ditto
11,523 - 24	0	0.8 1.0	0.05	0	-	-						Ditto
11,524 - 25	0	0.9 0.7	0.05 0.10	0	-	-						Ditto
11,525 - 26	0	1.1 1.2	0.05	0	-	-						Ditto
11,526 - 27	0	0.2 0.2	0.05 <0.05	0	-	-						Ditto
11,527 - 28	0	0.1 0.1	0.05 0.05	0	-	-						Ditto
11,528 - 29	0	0.2 0.1	0.05 0.05	0	-	-						Ditto
11,529 - 30	0	0.2 0.1	0.05 0.05	0	-	-						Ditto
11,530 - 31	0	0.1 0.1	0.05 0.05	0	-	-						Ditto
11,531 - 32	0	1.0 0.8	0.05 0.05	Tr.	-	-						Ditto

DRILLING MUD DATA	ANALYSTS	DISTRIBUTION	REMARKS
Weight ____ Visc. ____			Drilling fluid: oil emulsion
Chlorides ____ P.P.M.			Continued on page 2
Water loss ____ cc/ ____ min.			
	CHECKED BY		

CORE ANALYSES

ENGINEERING & OPERATING LABORATORIES
THE ATLANTIC REFINING CO.

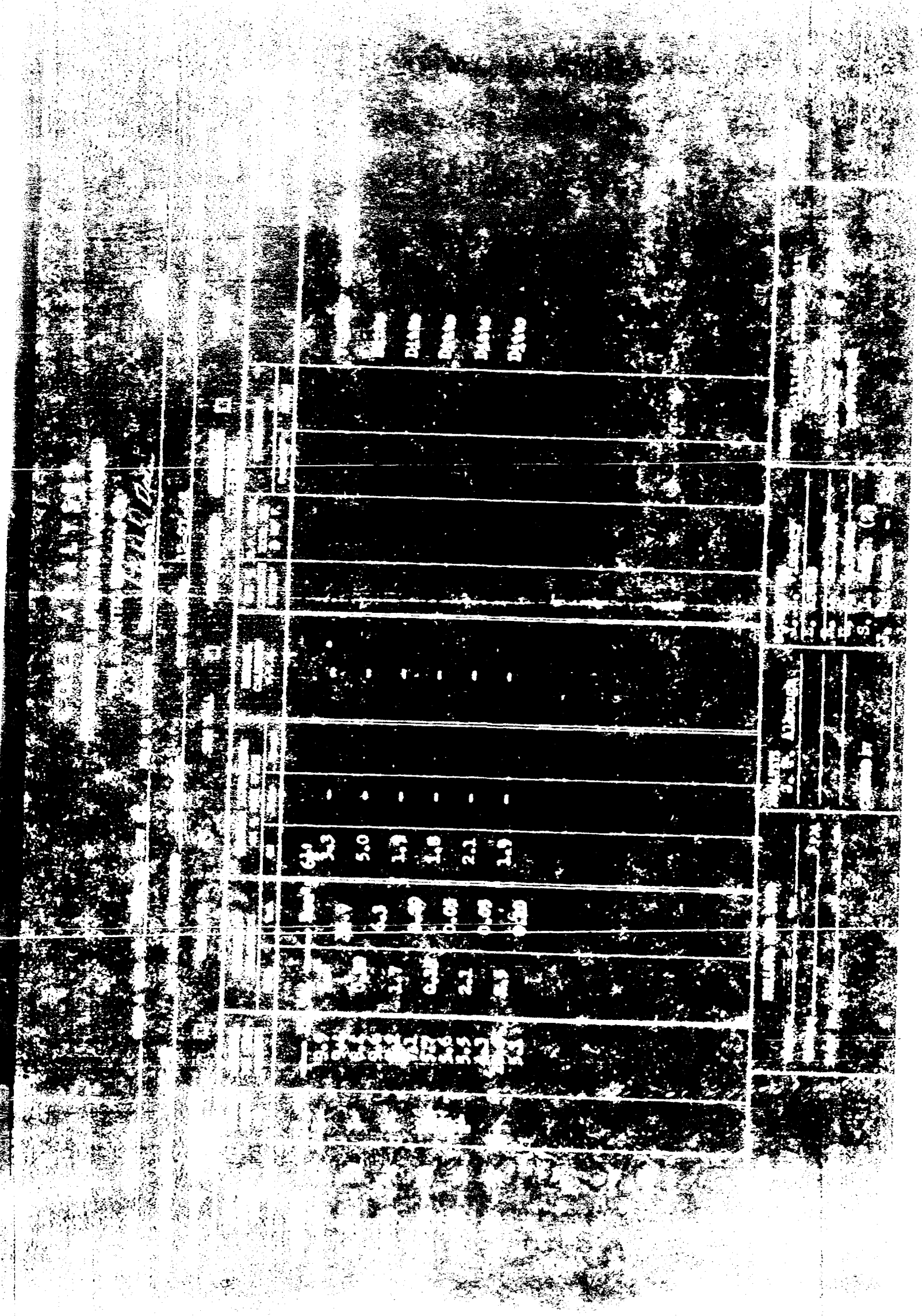
LEASE & WELL NO. Regional Proj. #1 FIELD OR LOCATION (Undesignated) Permian Pool COUNTY Ector

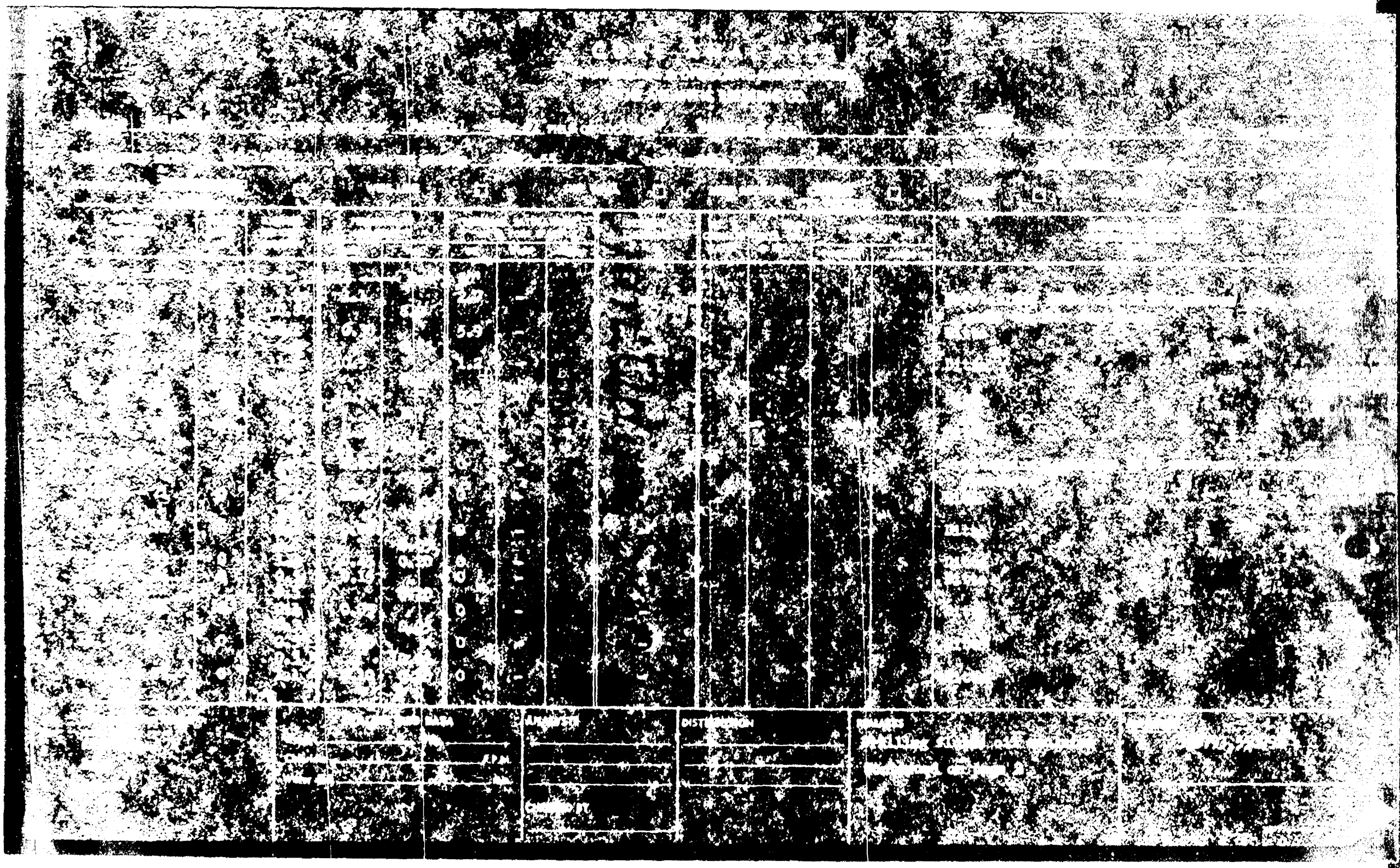
DATE ANALYSIS REQUESTED 12-10-55 DATE REPORTED 12-20-55 ELEVATION G. Not Given

WIRE LINE ☐ SIDE WALL ☐ HOW RECEIVED: CUTTINGS ☐ ROTARY ☐

SAMPLE FROM	FEET	PERMEABILITY MILLIDARCYS Horiz.	PERMEABILITY MILLIDARCYS Vert.	RESIDUAL SATURATIONS IN % PORE SPACE Oil	Water	Vacuum	RESISTIVITY RESISTIVITY FACTOR F. F. M.	SPEC. % CONNATE WATER*	A.P.I. GRAV. EXTR. OIL @ 60° F.	PRODUCTION Projected	PRODUCTION Actual	REMARKS (Lithology and Shows)
	2.0	0.05		0	-		-					Crystalline limestone with vugs&pin
	2.5		0.05									
	1.1	0.05		0	-		-					Ditto
	2.8		0.05									
	0.3	0.05		0	-		-					Ditto
	0.4		0.05									
	1.3	0.[illegible]	0.10	0	-		-					Ditto
	1.2	0.05		0	-		-					Ditto
	0.8		0.05									
	0.[illegible]	[illegible]	0.10	[illegible]	-		-					Ditto
	0.[illegible]	[illegible]	0.05	0	-		-					ditto
	0.[illegible]	[illegible]	0.05	0	-		-					Ditto
	0.[illegible]	[illegible]	[illegible]	[illegible]	-		-					Ditto
	[illegible]	[illegible]	[illegible]	[illegible]	-		-					Vugular crystalline limestone
	[illegible]	[illegible]	[illegible]	[illegible]	-		-					Ditto
	[illegible]	[illegible]	[illegible]	[illegible]	-		-					Vugular crystalline limestone
	[illegible]	[illegible]	[illegible]	[illegible]	-		-					[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	-		-					[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	-		-					[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	-		-					[illegible]

Drilling fluid: Oil emulsion





CORE ANALYSIS

LEASE & WELL NO. Federal [illegible] DATE SAMPLE RECEIVED 12-22-45 DATE REPORTED 1-2-46

☐ WELL CUT ☐ SIDE WALL ☐ NEW METHOD ☐

	0	2.1	0.15		0	-	-					
		0.3		0.05								Highly fract
	0	0.4	0.05		0	-	-					
		0.2		0.05								Ditto
	0	2.0	0.20	0.15	0	-	-					
	0	1.4	0.20	0.20	0	-	-					Ditto
	0	0.8	0.10	0.10	0	-	-					Ditto
	0	1.5	0.10	0.10	0	-	-					Ditto
	0	0.7	0.10	0.10	0	-	-					Ditto
	0	0.7	0.10		0	-	-					Ditto
		0.3		0.05								Ditto
86	0	0.5	0.05		0	-	-					
		1.1		0.05								Ditto
87	Tr.	1.6	0.15	0.10	Tr.	-	-					
88	0	21.0	*3.0	*128.0	0	-	-					Ditto
89	0	1.5	0.10	0.10	0	-	-					Ditto
90	0	1.3	0.10	0.05	0	-	-					Ditto
	0	1.8	0.10	0.10	0	-	-					Ditto
	0	2.1	0.10	0.05	0	-	-					Ditto
	0	2.2	0.15	0.15	0	-	-					Ditto
	0	1.1	0.15	0.10	0	-	-					Ditto
	0	3.0	0.10		0	-	-					Ditto
		1.6		0.10								Ditto
	0	2.5	0.25	0.25	0	-	-					
	0	1.7	0.10	0.10	0	-	-					Ditto
												Ditto

DRILLING MUD DATA

Weight _____ Visc. _____

Chlorides _____ P.P.M.

Water loss _____ cc/_____ min.

ANALYSTS

_____

_____

_____

CHECKED BY

_____

DISTRIBUTION

_____

_____

_____

REMARKS

Drilling fluid: oil emulsion

* Natural fracture noted

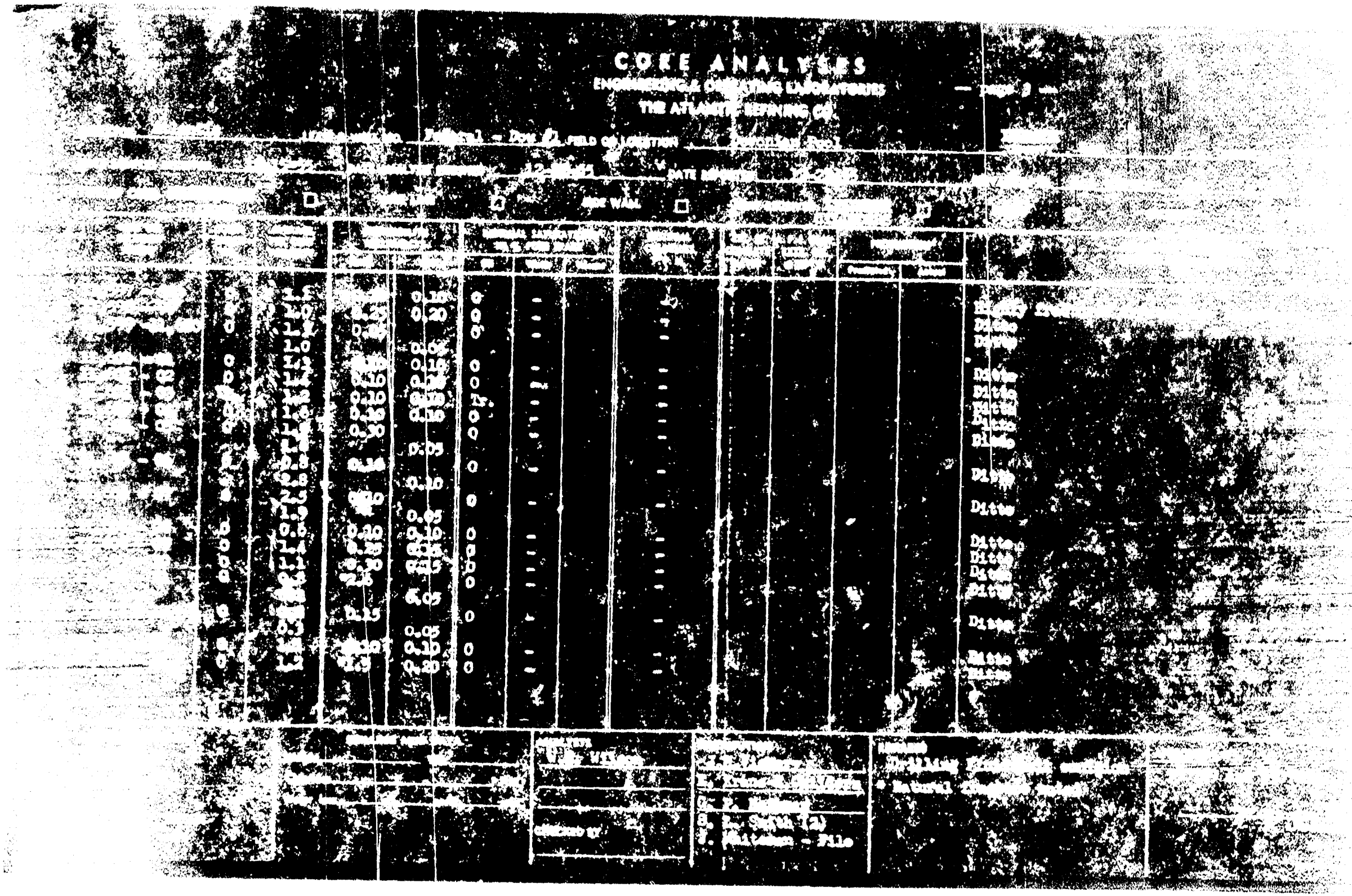
Continued on page 3

Analyses: 550 [illegible]

COKE ANALYSES

ENGINEERING OPERATING LABORATORIES

THE ATLANTIC REFINING CO.



SINCLAIR OIL & GAS COMPANY

SINCLAIR OIL BUILDING

TULSA, OKLAHOMA

LEGAL DEPARTMENT

January 20, 1956

Mr. W. B. Macey
Secretary
Oil Conservation Commission
Santa Fe, New Mexico

Dear Mr. Macey:

Herewith is original and two copies of application of Sinclair Oil & Gas Company requesting an order of the Commission allowing dual completion of wells for Devonian and Pennsylvanian production in the E½ NE¼ and SE¼ of Section 34, all of Section 26 and 35, Township 15 South, Range 36 East, and Lots 1 through 8 of Section 5 and Lots 1,2, 7 and 8 of Section 6, Township 16 South, Range 37 East, Lea County, New Mexico.

It is requested that you have the proper notice of this application made and set same for hearing on February 15.

Would appreciate being advised of the setting of this cause and proof of publication.

Yours very truly,

James H. McGowan

James H. McGowan
Attorney

JHM md

Enclosures

BEFORE THE OIL CONSERVATION COMMISSION
OF
THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF SINCLAIR OIL & GAS COMPANY FOR AN ORDER AUTHORIZING THE DUAL COMPLETION OF WELLS IN THE DEVONIAN COMMON SOURCE OF SUPPLY AND THE PENNSYLVANIAN COMMON SOURCE OF SUPPLY UNDERLYING THE $E\frac{1}{2}$ $NE\frac{1}{4}$ AND $SE\frac{1}{4}$ OF SECTION 34, ALL OF SECTION 26 AND 35, TOWNSHIP 15 SOUTH, RANGE 36 EAST AND LOTS 1 THROUGH 8, SECTION 5 AND LOTS 1, 2, 7, AND 8 OF SECTION 6, TOWNSHIP 16 SOUTH, RANGE 37 EAST, LEA COUNTY, NEW MEXICO)

CASE: 1016

A P P L I C A T I O N

Comes now Sinclair Oil & Gas Company and respectfully shows to the Oil Conservation Commission as follows, to-wit:

1. That Applicant is the owner of oil & gas leases within the following area, to-wit:

East Half of Northeast Quarter ($E\frac{1}{2}$ $NE\frac{1}{4}$) and Southeast Quarter($SE\frac{1}{4}$)of Section Thirty-Four (34), all of Section Twenty-Six (26) and Thirty-Five (35), Township Fifteen (15) South, Range Thirty-six (36) East, and Lots One through Eight (1 through 8) of Section Five (5) and Lots one, two, seven and eight (1,2,7 and 8) of Section Six (6) Township Sixteen (16) South, Range Thirty-Seven (37) East, Lea County, New Mexico.

2. That Applicant has heretofore completed its J. P. Dean Well No. 1, located in the Southeast Quarter of Southwest Quarter ($SE\frac{1}{4}$ $SW\frac{1}{4}$) of Section 35, Township 15 South, Range 36 East, at a total depth of 13,910 feet; that said well encountered the Pennsylvanian common source of supply between 11,429 feet and 11,530 feet below the surface and the Devonian common source of supply between 13,600 feet and 13,725 feet below the surface; that said well is capable of producing oil from both of said formations.

3. Applicant further states that the entire area covered by this application is underlain by both the Devonian and Pennsylvanian common source of supply at the approximate depths as those encountered in its J. P. Dean Well No. 1; that it costs approximately Three Hundred Five Thousand Dollars ($305,000.00) to drill and complete a well to the Devonian common source of supply and equip same for production; that it costs approximately Two Hundred Fifty Thousand Dollars ($250,000.00) to drill a well to the Pennsylvanian common source of supply and complete same for production; that one well can be dually completed to produce oil from both common sources of supply at an approximate cost of Three Hundred Thirty-eight Thousand Five Hundred Dollars ($338,500.00).

4. That Applicant proposes to dually complete wells into said common sources of supply by using parallel strings of tubing in each hole, one string of tubing to each common source of supply, and further states that such method of dually completing a well for two separate common sources of supply productive of oil is mechanically feasible, will result in separate production and reporting from each common source of supply and will not result in any oil being left in the ground in either source of supply that could be produced by separate wells.

5. That Applicant proposes that any well within the above described area capable of producing from the Devonian common source of supply and the Pennsylvanian common source of supply may be dually completed without the necessity of the operator thereof appearing before the Commission at a separate hearing with respect to each such dual completion upon said operator furnishing to this Commission the following data;

a; Diagrammatic sketch of dual completion installation.

b; An electric log of the subject well or a type electric log showing clearly thereon the subsurface location of the separate reservoirs claimed.

c; Affidavit of packer setting upon form prescribed by the Commission.

d; Packer leakage test upon form prescribed by the Commission.

e; Either waiver of offset operator of evidence that notice of such dual completion has been given to said operators.

PROVIDED that upon a determination by an operator to dually complete a given well, notice of such shall be given by registered mail to all offset operators and to the Conservation Commission and if any offset operator shall, within ten days from the date of receipt of said notice, file in writing with the operator giving said notice, an objection to such dual completion with a copy of such objection going to the Conservaion Commission, or if the Commission, on its own motion, shall determine that a hearing should be held, then and in such event the operator desiring to dually complete the well shall file a separate application with the Conservation Commission and cause notice thereof to be given as required by law and thereafter a hearing will be conducted with respect to such application. In the event, however, that no objection is filed by any operator within the time allowed and the Commission does not determine that a hearing should be held concerning said proposed dual completion, then the operator desiring to dually complete said well as herein set forth may proceed with such dual completion and furnish forthwith to the Commission the data set forth above.

Applicant further proposes that it be provided that any well dually completed hereunder shall be so equipped that there will be no commingling of the production from the formations in the well and the production from each of said formations shall be separately stored and measured on the lease in such manner that the pipe line company of purchaser can separately identify the production from each of said formations and separately report the same to the Conservation Commission,

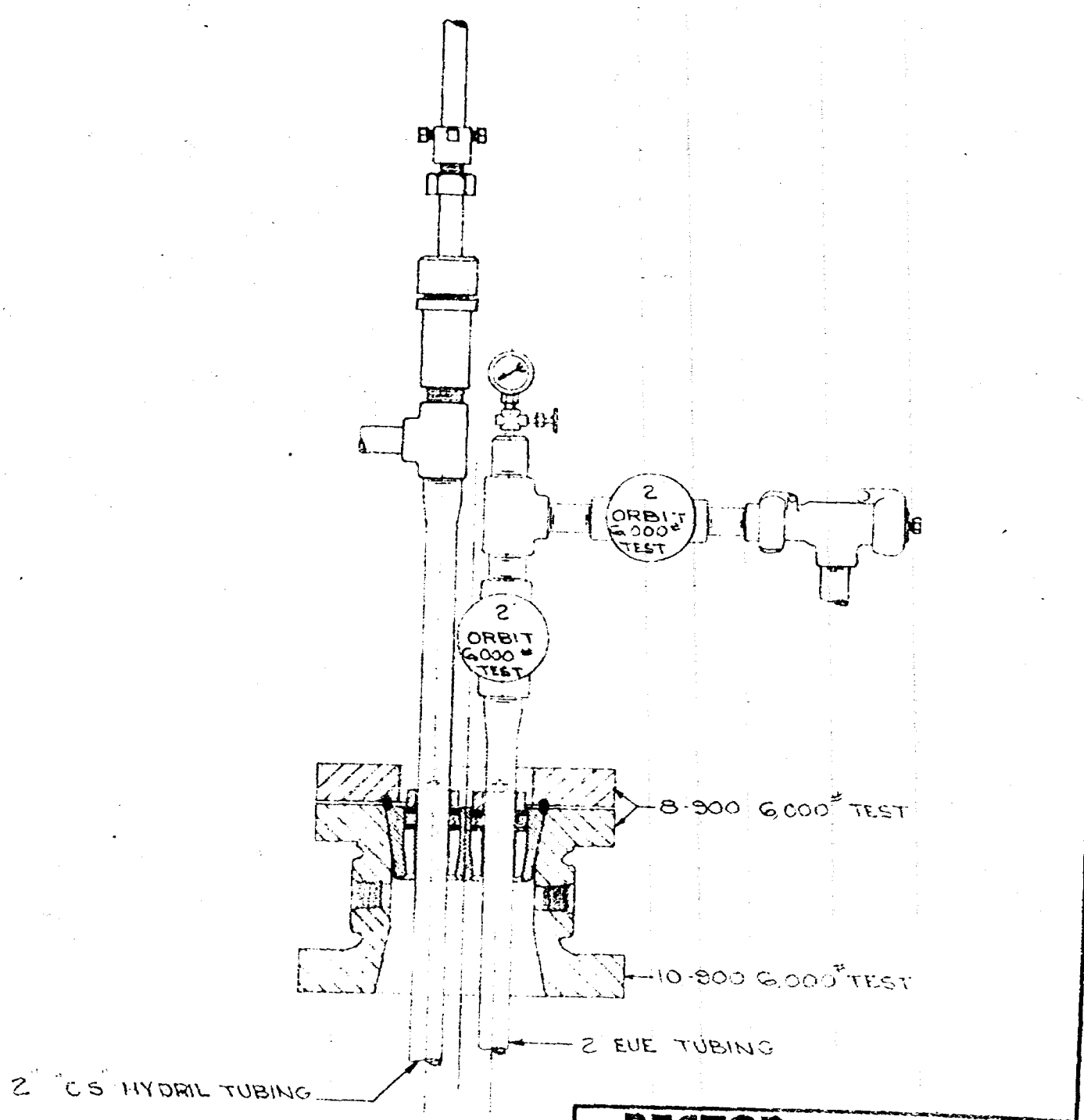
Further, that the operator shall notify the Conservation Commission of the date of dual completion so that tests may be made and allowables figured by the Commission and that each well dually completed hereunder shall be operated in such a manner that no detriment or damage will be done to either of said common sources of supply or to any other oil, gas or fresh water bearing formation.

WHEREFORE, Applicant prays that this matter be set down for hearing, that notice thereof be given as required by law and that upon final hearing this Commission enter its order permitting the dual completion of wells in the Devonian formation and the Pennsylvanian formation common sources of supply.

SINCLAIR OIL & GAS COMPANY

BY _____
James H. McGowan
Its Attorney

NEW MEXICO OIL & GAS ENGINEERING COMM.
HOBBS, NEW MEXICO
January 30, 1956



BEFORE THE
OIL CONSERVATION
SANTA FE, N.M.
EXHIBIT NO. 10
CASE Sundesa
DOCKET 1016-1017

RECTOR WELL EQUIPMENT CO.
MAKING THE OIL INDUSTRY SAFER

CSG. HD.: 10"-900 X 8"-900 DUAL COMPLETION
TUB. HD.: ONE STRING FLOWING ONE
XMAS TREE: STRING PUMPING

DRAWN BY	DATE	QUOTATION NO.	DRAWING NO.
JWF	2 7 55		A-839-2

2 wells

Dean

12,500'

12,000'

2" C.S. Hydril
S. 3

Drift Diam 1.845 } I.D. = 1.939"
Joint 1.890 } 4.7#

" 1.901 } 1.995
~~Joint~~

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

April 30, 1956

COPY

Mr. W. J. Rogers
Sinclair Oil & Gas Co.
P.O. Box 1470
Midland, Texas

Dear Sir:

We enclose a copy of Order R-799 issued April 27, 1956, by the Oil Conservation Commission in Case 1016, which was heard on February 15th.

Very truly yours,

A. L. Porter, Jr.
Acting Secretary - Director

ALP:brp
Encl.

AIR MAIL

Pennsylvania gas

6000 barrels stock tank oil/acre, gross

GOR: 2334 to 1 Gas Recovery: 80%

2334
6000
14,004,000 ft³/acre

14,004,000
40 acres
560,160,000 ft³/well gross gas

560,160,000
.80
448,128,000.00 ft³/well recoverable gas

448,128,000 / 1000 = 448128 MCF recoverable gas/well

448128
.10 est value of 1MCF gas
$44,812.80 est value of gas/well

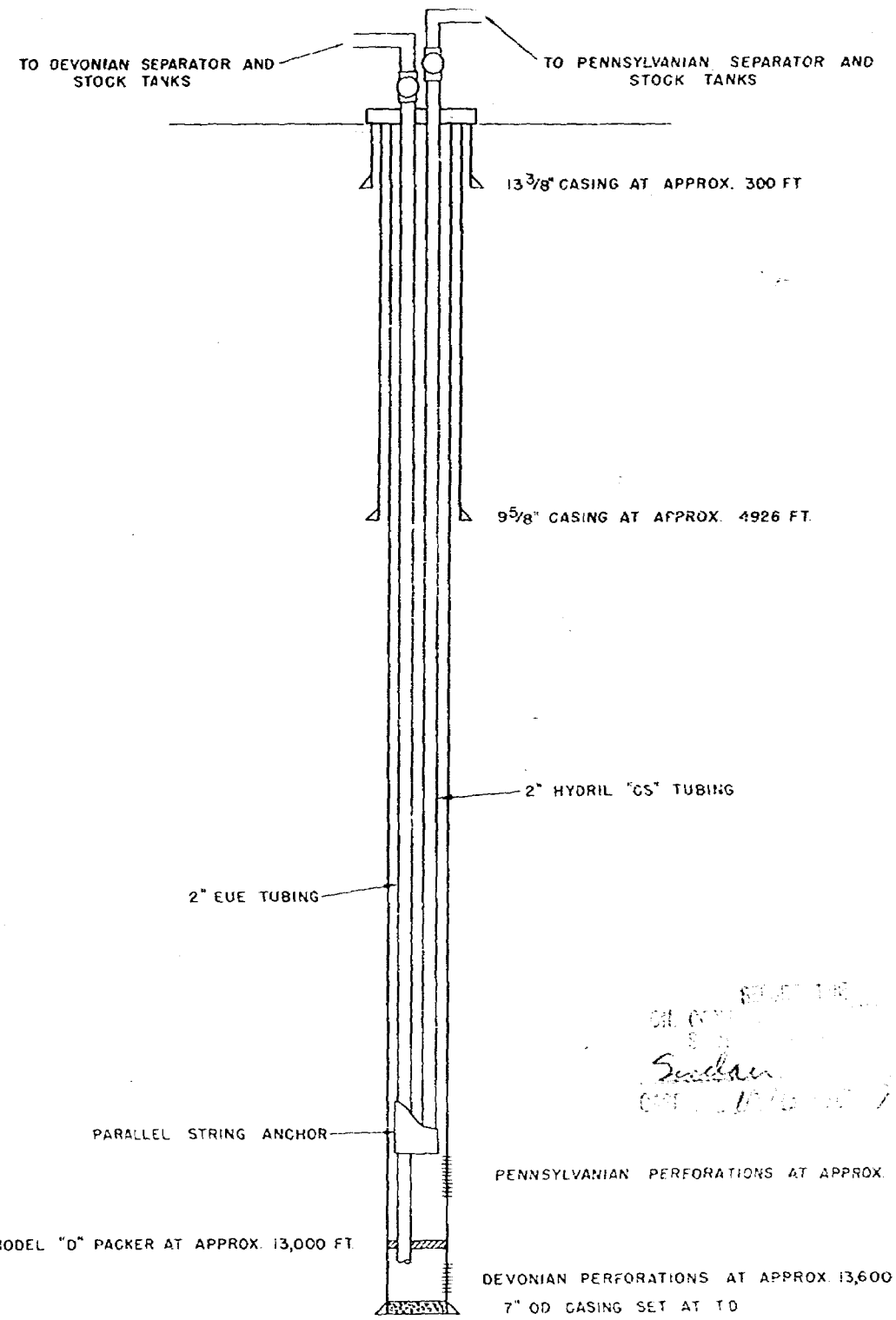
$44,812.80

SINCLAIR OIL & GAS COMPANY

PROPOSED FLOWING DUAL COMPLETION

DEAN DEVONIAN AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO

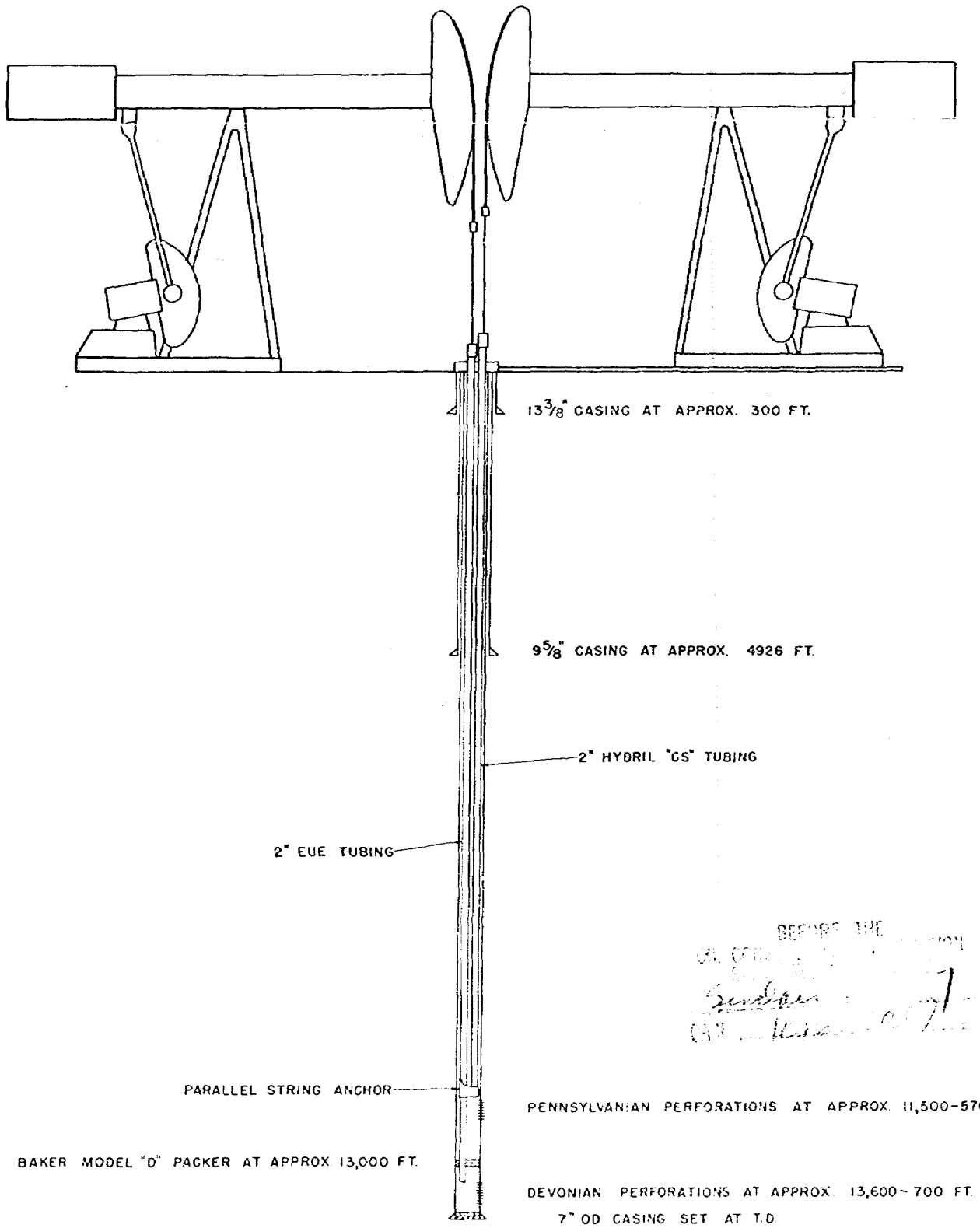


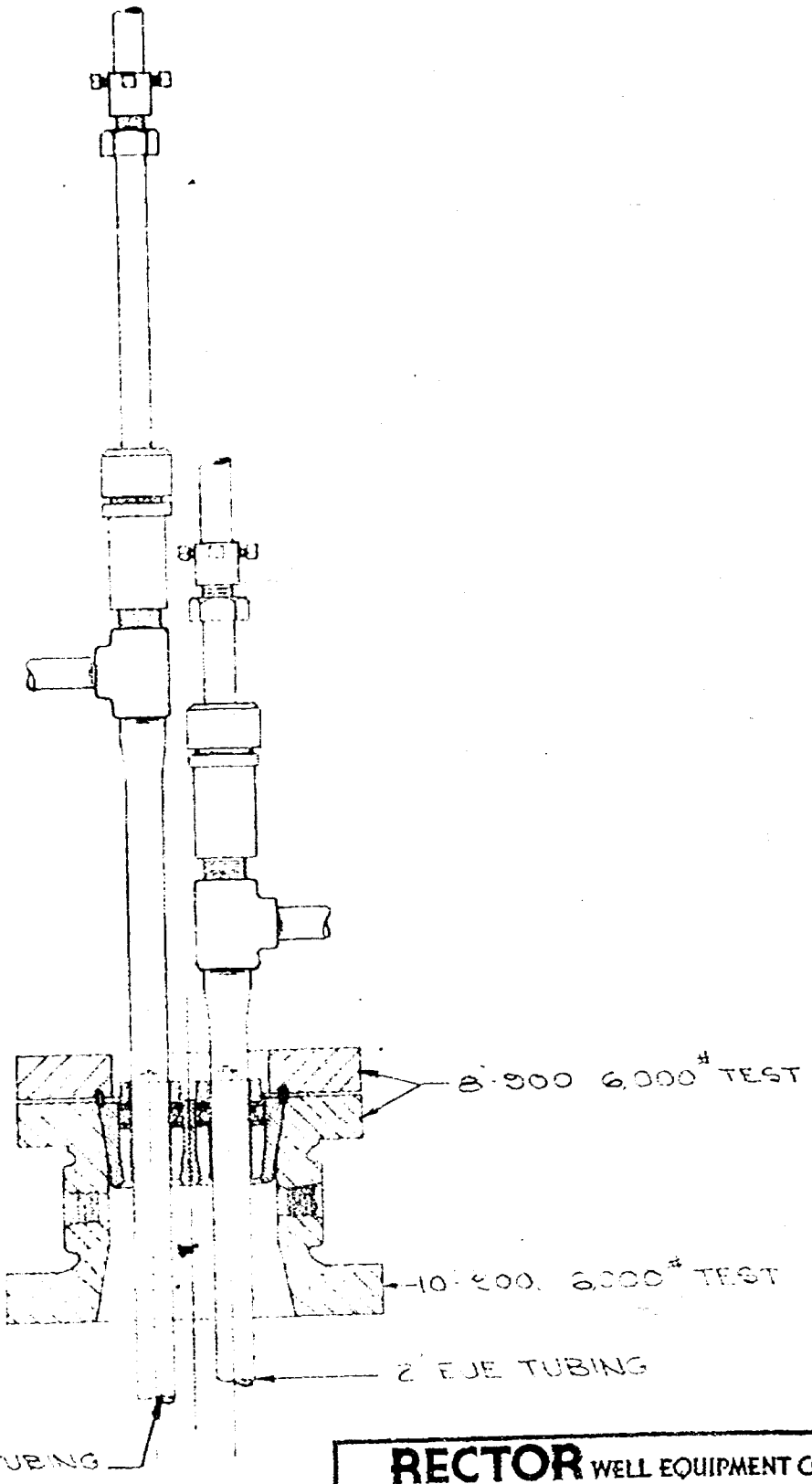
SINCLAIR OIL & GAS COMPANY

PROPOSED PUMPING DUAL COMPLETION

DEAN DEVONIAN AND PENNSYLVANIAN ZONES

LEA COUNTY, NEW MEXICO





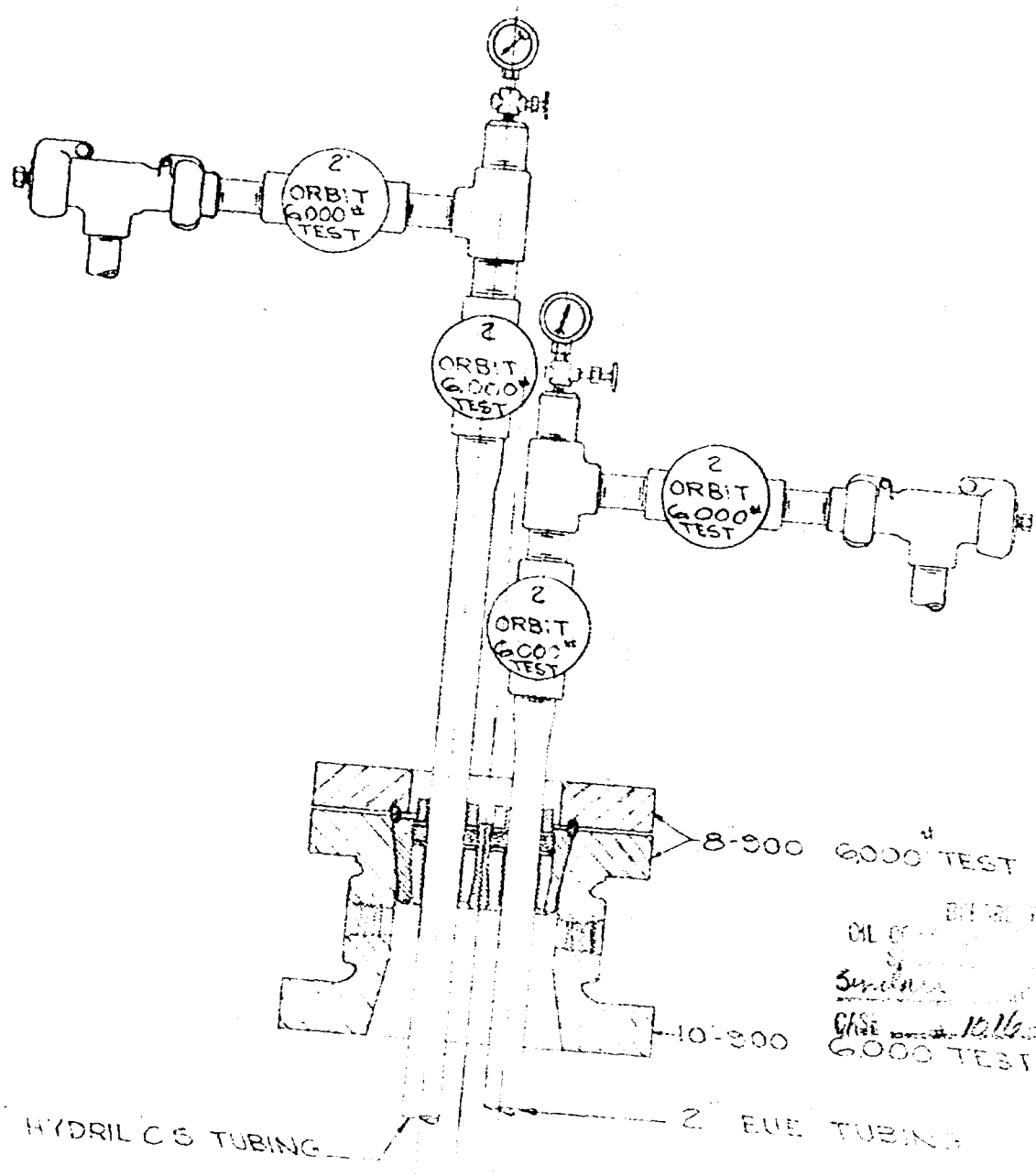
Section 1016-1017

RECTOR WELL EQUIPMENT CO

★ MAKING THE OIL INDUSTRY SAFER ★

CSG. HD.: 10"-900 X 8"-900 DUAL
TUB. HD.: COMPLETION BOTH STRINGS
XMAS TREE: PUMPING

DRAWN BY	DATE	QUOTATION NO.	DRAWING NO.
JWF	2-7-56		A-839-3



RECTOR WELL EQUIPMENT CO INC.

MAKING THE OIL INDUSTRY SAFER

CSG. HD.: 10-900 x 8-900 DUAL
TUB. HD.: COMPLETION BOTH STRINGS
XMAS TREE: FLOWING 6,000# TEST

DRAWN BY	DATE	QUOTATION NO.	DRAWING NO.
JWF	2-7-56		A-532-1

SINCLAIR OIL & GAS COMPANY

MIAN DEVONIAN and PENNSYLVANIAN POOLS

MAXIMUM PUMPING RATES

Type Motor: Bethlehem Type 43 Rated 45,000 psi working stress
Type Unit: Bethlehem C40D - 84B - 192

Setting Depth	13,500'	11,500'	9,500'	7,500'	7,50
Size Tubing, Inches	2"	2"	2"	2"	2"
Size Pump, Inches	1 1/4	1 1/4	1 1/4	1 1/2	1 3/
Size Rod String, Inches	7/8-3/4-5/8	7/8-3/4-5/8	7/8-3/4-5/8	7/8-3/4	7/8-3/
Length Stroke, Inches	192	192	192	192	192
Speed, SPM	7	9	11	11	9 1/2
Fluid Load, Lbs.	5,387	4,589	3,791	4,305	6,383
Rod Load, Lbs.	20,871	17,779	14,687	13,775	13,8
X Impulse Factor, Lbs.	23,489	22,490	19,536	18,854	17,893
Peak Rod Load, Lbs.	29,076	26,279	23,325	22,359	23,676
Counter Balance, Lbs.	23,571	20,079	16,587	15,878	17,885
Peak Torque, in Lbs.	528,480	575,880	446,848	641,376	638,736
Peak Rod Stress, psi	40,355	43,794	38,791	37,517	39,375
Impulse Factor	1.135	1.22	1.33	1.33	1.245
Overtravel, Inches	38	45	46	29	21 1/2
Rod Stretch	79"	57 1/2"	39"	28"	41"
Plunger Travel, Inches	151	179 1/2	199	193	172 1/2
BOE Production, BPD	154	235	319	445	482

10/6-10? Sinclair Not enough

Core Lab
Case 7016

RESERVOIR FLUID STUDY

FOR

SINCLAIR OIL & GAS COMPANY

STATE 735 NO. 1 WELL

WILDCAT

LEA COUNTY, NEW MEXICO

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

February 13, 1956

Sinclair Oil and Gas Company
520 East Broadway
Hobbs, New Mexico

Attention: Mr. George C. Confer

Subject: Reservoir Fluid Study
State 735 No. 1 Well
Wildcat
Lea County, New Mexico

Gentlemen:

On January 30, 1956, subsurface fluid samples were collected from the subject well and transported to our Dallas laboratory. Presented in the report following are the results of fluid studies performed using these samples.

During a constant composition expansion at the reservoir temperature of 172° F., the fluid exhibited a bubble point of 3859 psig. This value is in good agreement with the static reservoir pressure and is indicative that the reservoir exists in a saturated condition. It should be noted that the presence of a small column of water in the bottom of the tubing necessitated sampling some 180 feet above the perforations.

The fluid evolved 2334 standard cubic feet of gas per barrel of residual oil under differential pressure depletion conditions. This depletion resulted in a formation volume factor of 2.315 barrels of saturated fluid per barrel of residual oil. Under similar conditions, the viscosity of the liquid phase present varied from a minimum of 0.155 centipoise at saturation pressure to a maximum of 1.215 centipoises at atmospheric pressure.

Flash vaporization tests were performed at four operating pressures and atmospheric temperature to determine the effects of changes in

separation pressure upon gas-oil ratio, formation volume factor, and tank oil gravity. The data indicates the optimum separation pressure to be near 200 psig with maximum surface recovery per unit of reservoir withdrawal being attained by operation of separators near this optimum. The nature of the fluid, however, is such that near optimum separation conditions prevail at pressures as low as 80 to 100 psig.

As always, it was a pleasure to cooperate with you in any way possible. If you have any question in regard to this study or if we may help you in any further manner, please do not hesitate to call.

Very truly yours,

CORE LABORATORIES, INC.
F. O. Reudelhuber

P. L. Moses
Senior Engineer

PLM:se

Form 69385

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

Company Sinclair Oil and Gas Company — Date Sampled January 30, 1956

Well State 735 No. 1 — County Lea

Field Wildcat — State New Mexico

FORMATION CHARACTERISTICS

Formation Name	Pennsylvanian
Date First Well Completed	December 24, 1955
Original Reservoir Pressure	PSI @ ft.
Original Produced Gas-Oil Ratio	1577 cu. ft./bbl.
Production Rate	792 bbl./d.
Separator Pressure and Temperature	25 PSI, ° F.
Oil Gravity at 60° F.	42.4 ° API
Datum	7716 ft. subsea
Original Gas Cap	

WELL CHARACTERISTICS

Elevation	3864 Feet Gl.
Total Depth	13735 P.B. ft.
Completion Depth	11560-600 ft.
Tubing Size and Depth	2.5 in. to 11615 ft.
Productivity Index	0.57 bbl./d./PSI @ 129 bbl./d.
Last Reservoir Pressure	3997 PSI @ 11580 ft.
Date	January 30, 1956
Reservoir Temperature	172 ° F. @ 11580 ft.
Status of Well	Shut-In 75.5 Hours
Pressure Gauge	Amerada (D.O.)
Normal Production Rate	230 bbl./d.
Gas-Oil Ratio	2139 cu. ft./bbl.
Separator Pressure and Temperature	35 PSI, ° F.
Base Pressure	PSI Abs.
Well Making Water	3-4 % Cut

SAMPLING CONDITIONS

Sampled at	11400 Feet
Status of Well	Shut-In 75.5 Hours
Gas-Oil Ratio	cu. ft./bbl.
Separator Pressure and Temperature	PSI, ° F.
Tubing Pressure	1390 PSI
Casing Pressure	1400 PSI
Core Laboratories Engineer	J.N.C.
Type Sampler	Perco

REMARKS:

Form 54901

CORE LABORATORIES, Inc.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

Well State 735 No. 1

VOLUMETRIC DATA OF Reservoir Fluid SAMPLE

1. Saturation pressure (bubble-point pressure) 3859 PSI @ 172 °F.

2. Thermal expansion of saturated oil @ 5000 PSI = $\frac{V @ 172\ ^\circ F.}{V @ 74\ ^\circ F.}$ = 1.08876

3. Compressibility of saturated oil @ reservoir temperature: Vol./Vol./PSI:

   From 5000 PSI to 4600 PSI = 22.90×10^{-6}

   From 4600 PSI to 4200 PSI = 25.83×10^{-6}

   From 4200 PSI to 3859 PSI = 30.60×10^{-6}

4. Specific volume at saturation pressure: cu. ft./# 0.02844 @ 172 °F.

Form 50870

CORE LABORATORIES, Inc.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

Well State 735 No. 1

Reservoir Fluid SAMPLE TABULAR DATA

PRESSURE PSI GAUGE	PRESSURE-VOLUME RELATION @ 172 °F. RELATIVE VOLUME OF OIL AND GAS, $V/V_{SAT.}$	VISCOSITY OF OIL @ 172 °F., CENTIPOISES	DIFFERENTIAL LIBERATION @ 172 °F. GAS/OIL RATIO LIBERATED PER BARREL OF RESIDUAL OIL	GAS/OIL RATIO IN SOLUTION PER BARREL OF RESIDUAL OIL	RELATIVE OIL VOLUME, V/V_R
5000	0.9703	0.171			2.246
4800	0.9746	0.169			2.256
4600	0.9793				2.267
4500	0.9817	0.165			2.273
4400	0.9843				2.279
4300	0.9868				2.284
4200	0.9895	0.160			2.291
4100	0.9925				2.298
4000	0.9954	0.158			2.304
3900	0.9986				2.312
3859	1.0000	0.155	0	2334	2.315
3835	1.0016				
3818	1.0033				
3792	1.0048				
3770	1.0063				
3765			158	2176	2.220
3751	1.0079				
3700		0.161			
3660	1.0159				
3600			359	1975	2.105
3575	1.0239				
3420	1.0399				
3400		0.175	555	1779	1.998
3170	1.0723				
3100			795	1539	1.871
2940		0.194			
2834	1.1210				
2801			980	1354	1.776
2600	1.1870				
2500		0.234			
2400			1198	1136	1.665
2342	1.2697				
2104	1.3860				

V = Volume at given pressure
$V_{SAT.}$ = Volume at saturation pressure at the specified temperature.
V_R = Residual Oil Volume at 14.7 PSI absolute and 60° F.

Form 50870

CORE LABORATORIES, Inc.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

Well State 735 No. 1

Reservoir Fluid SAMPLE TABULAR DATA

PRESSURE PSI GAUGE	PRESSURE-VOLUME RELATION ● 172 °F. RELATIVE VOLUME OF OIL AND GAS. V/Vsat.	VISCOSITY OF OIL ● 172° F. CENTIPOISES	DIFFERENTIAL LIBERATION ● 172 °F. GAS/OIL RATIO LIBERATED PER BARREL OF RESIDUAL OIL	GAS/OIL RATIO IN SOLUTION PER BARREL OF RESIDUAL OIL	RELATIVE OIL VOLUME. V/VR
2000		0.274			
1992			1384	950	1.574
1870	1.5021				
1670	1.6522				
1593			1549	785	1.494
1500	1.8179	0.329			
1264	2.1274				
1193			1701	633	1.422
1000		0.403			
953	2.8193				
789			1852	482	1.351
710	3.8095				
571	4.8031				
500		0.522			
478	5.7923				
400			2003	331	1.275
200			2095	239	1.228
98			2159	175	1.182
0		1.215	2334	0	1.057
				@ 60°F.	1.000

Gravity of Residual Oil

41.1° API @ 60° F.

Supplementary Data

Pressure PSIG	Gas Gravity	Oil Density Gms/Cc	Deviation Factor Z
3859		0.5626	
3765	0.9603	0.5719	0.8467
3600	0.9136	0.5839	0.8157
3400	0.9059	0.5958	0.7967
0	0.9589	0.7752	

V = Volume at given pressure
$V_{SAT.}$ = Volume at saturation pressure at the specified temperature.
V_R = Residual Oil Volume at 14.7 PSI absolute and 60° F.

Form 54802

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

Well State 735 No. 1

SEPARATOR TESTS OF Reservoir Fluid SAMPLE

SEPARATOR PRESSURE, PSI GAUGE	SEPARATOR TEMPERATURE, ° F.	SEPARATOR GAS/OIL RATIO *See Foot Note (1)*	STOCK TANK GAS/OIL RATIO *See Foot Note (1)*	STOCK TANK GRAVITY, ° API @ 60° F.	SHRINKAGE FACTOR, $V_R/V_{SAT.}$ *See Foot Note (2)*	FORMATION VOLUME FACTOR, $V_{SAT.}/V_R$ *See Foot Note (3)*	SPECIFIC GRAVITY OF FLASHED GAS
0	74	2170		42.3	0.4523	2.211	0.9344
75	75	1846	79	45.1	0.4904	2.039	
150	75	1755	154	45.3	0.4916	2.034	
300	75	1623	294	45.3	0.4919	2.033	

(1) Separator and stock tank Gas/Oil Ratio in cubic feet of gas @ 60° F. and 14.7 PSI absolute per barrel of stock tank oil @ 60° F.

(2) Shrinkage Factor: $V_R/V_{SAT.}$ is barrels of stock tank oil @ 60° F. per barrel of saturated oil @ 3859 PSI gauge and 172 ° F.

(3) Formation Volume Factor: $V_{SAT.}/V_R$ is barrels of saturated oil @ 3859 PSI gauge and 172 °F. per barrel of stock tank oil @ 60° F.

Form 55849

CORE LABORATORIES, Inc.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

Company Sinclair Oil and Gas Company Formation Pennsylvanian

Well State 735 No. 1 County Lea

Field Wildcat State New Mexico

HYDROCARBON ANALYSIS OF Reservoir Fluid SAMPLE

COMPONENT	WEIGHT %	MOL %	DENSITY @ 60° F. GRAMS PER CUBIC CENTIMETER	° API @ 60° F.	MOLECULAR WEIGHT
Nitrogen	0.77	1.60			
Methane	13.63	49.50			
Ethane	6.16	11.93			
Propane	6.02	7.96			
Iso-butane	0.96	0.97			
N-butane	3.47	3.47			
Iso-pentane	1.34	1.08			
N-pentane	1.63	1.32			
Hexanes	4.41	2.98			
Heavier	61.61	19.19	0.8282	39.2	187
	100.00	100.00			

Core Laboratories, Inc.
F. O. Reudelhuber

P. L. Moses

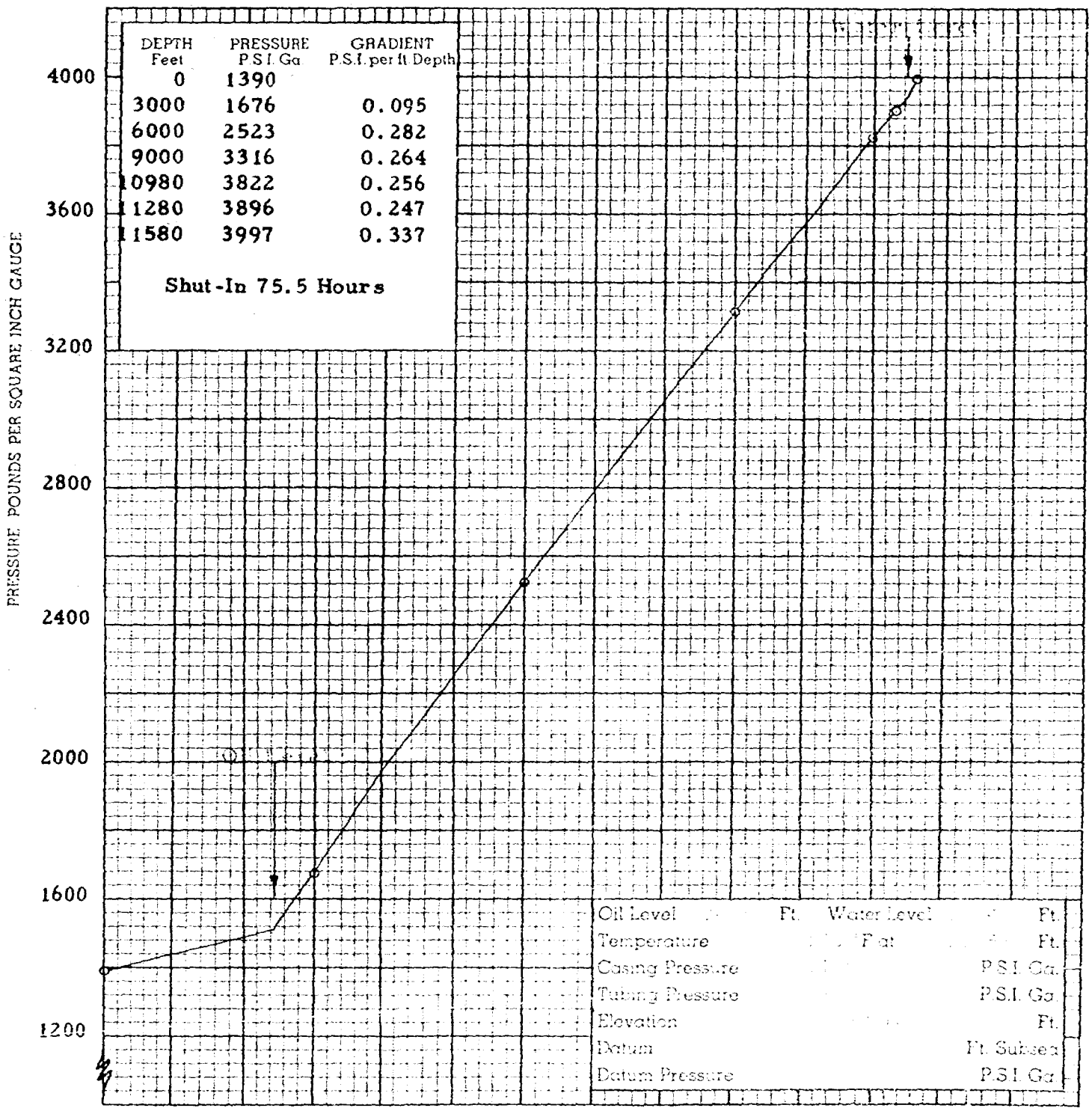
CORE LABORATORIES, INC
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

Company Sinclair Oil and Gas Company Formation Pennsylvanian
Well State 735 No. 1 County Lea
Field Wildcat State New Mexico

DEPTH Feet	PRESSURE P.S.I. Ga	GRADIENT P.S.I. per ft Depth
0	1390	
3000	1676	0.095
6000	2523	0.282
9000	3316	0.264
10980	3822	0.256
11280	3896	0.247
11580	3997	0.337

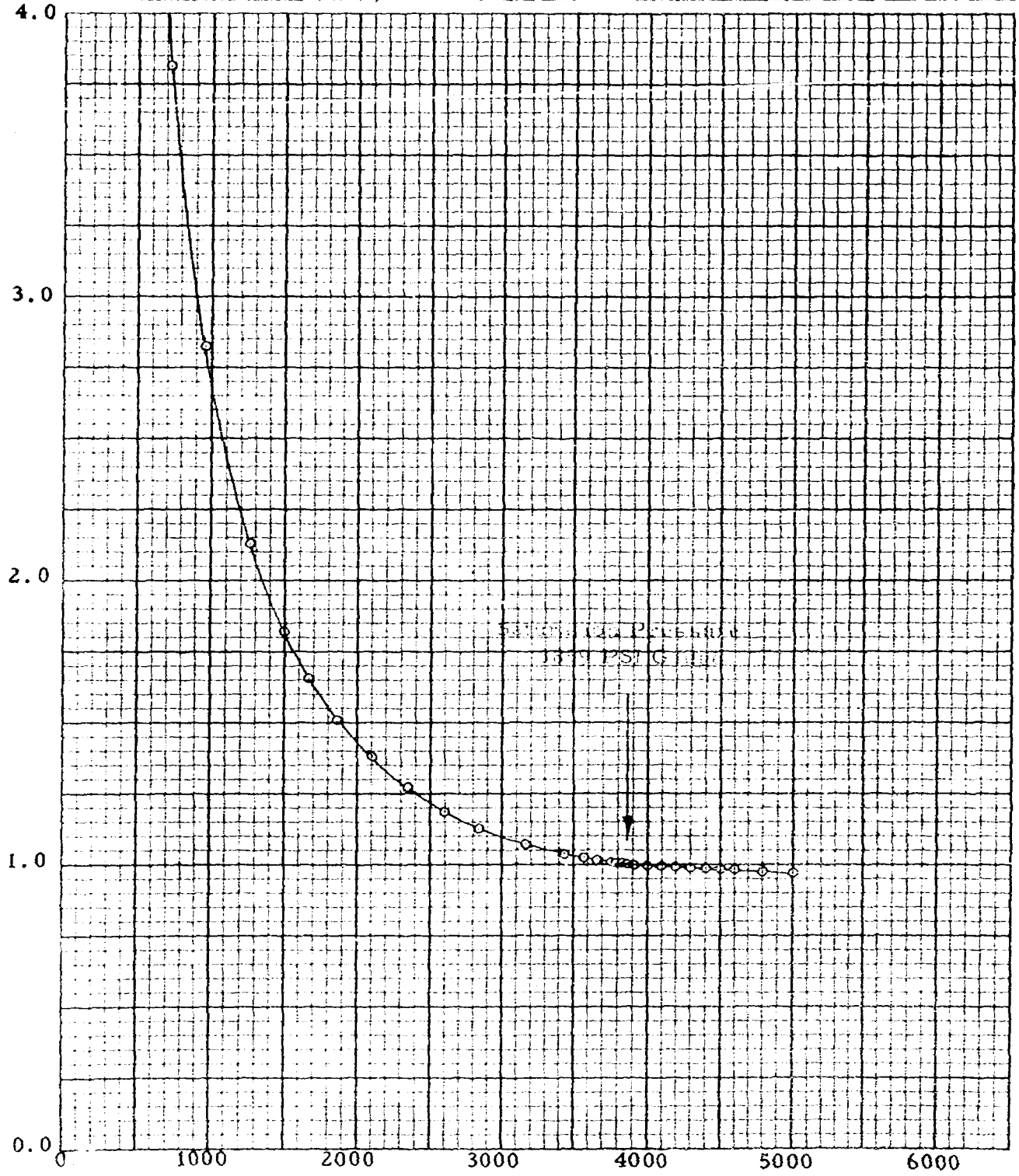
Shut-In 75.5 Hours



Oil Level	Ft.	Water Level	Ft.
Temperature		Datum	Ft.
Casing Pressure			P.S.I. Ga.
Tubing Pressure			P.S.I. Ga
Elevation			Ft.
Datum			Ft. Subsea
Datum Pressure			P.S.I. Ga

PRESSURE-VOLUME RELATIONS OF RESERVOIR FLUID

Company Sinclair Oil and Gas Company Formation Pennsylvanian
Well State 735 No. 1 County Lea
Field Wildcat State New Mexico

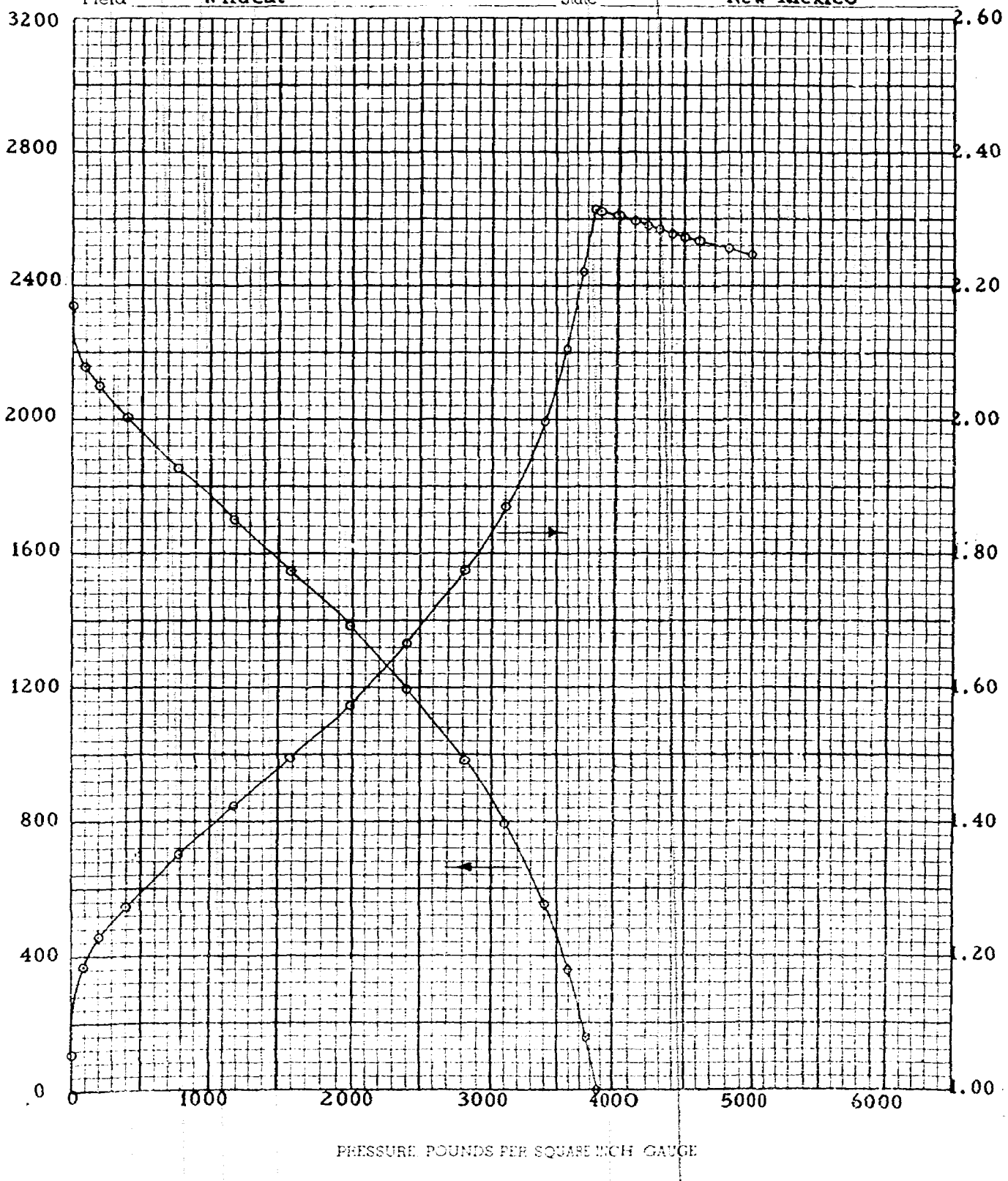


CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

DIFFERENTIAL VAPORIZATION OF RESERVOIR FLUID

Company Sinclair Oil and Gas Company Formation Pennsylvanian
Well State 735 No. 1 County Lea
Field Wildcat State New Mexico

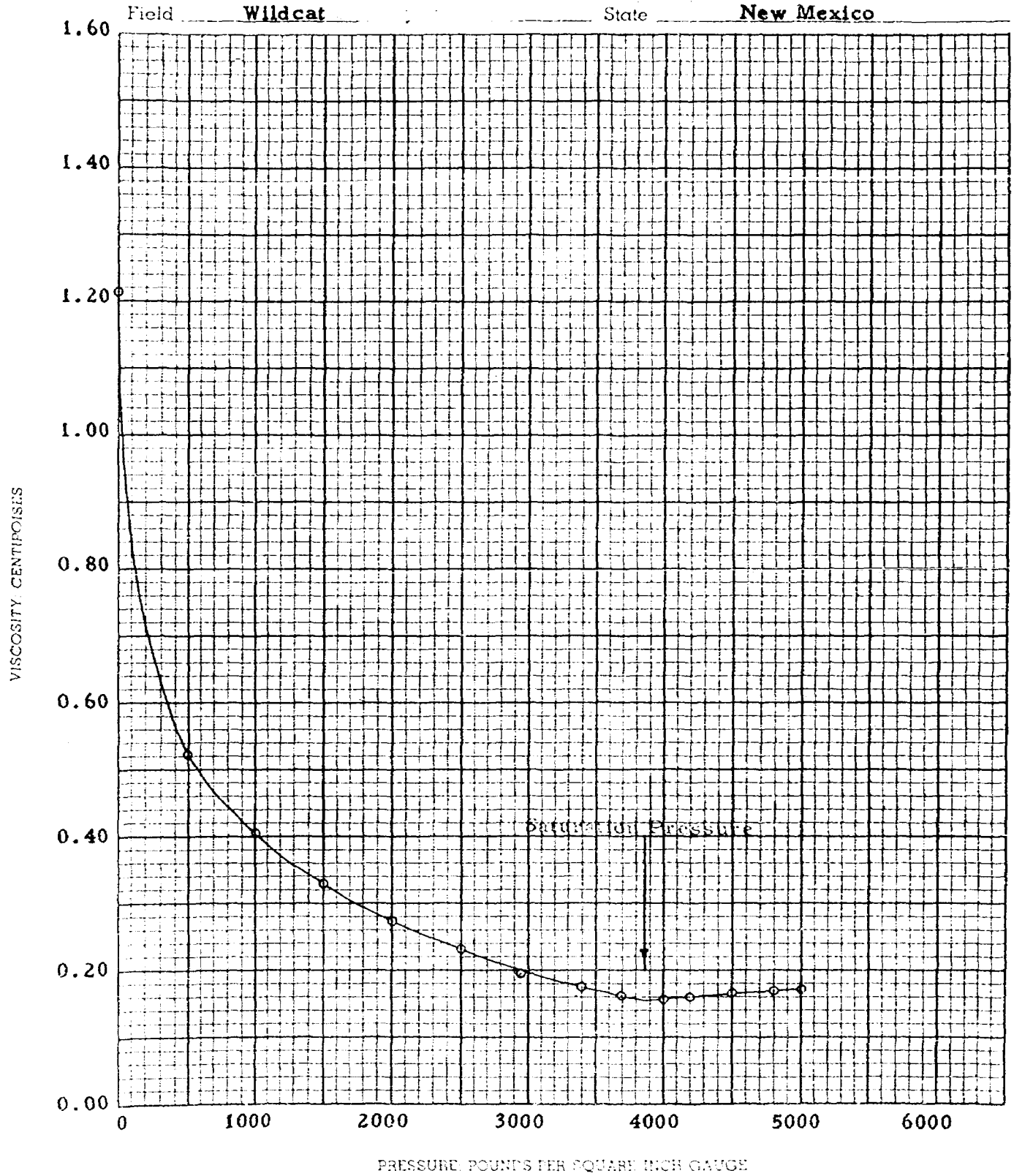


CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 635

VISCOSITY OF RESERVOIR FLUID

Company Sinclair Oil and Gas Company Formation Pennsylvanian
Well State 735 No. 1 County Lea
Field Wildcat State New Mexico



Core Analysis
Dean Penn.
NM.

CORE ANALYSIS REPORT

FOR

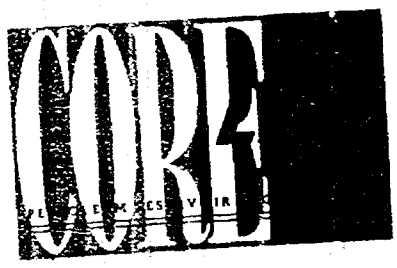
SINCLAIR OIL & GAS COMPANY

STATE NO. 1-735 WELL

WILDCAT

LEA COUNTY, NEW MEXICO

LOCATION: SEC. 26-T15S-R36E



CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

October 31, 1955

REPLY TO
P. O. BOX 36
MIDLAND, TEXAS

Sinclair Oil & Gas Company
Box 809
Roswell, New Mexico

Attention: Mr. H. A. Merrill

Subject: Core Analysis
State No. 1-735 Well
Wildcat
Lea County, New Mexico
Location: Sec. 26-T15S-R36E

Gentlemen:

Diamond coring equipment and water base mud were used to core the interval from 11,578 to 11,651 feet in the State No. 1-735 well. The cores were logged and sampled by a representative of Sinclair Oil & Gas Company, quick-frozen by a representative of Core Laboratories, Inc., and transported to the Lovington laboratory for analysis by whole-core methods. Permeability values marked with an asterisk are matrix permeability as measured on a plug sample. The samples were too small and broken for whole-core permeability measurements.

The Strawn formation in the interval from 11,578.0 to 11,594.5 feet exhibits residual oil and total water saturations indicating the formation to be oil productive. Productive and storage capacities are limited and a formation treatment to increase permeability is recommended. The interval from 11,594.5 to 11,611.0 feet is insufficient in permeability and porosity to produce any appreciable quantity of fluid. Should any fluid be recovered from this interval, it is expected to be predominantly water. Completion is recommended above 11,594.5 feet.

Recovery estimates for the oil productive interval have been calculated using measured core analysis data in conjunction with estimated reservoir fluid characteristics. These estimates represent the theoretical

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS

File WP-3-340 S
Well State No. 1-735

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

CORE SUMMARY

FORMATION NAME	Strawn
DEPTH, FEET	11,578.0-11,594.5
% CORE RECOVERY	100
FEET OF PERMEABLE, PRODUCTIVE FORMATION RECOVERED	13.9
AVERAGE PERMEABILITY MILLIDARCYS	Max.: 0.8 90°: 0.5
CAPACITY — AVERAGE PERMEABILITY X FEET PRODUCTIVE FORMATION	Max.: 11 90°: 7.0
AVERAGE POROSITY, PERCENT	5.5
AVERAGE RESIDUAL OIL SATURATION, % PORE SPACE	4.5
GRAVITY OF OIL, °A.P.I.	42
AVERAGE TOTAL WATER SATURATION, % PORE SPACE	30.7
AVERAGE CALCULATED CONNATE WATER SATURATION, % PORE SPACE	30.7
SOLUTION GAS-OIL RATIO, CUBIC FEET PER BARREL (1)	1200
FORMATION VOLUME FACTOR—VOLUME THAT ONE BARREL OF STOCK TANK OIL OCCUPIES IN RESERVOIR (1)	1.74

CALCULATED RECOVERABLE OIL — Prediction dependent upon complete isolation of each division. Structural position of well, total permeable thickness of oil zone and drainage area of well should be considered.

BY NATURAL OR GAS EXPANSION, BBLS. PER ACRE FOOT (2)	29
INCREASE DUE TO WATER DRIVE, BBLS. PER ACRE FOOT	122
TOTAL AFTER COMPLETE WATER DRIVE, BBLS. PER ACRE FOOT (3)	151

Core Laboratories, Inc.

R S Bynum Jr (PE)

R. S. Bynum, Jr.

NOTE:

(*) REFER TO ATTACHED LETTER.

(1) REDUCTION IN PRESSURE FROM estimated SATURATION PRESSURE TO ATMOSPHERIC PRESSURE.

(2) AFTER REDUCTION FROM ORIGINAL RESERVOIR PRESSURE TO ZERO POUNDS PER SQUARE INCH.

(3) RESERVOIR PRESSURE MAINTAINED BY WATER DRIVE AT OR ABOVE estimated ORIGINAL SATURATION PRESSURE.

(4) NO ESTIMATE FOR GAS PHASE RESERVOIRS.

FORM 6 2

CORE LABORATORIES, INC. *Petroleum Reservoir Engineering*

COMPANY SINCLAIR OIL & GAS COMPANY
WELL STATE NO. 1-735
FIELD WILDCAT
COUNTY LEA STATE NEW MEXICO
LOCATION SEC 26-15S -36 E.

DATE ON 10-19-55
DATE OFF 10-24-55
FORMATION AS NOTED
DRLG. FLD. WATER BASE MUD
REMARKS SAMPLED BY A REPRESENTATIVE OF SINCLAIR OIL & GAS COMPANY

FILE NO. AP-3-340 S
ENGRS. BOONE
ELEV. 3364' GL
CORES HILLMAC 3½"

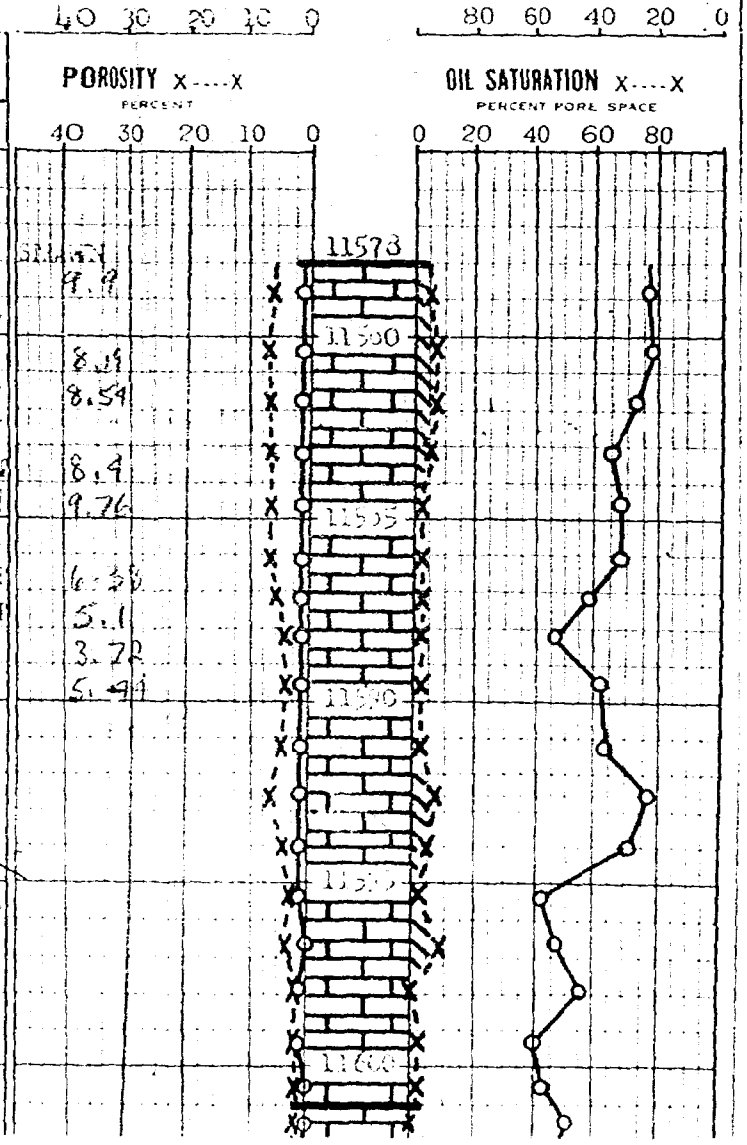
Special Analysis

CORE REPORT

SAND LIMESTONE CONGLOMERATE CHERT
SHALE DOLOMITE

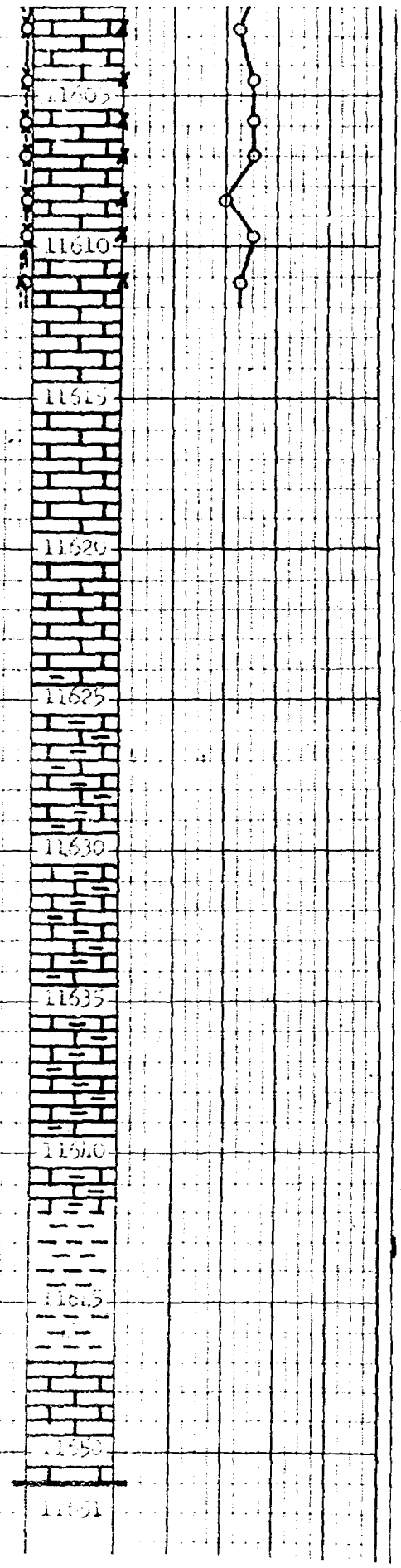
SV-SLIGHTLY VUGULAR
ST-STYLOLITIC
FO-FOSSILIFEROUS SF-SLIGHTLY FRACTURED

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILIDARCYS MAX.	PERMEABILITY MILIDARCYS 90°	POROSITY %	RESIDUAL SATURATION % PORE SPACE OIL	RESIDUAL SATURATION % PORE SPACE TOTAL WATER	VISUAL DESCRIPTION
1	11578.0-79.8	0.5	0.4	5.5	5.5	23.6	SV,FO
2	11579.8-81.1	0.3	0.5	6.3	6.4	23.2	SV,FO
3	81.1-32.5	0.7	0.5	6.1	6.6	27.9	SV,FO
4	11532.5-33.9	1.3	0.9	6.0	5.0	31.0	SV,FO,SF
5	33.9-35.5	1.7	1.0	6.1	1.6	32.8	SV,FO
6	11535.5-36.6	0.4	0.3	5.3	3.4	34.3	SV,FO,SF
7	36.6-37.6	0.4	0.4	5.1	2.0	41.2	SV,FO,SF
8	37.6-38.3	0.3	0.3	2.1	TR	54.3	SF
9	38.3-39.4	0.3	0.2	3.4	2.9	33.2	SF
10	11590.4-91.3	0.2	0.2	4.3	TR	37.2	
11	91.3-93.3	0.4	0.5	4.9	4.5	24.2	SV
12	93.3-94.3	0.7	0.3	4.1	4.2	29.3	
13	11594.3-96.1	0.9	0.1	2.7	TR	59.3	SF,FO
14	96.1-97.1	<0.1	<0.1	3.1	9.7	54.3	FO
15	97.0-98.6	0.6	0.1	2.9	3.0	45.0	
16	11599.1-99.4	0.4	0.1	2.0	TR	60.0	FO
17	11600.0-01.0	<0.1	<0.1	2.1	TR	57.2	FO
18	01.0-02.0	<0.1	<0.1	2.3			



19	02.0-03.6	0.7	.6	1.5	0.0	50.0	SP	
20	11603.6-05.2	0.3	0.2	1.3	0.0	50.0	SP	
21	05.2-06.5	0.3	0.2	1.3	0.0	50.0	SP, FS	
22	06.5-07.6	0.9	0.8	1.2	0.0	50.0	SP	
23	11607.6-09.1	0.2	0.1	1.5	0.0	50.0	SP	
24	09.1-10.4	0.3	0.2	1.2	0.0	50.0	SP	
25	11610.4-11.0	0.3	0.1	2.5	0.0	55.0	SP, FS	

* - REFER TO ATTACHED LETTER



Case 1014

SINCLAIR OIL & GAS COMPANY

SINCLAIR OIL BUILDING

TULSA, OKLAHOMA

February 21, 1956

Mr. W. B. Macy, Secretary
New Mexico Oil Conservation Commission
Santa Fe, New Mexico

Re: Sinclair's Dual Completion Application, Dean Devonian and Pennsylvanian Reservoirs, Lea County, New Mexico (Case #1016, #1017)

Dear Mr. Macy:

At the February 15 hearing on Sinclair's application for dual completions in the Dean Devonian and Pennsylvanian reservoirs, we furnished a letter from Core Laboratories, Inc. to your Mr. Dan Nutter which gave preliminary results of a reservoir fluid analysis on our State 735 #1 well. Since the hearing, we have received bound copies of Core Laboratories' final report on the Pennsylvanian reservoir fluid analysis and a copy is enclosed for your information.

Our Mr. Loren Ware says that recently you asked about reserves in the Dean Devonian Field. Attached is a ditto sheet which shows Sinclair's estimate of the Devonian oil reserves under the J. P. Dean #1 well and the economics of a Devonian 40 acre unit.

Yours very truly,

C. L. Wilson

CLW:blo
Encs.

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 1016
Order No. R-799

THE APPLICATION OF SINCLAIR OIL
AND GAS COMPANY FOR AN ORDER
AUTHORIZING THE DUAL COMPLETION
OF WELLS IN THE DEVONIAN COMMON
SOURCE OF SUPPLY AND THE PENNSYLVANIAN
COMMON SOURCE OF SUPPLY UNDERLYING
THE E/2 NE/4 AND THE SE/4 OF SECTION
34, ALL OF SECTIONS 26 AND 35, TOWN-
SHIP 15 SOUTH, RANGE 36 EAST, AND
LOTS 1 THROUGH 8 OF SECTION 5, AND
LOTS 1, 2, 7 AND 8 OF SECTION 6,
TOWNSHIP 16 SOUTH, RANGE 37 EAST,
LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

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

NOW, on this 27th day of April 1956, the Commission, a quorum being present, having considered the testimony and exhibits adduced and being fully advised in the premises,

FINDS:

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

(2) That although the defined limits of the Dean-Devonian common source of supply are the same as outlined in applicant's application, the defined limits of the Dean-Pennsylvanian common source of supply, as set forth in Commission Order R-757, are somewhat different than the defined limits of the Dean-Pennsylvanian common source of supply as outlined in applicant's application and consist of the following described area:

TOWNSHIP 15 SOUTH, RANGE 36 EAST, NMPM
SW/4 SW/4 Section 25
All Section 26
E/2 NE/4 and SE/4 Section 34
All Section 35
NW/4 Section 36

TOWNSHIP 16 SOUTH, RANGE 37 EAST, NMPM
Lots 1, 2, 3, 4, 5, 6, 7 & 8 of Section 5
Lot 1 of Section 6

(3) That the recoverable reserves in the above described Dean-Pennsylvanian Pool are such that a well drilled to the Pennsylvanian formation in this pool would probably not be a profitable venture.

(4) That although some wells have been drilled to and are producing from the Dean-Pennsylvanian Pool, unless means is provided to produce the known reserves in said pool by some method other than drilling separate wells into said Pennsylvanian formation, waste will occur in that all of the known recoverable reserves probably will not be produced.

(5) That the applicant, Sinclair Oil and Gas Company, has shown that to dually complete wells in the Dean-Devonian Pool and the Dean-Pennsylvanian Pool would probably be a profitable venture, by virtue of which most of the recoverable reserves in the Pennsylvanian formation could be produced and the waste thereby averted.

(6) That the applicant has shown that a dual completion installation utilizing parallel strings of tubing, one string of tubing to each common source of supply, and a retainer-type production packer will provide adequate separation of the fluids from the two reservoirs within the casing. Applicant has further shown that this type of installation may be readily adapted to the artificial lifting of the fluids from either or both of the two reservoirs if and when that should become necessary.

(7) That adequate separation of the reservoirs in the well bore outside the casing can be accomplished by setting the production casing string at the total depth of the well bore and by cementing it from total depth to a point at least 500 feet above the top of the Pennsylvanian formation.

(8) That although there is present in any dual completion the inherent danger of communication between the zones involved, and that such communication would result in waste, the evidence submitted in support of applicant's proposal for special pool rules permitting authority for dual completions in the Dean-Pennsylvanian and the Dean-Devonian Pools indicates that there is reasonable assurance that in this particular case, any such communication can be averted, and if it should occur, that it can be detected and corrected. Further, that waste will occur in this particular case if provision is not made for the dual completion of wells in the subject pools.

(9) That provision should be made for the Secretary-Director of the Commission to have the authority to grant administrative approval for the dual completion in the Pennsylvanian and Devonian formations only of any well located within the horizontal limits of both of the subject pools or located within the horizontal limits of one of the pools and within one-half mile of the horizontal limits of the other pool as they may now or as they may hereafter be defined.

(10) That special pool rules should be prescribed governing dual completions in the subject pools, also designating the mechanical manner of completion acceptable, type and manner of tests required, and such other rules as may be necessary to insure safe completion and operation of any well so dually completed.

IT IS THEREFORE ORDERED:

1. That the application of Sinclair Oil and Gas Company for an order promulgating special pool rules for the Dean-Devonian common source of supply and the Dean-Pennsylvanian common source of supply permitting the dual completion of a well within the horizontal and the vertical limits of the subject pools, after individual approval as hereinafter provided, be and the same is hereby approved.

2. (a) That the dual completion of any well within the horizontal and vertical limits of the subject pools may be permitted only by order of the Commission after due notice and hearing, except as noted by Paragraph 2 (c) of this order.

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

(c) The Secretary of the Commission shall have authority to grant administratively an exception to the requirements of Paragraph (a) above without notice and hearing where application for administrative approval has been filed in due form and includes an exhibit showing the location of all wells in the subject pools and a diagrammatic sketch of the proposed dual completion, and has set forth all material facts on the common sources of supply involved, and the manner and method of dual completion proposed, and

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

(2) applicant proposes to complete and equip the well in such a manner that the Dean-Devonian common source of supply and the Dean--Pennsylvanian common source of supply shall be completely segregated from each other by setting the production casing string at total depth and circulating cement from total depth to a point at least 500

feet above the top of the Pennsylvanian formation, and by utilizing parallel strings of tubing, one string to each of the common sources of supply, and a permanent retainer-type production packer.

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

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

PROVIDED HOWEVER, That any well so dually completed shall be completed and thereafter produced in such a manner that there will be no commingling within the well-bore, either within or outside the casing, of gas, oil and gas, or oil produced from either or both of the separate strata.

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

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

PROVIDED FURTHER, That the operator shall be required to make any and all tests, including segregation tests, but not excluding other tests and/or determinations at any convenient time and in such manner as deemed necessary by the Commission; the original and all subsequent tests shall be witnessed by representatives of the Commission and by representatives of offset operators,

if any there be, at their election, and the results of each test properly attested to by the operator and all witnesses, and shall be filed with the Commission within ten days after completion of such test.

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

PROVIDED FURTHER, That upon actual dual completion of any well, operator shall within 10 days commence a segregation test, and shall conduct and report the results of said test in accordance with the instructions pertaining to and a part of the Commission's "Packer Leakage Test" form. Such segregation tests shall also be conducted at six months intervals from the date of initial dual completion and at such other times as may be deemed necessary by the Commission.

IT IS FURTHER ORDERED:

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN F. SIMMS, Chairman

E. S. WALKER, Member

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

ir/

The Ohio Oil Co.
Legal Department

W. Hume Everett
Thomas K. McElroy
J. O. Terrell Couch
Attorneys

P. O. Box 3128
Houston, Texas

May 2, 1956

Re: Cases 1016 and 1017 - Application of Sinclair Oil & Gas Company for Order authorizing dual completion of wells in the Dean-Devonian Pool and in the proposed Dean-Pennsylvanian Pool, and Application of Sinclair for an Order establishing the Dean-Pennsylvanian Pool.

Mr. A. L. Porter, Acting Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Dear Sir:

I have received and read a copy of the transcript in the above designated cases. Our Mr. D. K. Spellman, Jr., has also read the copy of the transcript.

On page 10 the transcript quotes Mr. Reider as directing a question to "Mr. Spellman". On page 11 Mr. McGowan is likewise quoted as directing a question to "Mr. Spellman". Although our Mr. D. K. Spellman, Jr., was the witness in Case 1021 which was submitted to the Commission immediately prior to Cases 1016 and 1017, he was not a witness in either of the cases submitted by Sinclair. It is thought that the references to "Mr. Spellman" on pages 10 and 11 of the transcript were actually references to Mr. Merrill, who was the witness on the stand at the time. It seems unlikely that both Mr. Reider and Mr. McGowan would have made the same error. In any event I earnestly request that the record be changed to show the correct name of the witness.

We are particularly interested in seeing these corrections made because of the fact that The Ohio has leases in the pools involved in the hearing, and, to avoid possible confusion in the future, we think it advisable that Mr. Merrill and Mr. Spellman each be credited with their own testimony in the official records of the Commission.

Very truly yours,

J. O. Terrell Couch

TC:MK

cc - Dearnley-Meier and Associates - Att: Mr. Thurman J. Moody
P. O. Box 1092
Albuquerque, New Mexico

Mr. D. K. Spellman, Jr., Houston, Texas

ECONOMICS OF DUAL COMPLETIONS VS TWIN WELLS
PENNSYLVANIAN RESERVOIR, DEAN FIELD
LEA COUNTY, NEW MEXICO

I. Factors Used in Computing Pennsylvanian Reserves

a. Porosity of 6.47% (Core analyses, Sinclair's State Lea 735 #1, and Atlantic's Federal Dow #1)
b. Effective Pay Thickness of 33 ft. (Electric-Micro-Radioactivity Logs)
c. Formation Volume Factor of 2.315 bbls. reservoir oil per bbl. st. tk. oil (bottom hole sample analysis Sinclair State Lea 735 #1)
d. Connate Water of 16%
e. Oil Recovery of 20%

II. Stock Tank Oil-in-place equals 6,000 gross bbls. per acre.

III. Pennsylvanian Stock Tank Oil Reserves

a. Gross barrels per acre equals 1,200
b. Gross barrels for 40 acres equals 48,000

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

V. Economics of Pennsylvanian 40 acre Unit.

	Twin Well	Dual Completion
a. Gross value of recoverable STO	$135,840	$135,840
b. Charges against well		
1. Royalty	16,980	16,980
2. Direct Taxes	7,320	7,320
3. Operating Expense	32,800	32,800
c. Net Revenue	82,740	78,740
d. Cost of Well	221,080	98,300
e. Net Profit or (Loss)	(138,340)	20,440

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT No. 4
CASE 1016-1017

Case 1016 File

Oil Reserves
Devonian Reservoir
Dean Field, Lea Co., N.M.

I. Factors Used in Computing Reserves

a. Porosity of 5.15% (Core analysis, Sinclair's J.P.Dean #1)
b. Estimated Connate Water of 16%
c. Effective Pay Thickness of 76 ft. (Core analysis, Dean #1)
d. Bbls. of reservoir oil per bbl. of stock tank oil of 1.127 (taken from bottom hole sample analysis, Dean #1)
e. Estimated Recovery of 44%

II. Conclusions

a. Stock tank oil-in-place per acre is 22,700 bbls.
b. Stock tank oil recovery per acre of 10,000 bbls.
c. Recovery for 40 acre Unit is 400,000 gross bbls.

Value of Recoverable Stock Tank Oil
From Devonian 40 Acre Unit
Dean Field, Lea Co., N.M.

I.	Volume of recoverable stock tank oil, gross bbls.	400,000
II.	Price of stock tank oil per bbl.	$2.83
III.	Gross Value of recoverable stock tank oil	$1,132,000
IV.	Charges Against Well.	
	a. Royalty	$111,500
	b. Direct Taxes	61,000
	c. Operation Expense	72,000
	d. Cost of Well	286,400
	Total	$550,900
V.	Net Profit to Operator	$571,100

BR. AMER. | LOS NIETOS

K.E. AULT | LEEMAN | JONES

HUMBLE | HUMBLE | MID - CONT. | S.O. & G. #636 9-1-56 | GULF | HUMBLE

U.S.

S.O. & G. # 735 | LOS NIETOS

K.E. AULT | STATE | STATE | STATE

HUMBLE | OHIO 27 | MAGNOLIA | S.O. & G. #413 2-10-58 | S.O. & G. #735 | GULF 26 | MID - CONT. | LOS NIETOS | MID CONT.

PENNSYLVANIAN DISCOVERY

PACIFIC WESTERN | MAGNOLIA | LOS NIETOS

AULT | DEAN

HUMBLE | TIDE WATER | MAGNOLIA | TIDE WATER | HUMBLE "AJ" | GULF | MID - CONT.

T 15 S

CONE | CONE

MID-CONTINENT | MID-CO

-7750 -7725 -7700 -7675 -7650 -7625 -7600 -7575

W.E. SUMRULD | STATE | STATE | STATE

OHIO 34 | OHIO | S.O. & G. #413 2-10-58 | SINCLAIR #396 11-10-56 | 35 | SINCLAIR #758

A.C. DEAN

HUMBLE

J.R. DEAN

HUMBLE 22 | SINCLAIR * 586 4-15-57 | MID - CONTINENT 23 | LOS NIETOS | BRITISH AMERICAN | LOS NIETOS 24

BR. AMER. | LOS NIETOS

K.E. AULT | LEEMAN | JONES

HUMBLE | MID - CONT. | S.O. & G. *636 9-1-56 | GULF | HUMBLE

U.S. | S.O. & G. * 735 | LOS NIETOS

STATE | STATE | STATE

OHIO 27 | MAGNOLIA | S.O. & G. *413 2-10-58 | S.O. & G. *735 | GULF 26 | MID - CONT. | LOS NIETOS | MID CONT. | LOS NIETOS 25

PENNSYLVANIAN DISCOVERY

PACIFIC WESTERN | MAGNOLIA | LOS NIETOS | GULF

DEAN

TIDE WATER | MAGNOLIA | TIDE WATER | HUMBLE "AJ" | GULF | MID - CONT. | LOS NIETOS

CONE | CONE

MID-CONTINENT | MID-CONTINENT

7750 | 7725 | 7700 | 7675 | 7650

STATE | STATE | STATE

OHIO 34 | OHIO | S.O. & G. *413 2-10-58 | SINCLAIR * 396 11-10-56 | 35 | SINCLAIR * 758 | 36

A.C. DEAN

Str Ls. 7686

HUMBLE

K.E. AULT | LEEMAN | JONES

HUMBLE | HUMBLE | MID – CONT. | S.O. & G. #636 9-1-56 | GULF | HUMBLE

U.S.

S.O. & G. # 735

LOS NIETOS

K.E. AULT | STATE | STATE | STATE

HUMBLE | OHIO 27 | MAGNOLIA | S.O.&G. #413 2-10-58 | S.O.&G. #735 | GULF 26 | MID – CONT. | LOS NIETOS | MID CONT.

PENNSYLVANIAN DISCOVERY

PACIFIC WESTERN

MAGNOLIA | LOS NIETOS

AULT | DEAN

HUMBLE | TIDE WATER | MAGNOLIA | TIDE WATER | HUMBLE "AJ" | GULF | MID – CONT.

T 15 S

CONE | CONE

MID – CONTINENT

MID-CO

W.E. SUMRULD | STATE | STATE | STATE

OHIO | 34 | OHIO | S.O.&G. #413 2-10-58 | SINCLAIR # 396 11-10-56 | 35 | SINCLAIR # 758

7750 7725 7700 7675 7650 7625 7600 7575

A.C. DEAN

HUMBLE

J.R. DEAN

BR. AMER. LOS NIETOS

K.E. AULT LEEMAN JONES

BLE HUMBLE MID – CONT. S.O. & G. #636 9-1-56 GULF HUMBLE

U.S.

S.O. & G. # 735 LOS NIETOS

LT STATE STATE STATE

MBLE OHIO 27 MAGNOLIA S.O.& G. #413 2-10-58 S.O.& G. #735 GULF 26 MID – CONT. LOS NIETOS MID CONT. LOS NIETOS 25

PENNSYLVANIAN DISCOVERY

PACIFIC WESTERN MAGNOLIA LOS NIETOS GULF

DEAN

LE TIDE WATER MAGNOLIA TIDE WATER HUMBLE "AJ" GULF MID – CONT. LOS NIETOS

CONE CONE

MID – CONTINENT MID–CONTINENT

7750 7725 7700 7675 7650 7625 7600 7575

RULD STATE STATE STATE

OHIO 34 OHIO S.O.& G. #413 2-10-58 SINCLAIR # 396 11-10-56 35 SINCLAIR # 758 36

A.C. DEAN HUMBLE

J.R. DEAN

MAGNOLIA

CITIES SERVICE

MAGNOLIA

S.O.& G. *413
2-10-58

Str. Ls - 7612

Str. Ls - 7576

-7575

-7600

-7625

-7650

-7675

-7700

-7725

-7750

HODGES

S.O.& G. *413
2-10-58

MAGNOLIA

S.O.& G. * 707
HBP

Str. Ls - 7568

GULF

MA

HARKRIDER

DEAN

R-36-E

DEAN

STATE

STATE

1

MAGNOLIA

6

MAGNOLIA

DOW

S.O.& G. *708
2-15-65

5

ATLANTIC

R-37-E

MAGN

Str. Ls - 7693

A'

MAGNOLIA

S.O.& G. * 754
9-9-59

MAGNOLIA

S.O.& G. * 756
10-9-61

MAGNOLIA

HUMBLE

ANDERSON

PHILLIPS

MAGNOLIA

S.O.& G. * 755
7-10-59

ATLANTIC

MAGNOLIA

LOWE

T
16
S

STATE

DOW

MAGNOLIA

HUMBLE

ANDERSON

STATE

2

7

HUMBLE

8

BE

OIL

CASE

DEAN FIEL

LEA COUNTY, NEW M

CONTOURED ON TOP STR

CONTOUR INTERVAL

PRODUCTION

MAGNOLIA

CITIES SERVICE

MAGNOLIA

S.O.& G. #413
2-10-58

Str Ls -7612

Str Ls -7576

-7575

-7600

-7625

-7650

-7675

-7700

-7725

-7750

S.O.& G. #413
2-10-58

MAGNOLIA

S.O.& G. #707
HBP

Str Ls -7568

GULF

MAGNOLIA

HARKRIDER

R-36-E

DEAN

STATE

STATE

MAGNOLIA

6

MAGNOLIA

DOW

Str Ls -7693

S.O.& G. #708
2-15-65

5

ATLANTIC

R-37-E

MAGNOLIA

GULF

A

MAGNOLIA

S.O.& G. #754
9-9-59

MAGNOLIA

S.O.& G. #756
10-9-61

MAGNOLIA

HUMBLE

ANDERSON

MAGNOLIA

S.O.& G. #755
7-10-59

ATLANTIC

MAGNOLIA

LOWE

STATE

DOW

MAGNOLIA

HUMBLE

ANDERSON

STATE

7

HUMBLE

8

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Exhibit No. 2
CASE 1016-1017

DEAN FIELD

LEA COUNTY, NEW MEXICO
CONTOURED ON TOP STRAWN LIME
CONTOUR INTERVAL 25'

HODGES

S.O.&G. #713
2-10-58

MAGNOLIA

S.O.&G. #707

HEP

Str. Ls. -7568

GULF

HARKRIDER

DEAN

R·36·E

DEAN

STATE

STATE

R·37·E

MAGNO

1

MAGNOLIA

6

MAGNOLIA

DOW

Str. Ls. -7693

S.O.&G. #708
2-15-65

5

ATLANTIC

A

A'

MAGNOLIA

S.O.&G. #754
9-9-59

MAGNOLIA

S.O.&G. #756
10-9-61

MAGNOLIA

HUMBLE

ANDERSON

PHILLIPS

MAGNOLIA

S.O.&G. #755
7-10-59

ATLANTIC

MAGNOLIA

LOWE

T
16
S

STATE

DOW

MAGNOLIA

HUMBLE

ANDERSON

STATE

2

7

HUMBLE

8

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
EXHIBIT NO. 2
CASE 1014-1017

DEAN FIEL

LEA COUNTY, NEW M

CONTOURED ON TOP STR

CONTOUR INTERVAL

DATE 2-8-5

SCALE 1" = 1C

PRODUCTION

PENNSYLVANIAN ◉

DEVONIAN ●

COX & HESSLER

STATE

DUCTION

VANIAN ◉

◉

COX & HESSLER

BEFORE THE
OIL CONS. COMM.
Santa Fe, N. M.
Stanolind EXH. NO. 2
CASE 1016-1017

DEAN FIELD

LEA COUNTY, NEW MEXICO
CONTOURED ON TOP STRAWN LIME
CONTOUR INTERVAL 25'
DATE 2-8-56
SCALE 1" = 1000'

SINCLAIR OIL & GAS CO./ANY
H. M. FORD NO. 2

PARKER WOLFCAMP AND PENNSYLVANIAN POOLS
WOLFCAMP 8623-8651', PUMP @ 6500'
PENNSYLVANIAN 9098-9128', PUMP @ 8900'
BAKER MODEL D PACKER @ 9010'