Case No. 4748

Application, Transcripts,

Small Exhibits, Etc.

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
CONFERENCE HALL, STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

June 28, 1972

EXAMINER HEARING

IN THE MATTER OF:	
Application of Pubco Petroleum Corporation for Special pool rules, Lea County, New Mexico.	CASE NO. 4748
and	
Application of Harding Oil Company for a discovery allowable and special pool rules, Lea County, New Mexico.	CASE NO. 4749

BEFORE: Elvis A. Utz
Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 4748.

MR. HATCH: The Application of Pubco Petroleum Corporation for special pool rules, Lea County, New Mexico. I think we need a decision as to whether we are going to hear these cases at the same time, Case 4748, the Application of Pubco, and Case 4749, the Application of Harding Oil.

MR. HINKLE: Clarence Hinkle of Hinkle, Bondurant and Christy, Roswell, New Mexico, appearing on behalf of Harding Oil Company. We would like to enter our appearance in Cases 4748 and 4749, and we have no objection to consolidating the Cases for the purpose of taking testimony.

MR. BUELL: Sumner Buell of Montgomery, Federici, Andrews, Hannahs and Morris, I would like to enter my appearance on behalf of H. L. Brown, Jr.

MR. SPERLING: James Sperling of Modrall, Sperling, Roehl, Harris and Sisk, Albuquerque, appearing on behalf of Pubco Petroleum Corporation in Cases 4748 and 4749. We have no objection to the consolidation of the two Cases for the purpose of testimony.

MR. UTZ: In absence of objection, Applications 4748 and 4749 will be consolidated, for the purpose of testimony.

MR. HATCH: I have a question that I would like Mr. Hinkle, Mr. Sperling and Mr. Buell to review for a moment before we proceed.

In the Affidavit of Publication for Case 4749, there was something left out. The pool name is the principal thing that was left out.

MR. HINKLE: I don't think that makes a whole lot of difference, it is identified by Township and well identification.

MR. HATCH: I am not disturbed about it, but I don't know about you or Mr. Sperling.

MR. HINKLE: Jim, the pool name is the only thing left out, the Township and Range and discovery well are all identified.

MR. SPERLING: I have no objection to proceeding.

MR. HINKLE: I have none.

MR. UTZ: Cases 4748 and 4749 have been called. Mr. Speling, how many witnesses do you have?

MR. SPERLING: Two.

MR. UTZ: How many witnesses do you have, Mr. Hinkle?

MR. HINKLE: Three.

MR. UTZ: Will all five witnesses stand and be sworn at this time?

(Whereupon, five witnesses were sworn simultaneously by Mr. Hatch.)

MR. UTZ: You may proceed when you are ready, Mr. Sperling.

MARION CAUSEY,

was called as a witness and, having been already duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. SPERLING:

Q Would you please state your name?

A Marion Causey.

Q By whom are you employed and in what capacity?

A I am employed by Pubco Petroleum Corporation and my present position is Permean Basis Exploration Manager in Midland, Texas.

Q How long have you held that position?

A Since the first of the year.

Q Have you ever, on any previous occasion, testified before the New Mexico Oil Conservation Commission so that your qualifications are a matter of record?

A No, I have not.

Q Would you please give us a brief resume of your education and professional training and experience relative to the position you hold?

A I have a Bachelor of Science Degree in geology from the University of Southern Mississippi; I have a M.S. Degree in geology from the University of Tennessee. I was employed by Phillips Petroleum Company as a petroleum geologist from 1957 to 1962, primarily working in

exploration of the Permean Basin in the southeastern New Mexico area. I was employed from 1962 until 1968 by Mobil Oil Corporation as an exploration geologist primarily working in southeast New Mexico.

From 1968 until the present time, I have been employed by Pubco Petroleum Corporation. I am a member of the American Association of Petroleum Geologists.

Q Now, Mr. Causey --

MR. SPERLING: Are Mr. Causey's qualifications accepted?

MR. UTZ: Yes, they are.

Q (By Mr. Sperling) Mr. Causey, would you please now refer to what has been marked as Exhibit 1 in this Case, Case 4748, and explain briefly the purpose of that Exhibit and what it is designed to show?

A Exhibit 1 is a scale of one inch to two thousand feet, which is indicated on the map, and is outlined as the proposed Humble City-Strawn Pool area comprising Sections 6, 7, 18, in Township 17 South, Range 38 East; and Sections 1, 2, 3, 10, 11, 12, 13, 14, 15, in Township 17 South, Range 37 East.

We have also designated on the map, the Lovington East and Lovington Northeast pools.

Also marked on the Exhibit is the discovery well of the Humble City-Strawn Pool, the Harding Oil Company

Number 1 well.

Exhibit 1-A is a geological cross-section which has been indicated on Exhibit 1 by two red lines, designated B to B' and A to A'. Represented on this Exhibit is the electric logs and the radioactive logs of the stratographic section on datum from the top and middle of the Pennsylvanian-Strawn. The scale of this map is a vertical scale of one inch to 100 feet and a horizontal scale of twelve inches equaling one mile --

MR. UTZ: Why don't you give us the datum?

A (Continuing) This is not a structural section, this is my interpretation of the Lovington East and the Lovington Northeast Strawn area and the discovery well, the Harding Oil Company Number 1 Shipp. The discovery well is producing from limestone of the Pennsylvanian-Strawn at an average depth of approximately 1,450 feet. I believe the Humble City-Strawn Pool is producing from a stratographic trap which resulted from a bank or a reef buildup within the Strawn.

Referring back to Exhibit 1-A, within the area mapped, I believe there are three different Pennsylvanian-Strawn banks or reefs producing.

I have designated these banks as Strawn Bank B', Strawn Bank B and Strawn Bank C.

The red on the cross-section indicates the producing

interval in each well in this zone. Designated as the Strawn B' and colored in green on both cross-sections, I believe is the prevalent zone which produces in the Humble City-Strawn field.

This cross-section which started with the State Shell Monty Number 1 in Section 14, Township 16 South, Range 36 East, was a dry hole which penetrated the Strawn.

The Southwest Production Corporation Monty State C in Section 24, Township 16 South, Range 36 East, was completed from the Strawn and has since been abandoned with an accumulated production of 4,114 barrels which was produced from 7/14/69.

The next well is the Monty State Number 2 in Section 19, Township 16 South, Range 37 East and it is also producing from the Strawn. These two wells are producing from the Strawn at the B' bank.

The Tidewater Monty B Number 1 in Section 19, Township 18 South, Range 37 East is still producing from what I have designated the Strawn Bank C and has an accumulative production of 325,156 barrels of oil and was completed 3/26/53 and is still producing.

The Getty Oil Corporation Monty D Number 1 in Section 18, Township 16 South, Range 37 East, is a dry hole.

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The Pennzoil United State C Number 2 in Section 17, Township 16 South, Range 37 East, was completed from what I believe to be the middle bank, or the Strawn Bank B. This was completed on 6/25/69 and up to 5/1/72 had an accumulative production of 286,215 barrels of oil.

These are the wells I have used on the cross-section, the A to A' cross-section.

On the B to B', starting with the first well, the Amerada Petroleum State LC Number 1, in Section 1, 17 South, 36 East, was a dry hole.

The Skelly Oil Corporation Taylor Number 6 in 17 South, 37 East, was a dry hile in the Strawn.

The Tidewater Oil State B Number 1 in Section 5, 17 South, 37 East, was completed from the Strawn Bank B' and had an accumulative total production of 60,297 barrels of oil. It has been abandoned.

The Tidewater Baton Number 1 in Section 5, 17 South, 37 East, was completed 3/3/52 and is abandoned and produced only 58,751 barrels of oil from the Strawn Bank B'.

The Tidewater State Number 1 in Section 4, Township 17 South, Range 37 East, was completed 8/29/51, and is abandoned. The total accumulated production was 59,647 barrels of oil. It was also completed in the

Strawn Bank B'.

The Tidewater Oil Company State Eugene Number 1 D in Section 32, 16 South, 37 East, was completed from what I believe to be both the Strawn B' and the Strawn Bank C. It perforated both banks and has a total accumulative production of 420,765 barrels of oil and is still producing.

The last log on the cross-section B to B' is the Shell Oil Company State Number 1 in Section 28, 16 South, 37 East. This well was a dry hole.

If I could refer you now to Exhibit 1 again, the solid blue contour line on this Exhibit represents the lower and middle Strawn as was designated on the cross-section A to A' and B to B'. The isopach was contoured at 250 foot intervals and the green isopach contours represent the isopach of what I have designated as the Strawn Bank B'. It is also contoured at 250 foot intervals.

This isopach does not represent a net porosity and does not indicate that all portions of the Strawn B' along the trend as mapped would be porous and permeable. I do feel that the limits of the green outline represent this bank or reef trend across the area mapped.

Along the trend that we have mapped, we should anticipate and expect separate carbon buildups of porous

permeable rock and I believe this is the case in the area under consideration.

I believe the Humble City-Strawn Pool is producing from the same bank as the Lovington East field, but it is separate carbon buildup.

The discovery well in the Humble City-Strawn Pool, the Harding Oil Company Shippnumber 1, was some 287 feet structurally lower than the edge well of the Lovington East field, the Tidewater State U Number 1 located in Section 4, Township 17 South, Range 37 East. I might also point out on Exhibit 1 that the values on the map underlined in green beside each control point, represent the thickness of the mapped Strawn Bank B' interval. The blue beside each control point represents the thickness of the isopach of the lower and middle Strawn interval.

Q Mr. Causey, I take it from what you have said, that you feel there is a separation between the Lovington East field and the Humble City-Strawn Pool; is that your conclusion?

A That is correct.

Q Even though the wells from both of the areas may be producing from what you have designated as the Strawn B' Bank?

A That is correct.

Q Now, does the fact that the wells which are located in the Lovington East Pool which you have referred to and which you have shown on your cross-section and which are abandoned, support that conclusion in view of the recent production encountered in the Humble City-Strawn Pool?

A Yes, I think that is correct.

Q Now, do I understand from the configuration of the contour line which runs across the Humble City-Strawn Pool, that you have concluded that that is the limit of possible Strawn production from the area or is there the possibility that these other members that you have identified may indicate production to the north?

A I believe that we have the possibility of production from the north. Presently there are two producing wells within the Humble City-Strawn Pool developing production from other Strawn zones which I have designated as the Strawn Bank B and the Strawn Bank C to the north.

I think this is substantiated by the production in the Lovington Northeast and the Lovington East Pool area where we pick up these two zones as they move to the north edge of the Strawn B' Bank trend. So I feel that we could establish production to the north of the trend as outlined.

Q Do you have anything else to comment on insofar as

Exhibits 1 and 1-A are concerned?

A I believe that's all that I have -- there is a specific point I would like to bring out in summary. I believe there are three different banks or reefs within the Pennsylvanian-Strawn formation in the mapped area. The Humble City-Strawn Pool and the Lovington East Strawn Pools are producing from separate stratographic controlled traps within the Strawn B' zone. This is evidenced by the Strawn structural position of the Humble City-Strawn Pool relative to the Lovington East Pool.

Only one well is still being produced by pumping in the Lovington East Pool, as compared to two in the Humble City-Strawn Pool.

The proposed pool outlined, I believe, is a reasonable outline which allows for shifting of the primary Strawn Bank trend plus the possible development within additional Strawn zones.

In my opinion, 160 acre spacing will not lead to unnecessary dry holes as compared to 80 acre spacing because of the flexibility within 160 acre spacing units as proposed by Pubco.

The Lovington East Pool was, for all practical purposes, drilled on 160 acre spacing with a minimum of dry holes and considering the fields within southeast New Mexico, specifically the Husk field, were developed

on 160 acre spacing and, in my opinion, the character of the rock encountered in the area indicates that one well will adequately drain 160 acres.

Q In that connection, Mr. Causey, let me call your attention to the Lovington East area and those three wells that you included in your cross-section, two of which are within Section 5 and one being in Section 4. Those wells actually appear to be drilled on 160 acre spacing; is that correct?

A That is correct, for all practical purposes, they were.

Q And they have produced to abandonment?

A That is correct.

Q Let me know refer you to Exhibit 1-B, what is the purpose of this Exhibit?

A Exhibit 1-B is a reduced copy of the logs on the Harding Oil Company Shipp Number 1, in Section 11, Township 17 South, Range 37 East, and a porosity log of the Pubco Shipp Number 2. This Exhibit shows the Strawn section encountered in these two wells, and our correlation of the Strawn B' Bank relative to the top of the Strawn middle and lower sections and the top of the Pennsylvanian-Atoka.

Q Does Exhibit 1-B correspond scale-wise with the logs shown on Exhibit 1-A?

A Yes, it is approximately the same scale as the

cross-section, A to A' and B to B' for comparison purposes.

Q Do you have anything else, Mr. Causey, at this time?

A That's all.

MR. SPERLING: That is all the testimony we have from this witness right now.

* * * * *

CROSS-EXAMINATION

BY MR. HINKLE:

Q Mr. Causey, I notice that you have labeled Exhibit 1-A as a stratographic cross-section, now, is it your position that this entire area is stratographic and not dependent on structure?

A I believe the Strawn is primarily stratographically controled.

Q Now, you have labeled here three different Strawn banks, the Strawn Bank B', the Strawn Bank B, and the Strawn Bank C, are those stratographic traps within the stratographic Strawn area?

A I believe that they are, although I have not mapped in detail in terms of trends, bank trends, of the Strawn B and Strawn C banks. All evidence, however, indicates that they are.

Q In your opinion, is there communication between these banks?

A In general, I would say no, however, I will qualify that by saying that one well in Section 32, Township 16 South, Range 37 East, was drilled and completed from the Strawn B' and the Strawn C Bank. It is possible in a case such as this, that those two banks could be in communication.

Q Each bank could be a separate pool, you might say?

A Yes, I believe, in a general sense, they are.

Q Generally, they probably would be?

A Yes.

Q Now, you can go from one bank to another and you could have a dry hole offsetting another one; could you not?

A That is correct.

Q Are you apt to have more dry holes in 160 acre spacing than you would have in 80 acre spacing?

A If we look at the analogy that we have in the Lovington East pool, I think we can say from that development that that pool on 160 acre spacing was not more risky than it would have been on 80 acre spacing.

Q Is that your opinion of this area, the Humble City-Strawn area?

A Yes, it is.

Q Now, referring to Exhibit Number 1, you have outlined the proposed Humble City-Strawn Pool?

A Yes.

Q What control did you figure for the boundaries of this pool?

A Well, I think it is obvious that only drilling is going to determine the exact boundaries of the field.

Q These are just arbitrary boundaries that you have drawn?

A This interpretation was based on the one discovery well which was drilled and has held up reasonably well to date. We feel that these are approximately correct, but this outline would allow minor shifting of the bank either to the north or the south as the field is developed.

Q Well, with the trend that you have shown here, your best chance at production is within the dotted green lines, the broken lines (indicating)?

A With the information that we have today, but we realize that it can shift.

Q Have you made any reservoir studies of the area at the present time?

A No, I have not.

MR. SPERLING: We have a witness that has.

Q (By Mr. Hinkle) Now, if the Commission were to approve 160 acre spacing, the Number 1 Well in Section 11 which is in the SW/4 would have the SW/4 dedicated to that well; is that right?

A Yes, that is correct.

Q And the SE/4 would be dedicated to your well?
A That is correct.
Q Now, you are drilling, as I understand it, a well which is indicated in the NW/4; is that right?
A That is correct.
Q What is the other location there, the location of the Harding well?
A This is Harding's second location (indicating).
Q This is going to result in a 40 acre location, you might say, at the present time; is it not?
A As it is spaced at the present time, on these four wells, it would be (indicating).
Q What is the exact location of your well Number 2, which is located in the SE/4 of Section 11?
A The Pubco Number 2 Shipp is located 2,130 feet from the east line and 1,980 feet from the south line.
Q 1,980 feet from the south line?
A Correct.
Q Now, if you had located that in the center of the NW of the SE/4, it would be 660 feet from the east-west line of that quarter; would it not?
A Would you repeat that?
Q If your Number 2 well had been located in the center of the NW of the SE/4 of Section 11, it would have been 660 feet from the east line of the quarter Section, would it

not have been?

A Yes, I believe that is correct.

Q Now, since you located it where you did -- you located it 150 feet farther west to get closer to the Number 1 Well; did you not?

A Well, in the absence of any established pool spacing rules, we went on the 40 acre state-wide spacing.

Q You got as close as you could to the discovery well; is that right?

A Yes, basically, that is right.

Q Isn't the same true of your well that you are drilling now in the NW/4 of Section 11, you got as close as you could there too; did you not?

A Yes, I believe we did. Yes, that is correct.

Q Now, are you going to have a plat here?

MR. SPERLING: Yes.

Q (By Mr. Hinkle) At the time you located these two wells, did you have in mind wider spacing than 40 acres?

A Yes, we did.

Q Why did you locate -- why didn't you step out and locate it farther away if you thought one well would drain 160 acres?

A Well, I think we took the course of action that most people would take in that, without established pool rules, we moved it as close as we could to the

discovery well until such time as spacing rules could be established.

Q Now, if the Commission should approve 160 acre spacing in this area, and as I understand it, you are asking for permission to drill in any 40 acre component of 160 acres; is that correct?

A That is correct.

Q Would that not result in the same situation that you have here? You have four wells located together, as you go to the next area, aren't you apt to have your offset wells in the same way?

A That is possible, but you would also, of course, have 160 acres to drain.

Q It might depend somewhat on the ownership of the acreage; would it not?

A Well, it would probably depend on numerous factors.

Q But you might have this reoccur?

A This is possible.

Q It is a possibility?

A Yes.

Q So you have four wells together and that would mean you would step out considerably and it could mean if you stepped out that far, that you might get a dry hole because of the stratographic situation?

A Certainly anytime you drill a well you run the risk of

getting a dry hole, but the flexibility within 160 acre spacing would give you -- I think it would reduce your dry hole risk when the field is developed and we obtain more datum to determine the next location.

MR. HINKLE: Do you have a witness that will refer to core analyses?

MR. SPERLING: Yes.

MR. HINKLE: I think that's all.

MR. UTZ: Any further questions?

(No response.)

* * * * *

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Causey, I have one or two questions.

This large -- or heavy dotted green line, do you consider that to be the trend of the Strawn zone throughout the three pools?

A That is correct, that is my interpretation of the Strawn Bank B'.

Q Would you give me the control information?

A All right, starting in Section 11 of Township 17 --

Q Why don't you just limit yourself to the area in question -- well, go ahead and give me whatever you want.

A In Section 11, Township 17 South, Range 37 East, we have two control points. In Section 6 of 17 South, 38

East, we have four control points. Those are the control points in the approximate SE/4 of the map area.

Q Can you give me anything over in the area of 17 South, 36 East?

A Yes, we have one well in Section 36, excuse me, Section 1 of 17 South, 36 East. It is the extreme western well on our B' cross-section.

Q What Section?

A Section 1. There are also three control points in Section 12 of Township 17 South, Range 36 East. The control points are circled with larger circles and the values underlined in green are the values of the thickness of the B'.

There is also a control point in Section 6 of 17 South, 37 East.

Q Did you give me one for Section 33?

A Section 33 of 16 South, 37 East is not deep enough, it has not been penetrated to the Strawn.

Q So you are a little short in control in the areas of Sections 33 and 32, all the way down to Section 6 of 17 South, 37 East?

A Would you repeat that area again?

Q Well, beginning in Sections 32 and 33 of 16 South, 37 East, the north boundaries of your control. I mean your green line goes over to Section 6 of 17 South,

37 East. You are a little short in control at that point; aren't you?

A Yes.

Q Now, I believe they were called blue, I'm a little color-blind, obviously, because they look more green to me. I think on your contour surrounding Section 11, that your control on that isn't too good. Is that your control on the wells in Section 11?

A That is correct, but I might point out that the interpretation of the Bank B' was projected at greater than 50 feet and in this location, we encountered the discovery well at 64 feet and the Pubco Number 2 was encountered at 35 feet.

Q Both these wells are only completed in your B' zone?

A That is correct.

Q The one that you designated as B'?

A Right.

Q Were the other zones tested?

A We did not have any pore spaces at equivalent intervals of the other two banks of the zone.

MR. UTZ: Does anyone have any further questions?

* * * * *

CROSS-EXAMINATION

BY MR. HINKLE:

Q In your previous testimony, Mr. Causey, you indicated

that the wells which were drilled in Sections 4 and 5 could be considered as being on 160 acre spacing. Now, isn't it true also that that is a perfect location for 80 acre spacing because each one is located at the west end of 80 acres?

A That is correct, but also, the spacing between them would have to be taken into consideration.

Q Is it not true then that they could be either?

A That is correct, but for practical purposes and drainage purposes, I believe 160 acres would be more applicable.

Q You indicated in your last testimony that you used the wells in Section 11, the discovery well and the well Pubco has drilled, for your control. Now, isn't it true that you gave this same geological map to the Harding Oil Company, or the individual that you gave this information out to, and they drilled a well on the strength of this geology?

A That is correct, they drilled on this interpretation.

Q So, actually, these wells were not used as control points in preparing this plat?

A In the original interpretation, that is correct.

MR. HINKLE: I might say that our Exhibits are substantially the same as this and they were obtained from Pubco.

MR. UTZ: It was mentioned, on Cross-Examination,

that the area was farmed out by Pubco, is the farm-out on an 80 acre checkerboard?

MR. SPERLING: That, as yet, is undetermined. There seems to be some ambiguity in the contract.

MR. HINKLE: We will have some testimony on that.

MR. UTZ: Any further questions?

(No response.)

MR. UTZ: The witness may be excused.

(Witness excused.)

* * * * *

CHARLES SANDERS,

was called as a witness and, having already been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. SPERLING:

Q Please state your name.

A Charles Sanders.

Q Where do you live, Mr. Sanders?

A Albuquerque.

Q By whom are you employed and in what capacity?

A I am employed by Pubco Petroleum Corporation as a petroleum engineer.

Q Have you, on any previous occasion, testified before the Commission so that your qualifications as a petroleum engineer, are a matter of record?

A No, I have not.

Q In that event, would you please briefly outline your education and professional training and experience qualifying you as a petroleum engineer?

A I graduated from Texas Technology College in 1950 with a B.S. in Petroleum Engineering. Subsequently I worked for three years for the Texas Pacific Coal and Oil Company in the north-central Texas area and later as assistant division manager for the same company. I then worked for sixteen years in west Texas and northwest New Mexico as a reservoir engineer.

Q Are you a registered professional engineer?

A In the State of Texas, yes.

Q How long have you been with Pubco?

A For three years.

Q Are you familiar with the area which is the subject of this Application, Mr. Sanders?

A Yes, I am.

Q Would you please refer to what has been identified as Exhibit 2, please? Tell us what that Exhibit is.

A Exhibit 2 is a land ownership map of the proposed Humble City-Strawn Pool and the surrounding area. It primarily shows the land ownership of the proposed pool and also shows a partial outline of the Lovington East field.

Q And, of course, shows the two wells located within the proposed Humble City-Strawn Pool area that have been completed?

A Yes, sir, including the Number 3 Shipp -- the Pubco Number 3 Shipp which is now being drilled in the NE of Section 11.

Q Now, would you refer, please, to what has been marked as Exhibit Number 3 and tell us the purpose of that Exhibit and what it shows?

A Exhibit 3 is a tabulation of the well and completion data for the two wells now existing in the Humble City-Strawn Pool, the Harding Oil and Gas Company Shipp Number 1 and the Pubco Petroleum Corporation Shipp Number 2. The location of the Harding well is 2,060 feet from the west line and 2,310 feet from the south line in 17 South, 37 East, Section 11.

The Pubco Petroleum Corporation Shipp Number 2 is 2,130 feet from the east line and 1,980 feet from the south line of Section 11.

The total depth of the Harding well is 11,643 feet and the total depth of the Pubco well is 11,685.

The next significant figure is the completion dates and these are March 9th for the Harding Shipp Number 1 and June 10th, 1972 for the Pubco Shipp Number 2.

The perforated intervals for the two wells are

shown. The Harding well perforation is to an interval of 32 feet and the Pubco well to 26 feet. The Harding Oil and Gas Company Shipp Number 1 had a potential originally, of 286 barrels of oil per day with a gas-oil ratio of 1,000 and a flowing tube pressure of 16.

The well's repotential on April 18, 1972, was 624 barrels of oil with a gas-oil ratio of 1,098 and a flowing tube pressure of 55.

On June 10, 1972, it was producing 2,758 barrels of oil per day with a GOR of 1,662 and a flowing tube pressure of 700 pounds.

The oil gravity is essentially the same in both wells, approximately 45 degrees API. The net pay of the Harding well was 34 feet and the net pay of the Pubco was 30 feet.

The average porosity which we determined on the Harding well was 5.1 percent and 6.30 percent for the Pubco Number 2. The permeability was not determined for the Harding well and in the Pubco Shipp Number 2, it averaged 20 millidarcys.

The water saturation was determined to be 25 percent in both wells.

The reservoir pressure was 4,800 PSI in the Harding Well and 3,743 PSI in the Pubco well.

Q Would you refer to Exhibit 4 now and explain what it shows?

A Exhibit Number 4 is a gammaray neutron log run on the Pubco Shipp Number 2. On the left side of the log we see the top of the Strawn and the middle lower zone at 11,425 feet. The left-hand corner of the top shows tha Atoka at 11,684 feet.

The interval between is referred to as the Strawn limestone.

The vertical column on the left side is the depth column interval for the Pubco Shipp Number 2. The significant factor on this test was the rate of production which flowed and there was no water recovered.

The shut-in bottom hole pressure was 7,633 and the final maximum pressure was 3,473 which was reached in ten minutes and continued at 3,473 for the remainder of the 90 minute shut-in test.

At the bottom of Exhibit 4, we show the porosity scale for the sidewall neutron porosity log on a standard scale. We have used this scale in determining the net amount of pay in the Pubco well.

In the upper interval, we have a net pay of 11,430 feet down to 11,453 feet, or a total of 23 feet in which that maximum porosity was reached.

In the lower interval, we had 7 feet from 11,463 to 11,470. The total amount of net pay therefore, was 30 feet and the average log porosity was determined to

be 6.30 percent or 189 porosity feet.

I would like to point out, at this time, that we will refer to the analysis data later, but the core analysis showed a net pay of 29.1 feet with an average of 6.0 porosity. The log porosity at the same interval calculated 5.92 percent, so we do have real close agreement between the log porosity and the core proosity.

Q Anything else on Exhibit 4 at this time?

A I believe that's all.

Q Now, referring you to what has been marked as Exhibit 4-A, would you explain what that is?

A Exhibit 4-A is a gammaray neutron log run on the Harding Oil and Gas Company Shipp Number 1 Well. The left side of the gammaray is the top of the Strawn which is 11,430 feet and the top of the Atoka. The zone was perforated at 11,420 to 11,452. The rectangular box represents the drill stem test from 11,420 to 11,475. The maximum shut-in bottom hole pressure on the test was 4,800 PSI which we assumed to be the original sealed bottom hole pressure.

Q And the pressure confirms your tabulation as shown on Exhibit 3 of the initial bottom hole pressure?

A Yes, sir.

In the lower left-hand corner, you will find the

porosity scale which was found to be correlative with the core porosity and the porosity that was used in determining the net feet of pay for this well. This scale was not used because we felt it gave an unrealistic porosity value, so the other scale was used and it was determined that there was 28 feet of net pay within the perforated interval and 6 feet of net pay below the perforated interval for a total of 34 feet of net pay with an average porosity of 5.1 percent, or 173.4 porosity feet.

Q Any other comments on Exhibit 4, at this time?

A I might point out that if the standard porosity scale had been used, the average porosity would have been 3.6 percent.

Q Will you refer to Exhibit Number 5 now, and tell us what it represents?

A Exhibit 5 is the bottom hole pressure for the field versus the field's accumulated production. The vertical scale on the left-hand side is the bottom hole pressure and this represents the total production from the field from both wells.

I should point out that there is very little production represented by this graph attributable to the Pubco well because it was completed at a point where the arrow is shown on the graph.

Q The middle of the graph?

A Yes.

Q The vertical arrow pointing upward?

A Yes. Point Number 1 in the upper left-hand corner represents the original bottom hole pressure of 4,800 PSI which was taken from the drill stem test of the Harding Number 2.

With the buildup of pressure in the Harding well, the pressure reached 4,185 PSI in two hours, and 4,188 PSI in 12 hours, and continued at 4,188 PSI for the remainder of the 48 hour test.

Point Number 3 was taken May 15, 1972 and showed an accumulated production of 23,233 barrels of oil. This represented all that had been produced from the Shipp Number 1.

On the Pubco Shipp Number 2, the pressure obtained was 3,473 PSI and the maximum pressure was obtained in 10 minutes on the chart and continued at 3,473 PSI for the remainder of the test and that was the maximum pressure obtained..

Point Number 4 was taken June 15, 1972, at a point of 38,475 barrels of oil which represented accumulated production. This pressure point recorded a maximum bottom hole pressure of 3,035 PSI and it was reached in 12 minutes. The pressure of 3,035 continued for the

remainder of the 12 hour shut-in period.

Point Number 4 included 2,662 barrels of oil produced from the Pubco Shipp Number 2 during the completion procedure.

On the bottom of the Exhibit is a map of both of the wells. At the center of the circle is the Harding Shipp Number 1 and at the edge of the circle is the Pubco Shipp Number 2. This shows the distance between the two wells as being 1,120 feet.

In my opinion, it is logical to infer from the graph that effective drainage did occur over this distance of 1,120 feet. From the circle the radius we obtained was an area of 90.4 acres which, in our opinion, represented that the well will drain at least 90.4 acres.

So, in conclusion, I would like to make these points. One, that there was a severe pressure loss of 1,767 pounds in the Pubco Shipp Number 2 which resulted primarily from the production from the Harding Shipp Number 1. Number two, that communication apparently exists in the Strawn formation between these two wells.

Number three, that the shape of the curve is the shape of a normal pressure decline curve. Number four, that we have here effective drainage in excess of 1,020 feet -- or in excess of 90.4 acres.

I would like to point out, at this time, that while

we were completing our well on June 10, 1972, we started flowing our well at a rate of 758 barrels of oil per day with a tube pressure of 700 PSI. At the same time, the Harding Shipp Number 1 had a pressure of 700 PSI. The next morning, the Harding pumper came over to our rig where we were working and asked us if we had any idea what happened to the well. We asked him what happened and he said it lost 50 pounds of pressure overnight. After we checked the pressure, we knew the pressure had declined from 700 pounds to 650 pounds overnight.

Of course, our reply to this was that we had completed our well and it was draining oil from the same formation.

Q Anything else at this time, with reference to Exhibit 5?

A I believe that's all.

Q Now, if you will refer to what has been marked as Exhibit 6 and explain what that is.

A Exhibit 6 is a report from Core Laboratories, Inc. on the core analysis of the cores cut from the Pubco Shipp Number 2. The first core is from 11,440 to 11,481 and core number 2 is from 11,481 to 11,491. The report gives an analysis on the interval from 11,440 to 11,491.

The second sheet of this Exhibit is a summary of their findings. You will notice there that it is

indicated that there is 21.9 feet of pay which was included in the averages for the pay porosity and this 21.9 feet occurred at an interval of 11,440 to 11,467. The top ten feet of the pay zone was not cored and the average porosity over 21.9 feet was determined to be 6.0 percent. As I pointed out previously, the average sidewall neutron porosity over the cored pay interval was 5.92 percent.

The other significant factor I would like to point out is the calculated maximum gas drive recovery of 30 barrels an acre-foot. When we received the report, we felt this was low and after doing some calculations, on 80 acres, we were definitely concerned enough to take bottom hole pressures of the formation and have the samples analyzed at the laboratory and this will be our next Exhibit.

Q You are referring to Exhibit Number 6-A?

A Yes, sir.

Q If you will explain that, please.

A Exhibit Number 6-A is a summary of the reservoir sample analyses performed by Core Laboratories, Inc. The well was sampled and this bottom hole sample was obtained at a mid-point in the pay zone at a depth of 11,449 feet on June 19, 1972. At that point, the bottom hole pressure was 3,033 PSI and the accumulated

field production, 38,475 barrels of oil. This summary presents the comparison between 80 acre spacing and 160 acre spacing utilizing the data from the fluid samples and also from the previous core analyses. The first figure shows an average porosity of 6.3 percent. This was determined from the sidewall neutron porosity log that I have previously mentioned. The next figure I would like to point out is the 25.0 percent average interstitial water saturation percentage. I will now skip down to the 16.76 percent ultimate oil recovery, percentage of oil in place.

These two figures, the 25 percent for the average interstitial water saturation and the 16.76 percent for ultimate oil recovery were calculated using the pressure data and the curves from the Strawn limestone reservoir. We felt these were applicable and by these and using the fluid data obtained from our Shipp Number 2 Well and the bottom hole samples, these factors were determined.

The oil formation volume was determined to be 1.642 and the original oil in place for 160 acre spacing was 1,071,568 barrels of oil.

For 80 acre spacing it was 535,783 barrels of oil.

The ultimate recovery for 160 acre spacing was 179,630 barrels and for 80 acre spacing it was 89,815

barrels. The ultimate oil recovery on barrels per acre-foot was determined to be 37.4 in each case.

The ultimate gas recovery was 953,577 MCF for 160 acre spacing and 476,788 MCF for 80 acre spacing.

The total primary producing life for 160 acre spacing was 11.8 years and for 80 acre spacing it was 5.9 years. The primary producing life was taken from the economic limits of barrels of oil per day from the reservoir and a pressure of 500 PSI to arrive at that figure.

In arriving at the figure, it was assumed that productivity would decline in accordance with the effect of increasing reservoir gas saturation or oil permeability.

I have reviewed all of the Core Laboratory reports and determined them to be accurate and correct.

Q Now, based upon this information, do you think -- you just said that you determined them to be accurate and correct?

A Yes.

Q Based upon this information, do you think the volumetric calculations are correct?

A Yes.

Q As reflected on Exhibit 7?

A That's right. Exhibit 7 shows the computation of the recoverable oil reserves from the Humble City-Strawn Pool

using the basic data as used in the computations already presented and established. The average porosity used was 6.30 percent which was the porosity found on the Pubco well with an average net pay of 30 feet. The water saturation was 25 percent and the recoverable factor 16.76 percent.

The formation volume factor of the original bottom hole pressure was 1.642. The calculations show the original recoverable oil in barrels per acre-foot and according to the formula it was determined to be 37.4 barrels of oil per acre-foot which, of course, is the same figure that the Core Laboratories determined.

Q Based upon the computation which you have just gone through relating to recoverable oil, did you then make a study of the economics with reference to the proposed spacing units, that is, with respect to 80 acre spacing and 160 acre spacing?

A Yes, I did.

Q And that study is reflected on Exhibit 8?

A That is correct.

Q Would you explain that, please?

A Exhibit 8 is a tabulation of the economics for the Humble City-Strawn Pool, comparing 80 acre spacing to 160 acre spacing. Under revenue for an average well, an 80 acre well would produce 89,815 barrels of oil,

a figure which has already been established, at $3.56 per barrel plus 476,788 MCF of gas per well at $0.25 per MCF.

We included the gas economics in the computation because Phillips is now laying gas lines to the lease and contracts have been signed and gas sales should begin sometime within the next week.

So, this came up to a total revenue under 80 acre spacing of $438,938.

Under 160 acre spacing, the average well would produce 179,630 barrels of oil per well at $3.56 per barrel plus 953,577 MCF of gas for a total revenue of $877,877. Subtracting the royalty and taxes, we have a total revenue under 80 acre spacing per well of $325,472. Under 160 acre spacing, we have a total of $653,946.

The next item is expenses, which is self-explanatory. Total expenses on an 80 acre well would be $295,400 and for a 160 acre well, the total expenses would be $330,800.

The next item is the net profit resulting from subtracting the total expenses from the total revenue and the net profit for an 80 acre well would be $30,072 and for a 160 acre well it would be $320,146.

The profit to investment radio, is 0.12 on 80 acre spacing and 1.27 on 160 acre spacing.

Down at the bottom of the Exhibit is a note that the analysis does not consider any dry holes that may be drilled. Estimated dry hole cost if $162,000.

On the basis of these calculations, a producer on 160 acre spacing will support two dry holes while it will take five times the net profit on 80 acre spacing to support one dry hole.

I would like now to refer back to Exhibit 1 in connection with our economics and I will state again for the purpose of comparison, that the rate of recovery for 80 acre spacing is calculated at 89,815 barrels, while the recovery for 160 acre spacing was calculated at 476,788 barrels.

If you would refer to Exhibit 1, the wells are colored in green to the NW of the Pubco Well and the Harding Well. In Sections 4, 5, and 6 of Township 17 South, Range 37 East, versus the wells in Section 5 in the NW corner, shows the total recovery from the B' zone, the same zone that the Harding and Pubco wells are in, to be 60,297 barrels. This won't appear on your graph because our draftsman forgot it.

The next well in Section 5, in the NE/4 of Section 5, shows a total of 58,751 barrels of oil recovered.

The next well in the NW/4 of Section 5 shows a total recovery of 19,647 barrels of oil. These three wells

have all been plugged and abandoned.

The well in the SE/4 of Section 32 shows an ultimate recovery of 421,768 barrels. This ultimate recovery was calculated from extrapolation of production history. However, it has to be pointed out that recovery from the well is from both the B' and the C zone, so we do not feel that it is really comparative with the B zone wells, further up on the map.

In Section 31, close to the center, we have a well there in the NW/4, in the SE corner of the NW/4, which had produced a total of 17,040 barrels of oil before it was abandoned. Then, about two miles north, in Section 19, 37 East, 16 South, in the SW/4 of the Section, we have a well which produced over 100,000 barrels from the B' zone. The well produced a total of 132,597 barrels of oil. This well is still producing at a rate of 7 barrels a day.

To the left of that, just across the Section line in Section 24, 36 East, 16 South, this well produced a total of 4,115 barrels of oil from the B' zone. North of that, in Section 18, the SE/4 of Section 18, we have a well which is still producing 29 barrels of oil per day.

My point here is we have only one well producing from the B' zone which has produced in excess of 100,000

barrels of oil. This would indicate that these would be economic failures in as much as one well on 80 acre spacing would produce, as we have calculated, 89,815 barrels of oil. It is easy to see how four good wells would be required to support one dry hole and these other wells I have been talking about, must be economic failures.

In conclusion, I would like to make three points. First, it is our opinion that one well will effectively, efficiently, and economically drain 160 acres. Two, it is my opinion that 160 acre spacing will permit the drilling of economic wells whereas we have presented information here establishing the fact that 80 acre spacing will result in the drilling of unnecessary and uneconomic wells. Three, it is my opinion that 160 acre spacing development of the Humble City-Strawn reservoir will insure the operators that they can obtain profits even though some dry holes will undoubtedly result, regardless of the spacing which may be chosen.

Q Do you have anything further, Mr. Sanders?

A No, sir.

MR. SPERLING: I would like to offer our Exhibits 1 through 8.

MR. UTZ: Exhibits 1 through 8 will be entered into the record of this case.

(Whereupon, Pubco's Exhibits 1 through 8 were entered in evidence.

MR. SPERLING: I have nothing further.

* * * * *

CROSS-EXAMINATION

BY MR. HINKLE:

Q Mr. Sanders, I refer you to your Exhibit Number 5, I don't believe that you testified how long your well Number 2 was shut-in at point number 4. Do you know how long it was shut-in?

A Yes, 12 hours.

Q Now, in connection with Exhibit 5, I believe you said that this showed a severe pressure loss?

A Yes, sir.

Q And that this indicated good drainage between the two wells?

A That is correct.

Q Isn't it also indicative of a limited reservoir?

A Naturally, any reservoir is limited.

Q I mean a small reservoir. Doesn't it indicate that this is a small reservoir rather than a large reservoir?

A Such could be an indication, however, it also, as I believe our testimony has indicated, shows that this is an extremely permeable section in the vicinity of our well and your well and that such permeability gives real

good pressure communication between the wells whereas in a real tight reservoir, often times you reach 90 to 95 percent bottom hole pressure within the first 100 feet from the well bore under producing conditions.

Q Well, you had this pressure drop when you located your Number 3 well, did you not?

A No.

Q You didn't have it at all?

A No, sir.

Q You knew it was dropping when you drilled the Number 2 well?

A Yes, we had access to Harding information.

Q But you didn't take that into consideration in locating your well as close to the Number 1 well as you did?

A No. I think, as Mr. Causey pointed out, the geology of the situation required that in a new area we locate as close to production as possible within the limits of the statutes of the State.

Q Referring to your Exhibit Number 8, your economic study, now, doesn't this study that you have made in comparing 80 acre spacing to 160 acre spacing, take into consideration or assume that this is a large reservoir?

A Well, the only assumption we made here is that a 160 acre well would have the full 160 acres to develop

porosities of the qualities we have shown.

MR. HINKLE: I think that's all I have.

MR. UTZ: Any further questions?

(No response.)

MR. UTZ: The witness may be excused.

(Witness excused.)

MR. UTZ: Does that conclude your Case, Mr. Sperling?

MR. SPERLING: Yes.

MR. UTZ: You're on, Mr. Hinkle.

* * * * *

RICHARD F. SPENCER,

was called as a witness and, having been already duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HINKLE:

Q Will you state your name, residence, and occupation?

A My name is Richard Spencer, I live in Midland, Texas, and my occupation is an independent consulting geologist.

Q Have you previously testified before the New Mexico Oil Conservation Commission?

A No, I have not.

Q Would you state, briefly, your educational background and experience as a geologist?

A I am a graduate geologist of Texas Tech. I have 14 years experience, including working with Pan American Petroleum.

I am a certified petroleum geologist.

Q What companies have you been with prior to becoming an independent consulting geologist?

A Well, I stated Pan American, Forester, and I have been self-employed for a year and a half.

Q Are you familiar with this area under consideration?

A Yes.

Q And the pools in the vicinity?

A Yes.

Q The NE and East Lovington pools?

A I am very familiar with them.

Q And have you made studies of the well information available in connection with this?

A Yes, my partner and I worked the area in some detail sometime after the Pubco Shipp Number 1 bottomed at 9,162 feet. After that well was bottomed, my partner and I went to the Pubco Corporation, Oil Corporation, to seek a farm-out because we felt this area was quite representative of the Strawn and other zones.

MR. HINKLE: Are the witness' qualifications acceptable?

MR. UTZ: Yes, they are.

Q (By Mr. Hinkle) Have you prepared, or has there been prepared under your direction, certain Exhibits in this Case?

A That is correct.

Q And they have been marked?

A Yes.

Q Referring you to Exhibit 1, what does that show?

A Exhibit 1, as you can see before you Mr. Examiner, is just a regional map. This map shows the outlined fields with the Permean Basin area stratographically located.

Q Referring you to Exhibit 2, will you explain what that is?

A Exhibit 2 is an isopach map of the B' Strawn facies. This is the same zone Mr. Causey referred to earlier, I am referring to the cross-section on the wall.

Q What Exhibit is that?

A That is Exhibit 3. We concur completely as to the stratographic breakdown of the Strawn formation and this map, Exhibit 2, represents the facies of the B' Strawn within the local area. I might just point out that the wells we have designated on the map, the green designations, represent those wells that have penetrated and have produced from the B' Strawn. The blue designations are wells that have penetrated and produced from the B Strawn bank facies. The orange represents wells produced from the C bank facies.

The map is contoured on 25 foot contour intervals. And the map also shows the location of the leases in

in and around the Harding Shipp discovery well in Section 11.

Also on this map, is shown an 80 acre checkerboard on all the acreage Pubco has a leasehold interest within the immediate area.

I will point out initially that in the SW/4 of Section 11, where the discovery well is located, the Harding Shipp Number 1 well, this well was penetrated from 9,162 feet which was the total depth Pubco reached in this well. This well was deepened from that point down to a depth of 11,861 feet into the Atoka.

Under our contract arrangement, farm-out arrangement, we were to deepen this test to a depth where we would be 100 feet below the depth drilled and the acreage was to be designated to the unit, whatever that unit would happen to be, if it was 80 acres, it would be 80 acres.

On completion of the initial well, we would have the option to drill a second test and all continuous development would be on a 120 day continuous development.

Now, we are here today to set up -- to talk about special pool rules for the Humble City-Strawn Pool including provisions for 80 acre units and assignments of all discovery allowables for the Shipp Well Number 1 located in unit K of Section 11, Township 17 South, Range 37 East, Lea County, New Mexico.

This pool arrangement on 80 acre spacing would be similar to the Lovington NE and Lovington East field.

Q They are on 80 acre spacing; are they not?

A This is correct. In our initial discussions with Pubco, this was taken into consideration and it was felt that these would be the probable field rules for the Humble City-Strawn pool.

Q Did your farm-out agreement provide for 80, 40, 160 acre spacing, whatever spacing unit was determined by the Oil Conservation Commission?

A This is correct.

Q But the checkerboard which you show on Exhibit 2 indicates the checkerboard prevailing under the farm-out agreement, if the checkerboard showed 80 acre spacing and the Oil Conservation Commission approved 80 acre spacing; is that right?

A That is correct.

Q Now, I believe you said that you agreed with the cross-section which Pubco has presented, it is the same as you are presenting here?

A Yes.

Q Do you, by these different zones, indicate this is a separate stratographic trap within the Strawn formation or that there is communication between these two zones?

A In focusing our attention now on Exhibit 3 and Exhibit 4,

they are exactly the same wells as Mr. Causey showed on his cross-section with exactly the same designations. I do definitely agree with Mr. Causey in that this is a Strawn formation here. There are probably -- more likely there is vertical separation between each of the stratographic units, the B', B, and C, although these units occur within two to three hundred feet intervals, and were, more than likely, deposited under similar environment. What we are saying here -- reaching back here to Exhibit Number 2, you can see that these zones are very erratic, of a very erratic nature, both horizontally and vertically and you can see by the blue designation on the map over here, that the B bank facies is coming back to the south and west. This facies disappears -- doesn't disappear, but the rock characteristics change and you can see a number of dry holes that have been affected in Sections 16, 17, and 20 in 16 South, 37 East, and the wells down here in Section 19 and Section 24.

What I am saying here, is that each one of these units, each one of these stratographic units, right in here, affect the individual stratographic trap with no particular emphasis being placed on the present day structure.

The 160 acre spacing brought out by Pubco more than

likely would have caused some of these zones not to be drained. As you can see from the dry holes in Sections 19 and 20, the three producing zones within the total Strawn unit are independent of one another. In essence, what I am saying, is that the Strawn being deposited from the same environmental deposition, does have, within it, individual stratographic traps that are very erratic and very difficult to find and this is why Pubco came so close to the initial discovery well. You can pick up new zones, productive, stratographic zones, that come and go over a very short period of time.

For instance, in the cross-section, A and A', between these two wells, the well right here (indicating) produces from B' facies and this well (indicating) produces from the C facies. These two wells are only 2,550 feet apart and it is very possible with 160 acre spacing, that one of those zones may have been missed, especially the C zone.

Q You could have a situation where, if you had 160 acre spacing, you might have one producing well and a good part of the 160 acres might be barren or have no production at all?

A Absolutely. You can see this in Section 20, 16 South, 37 East. Section 20's producing well is located down in the SW/4 of Section 20 and that particular well is

producing from the B facies and it is surrounded by dry holes. There are dry holes in Sections 29, 30, 19, and the one in Section 20. That particular well has produced over 900,000 barrels of oil on 160 acre spacing and it is possible that that 900,000 barrels of oil might have been missed.

Now, granted, this is not in the same zone and it may be within 25 or 30 feet from the producing interval of the Harding Shipp Well, but it is in the same suite of rock deposits and under the same depositional environment which we hope to find productive in the general area of the discovery well.

Q I believe you mentioned previously, that your partnership is Spencer and Hudson and you mentioned the fact that you secured the farm-out from Pubco, what is your relationship to the Harding Oil Company?

A Our relationship has been that we are geologists, and we generate drilling prospects for companies such as Harding. We have a good working relationship with Harding. We offer consultation advice which we have done from time to time over the last year, and this is basically our relationship, primarily that of a consultant.

Q You have made a deal with Harding Oil Company to develop this area on the acreage you will obtain as a

farm-out?

A From our farm-out agreement which was consummated on November 5, 1971, with the Pubco Corporation. We later got approval from the Pubco people to reassign our rights to the Harding Oil Company and Harding assumed our obligations and reentered this well and fulfilled our obligations that we had under the contract.

Q So they are going ahead and performing in accordance with the contract?

A This is correct.

Q Do you have anything else that you would like to discuss?

A I would just like to point out, from a geological standpoint here, that you can see, as I pointed out before, in the SE/4 of Section 11, Pubco's two wells, are as close as they legally can be. Also, they are drilling the Number 3 well up in the NW/4 and our Number 2 well is in the NW/4.

This means there are four wells clustered together and any well that would be drilled beyond these four wells would be a considerable step out with 160 acre spacing. Backing up to the well in Section 19, how hazardous that would be as to picking up these individual zones that might be carrying substantial amounts of oil. We might not find these zones as a result of this wide

step out and I believe that is primarily what I would like to say here. There is no real basis on which to say how large this field will be. From a geological standpoint there is no immediate control over this immediate area, the only point of control we have is in Section 8 and these wells back here (indicating) in the Lovington East pool.

In Section 11, we had one point of control with the Pubco Number 2 well and because of the geological and engineering datum that was withheld from us, there was no way of telling just how large the pool might be.

The datum certainly points out the risk factor by the nature of the deposition of the two cross-sections. These show this is a risky area and there are zones that likely could be missed by wide spacing in the area.

Q If the geological information as shown in Exhibit 2 is correct, it would be a limited field as far as the area extending to the north and south; would it not?

A This is true. Referring back to Pubco's map, you will recall that the area went beyond the zero isopach line and their configuration was not exactly the same as ours. However, there was no way of telling how large the field might be. However, it is our hope that with proper development, we will be able to pick up these other zones, these other thin zones that could be very

elusive and hard to find and that oil may be missed on any other spacing arrangement.

MR. HINKLE: That's all I have on Direct.

MR. UTZ: Any questions?

* * * * *

CROSS-EXAMINATION

BY MR. SPERLING:

Q Mr. Spencer, would you indicate which of the three areas that you have referred to, B, B' and C, appear to have the greatest areal extent insofar as your studies have shown?

A The greatest areal extent as far as continuity is concerned is B', by virtue of the wells colored in green, but as far as reserves of one well, the one located down here (indicating) surrounded by dry holes is out of the C zone. It has produced in excess of 900,000 barrels.

From a reserve standpoint, the blue would be the greatest and this well could have easily been missed on a 160 acre basis.

Q Did you consider development of the East Lovington Pool on 160 acre spacing risky?

A I suspect that 80 acre spacing would have developed and drained what they would have on 160 acres.

Q Do you know what did develop and drain?

A Well, this will come in further testimony.

Q Have you made calculations which would indicate to you the area extent which would be necessary to produce 900,000 barrels?

A No, but that will come, I believe, in later testimony.

Q Do you have an opinion as to the areal extent around the Getty-Monty Number 1?

A The only thing I could show you here would be the development pattern around these wells appear in Sections 17, 16, 20 and 23. These are producing wells with one dry hole.

Q Wouldn't you have to have an area greater than 160 acres in order to justify that volumetric production?

A It would depend on the vertical extent.

Q Have any studies that you have seen or datum that you have seen, indicated the vertical extent of any of these zones?

A You can certainly see from this (indicating) that this area could easily have been missed.

Q Do you feel the drilling area is in excess of 160 acres here (indicating)?

A I couldn't say.

Q At least 160 acres?

A At least 80 and maybe 160 at most.

Q Now, you have referred to the farm-out agreement between Pubco and your partnership, isn't it true that the

agreement contemplated not only 80 acre spacing, but also 160 acre spacing and as high as 320 acres?

A This is correct.

Q So we are not talking about contract provisions, limiting the acreage to 80 acres?

A That's correct. We initially talked with Orin Crane and he was later replaced by Dale Harrison and we talked about 80 acre spacing in these two fields, however, we felt it would not be good business to draw up a contract that would not include 160 and 320 acre spacing.

Q You were really talking about 160 acres, were you not?

A No, we weren't. We could not have been talking about 160 acres. Based on what you see up here (indicating) we didn't rule it out up here (indicating).

Q You spoke about the difficulties in finding these other possible producing zones within the Strawn and the possibility of missing them on a 160 acre basis; isn't that true? From a volumetric standpoint, isn't it true that you might have geological success so far as locating one of these was concerned and, at the same time, have economic disaster?

A This is very true, but I think in answering that question, if you look at the Pubco development, you will see the proximity to this well here definitely points out they considered the economic potential of the area,

but certainly considered the risks involved here, and also, the other advantages in the way of additional zones, that I tend to believe extend out of this area.

Q Do you think 160 acre spacing eliminates the development of these other zones?

A I think it would be hazardous with 160 acre spacing. We feel that the dry hole here (indicating) would have prohibited us and Pubco from developing other locations such as these (indicating). In Section 16, you will see the dry hole in the SW/4, and then again in Section 19 you will see a dry hole in the SW/4, then again in Section 30 in the NE/4, and then again in Section 29 in the NW/4.

Any one of these dry holes might have prohibited additional drilling in the area and I tend to think that if additional dry holes had been drilled, some of these additional wells might never have been developed and that would have slowed the Strawn development in the area.

Q Do you have an opinion as to whether or not one well in this area as it is presently completed within the Humble City Pool would drain in excess of 80 acres?

A No, I really don't. I believe our engineer will testify to that.

MR. SPERLING: That's all I have.

MR. UTZ: Any other questions?

MR. HATCH: There has been, I believe, reference made to 80 acre spacing in the East Lovington Pool, I am not sure that is correct.

Would you have any exception to the Examiner studying compression records to see what the correct spacing is in the East Lovington Pool?

MR. HINKLE: I would certainly recommend that.

MR. UTZ: We will take administrative notice.

(Witness excused.)

* * * * *

ROY C. WILLIAMSON,

was called as a witness and, having been already duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HINKLE:

Q Would you state your name and residence?

A I am Roy C. Williamson, Jr., president of Bailey, Sipes & Williamson, of Midland, Texas.

Q Have you been employed by the Harding Oil Company as a consultant in this case?

A Yes, I have.

Q Have you previously testified before the Oil Conservation Commission?

A I have.

Q And have your qualifications as a petroleum engineer been accepted as a matter of record?

A Yes, my qualifications are a matter of record with the Commission.

Q Have you, since your employment, made an independent study of the Humble City-Strawn Pool?

A Yes, sir.

MR. HINKLE: Are the witness' qualifications acceptable?

MR. UTZ: Yes, they are.

Q (By Mr. Hinkle) Have you prepared or has there been prepared under your direction, certain Exhibits for introduction in this case?

A Yes, sir, there have been.

Q Referring you to Exhibit Number 5, would you explain what this shows?

A Exhibit 5 shows the logs from the four wells that were pointed out in Exhibit Number 2. These are located in Sections 16, 17, 20, and 21 of Township 16 South, Range 37 East. Mr. Spencer has referred to the fact that the wells in Sections 16, 17, and 20 are producing from the Strawn section, and the well in Section 21 is a dry hole.

I would like to direct your attention to Exhibit Number 5 which shows the perforated intervals of pay

development for the three producing wells. We can see here that the State C Number 2, which is in Section 17, has a perforated interval. These are all neutron porosity logs. The well in Section 16 is perforated.

The well in Section 20 has a longer perforated interval and pay zone.

In Section 21, which was the dry hole, we see that the pay has failed to develop and this, again, just points out the fact that we do have very rapid change in porosity and permeability development over very short distances in this field.

The three wells that are producing are all producing in excess of 200,000 barrels of oil as of the first of 1972. I might point out that the well in Section 24, is rather spotty with an accumulative production of 4,115 barrels of oil. The well in Section 19, the Clinton-Monty State Number 1 shows 113,000 barrels which again, shows the rapid change in the producing characteristics over very short distances. In Section 20, we have the Getty well, which has been referred to before and which has produced over 900,000 barrels of oil.

Right to the west of it, we have a dry hole and to the SW of it another dry hole. The nearest producer in Section 19, is rather spotty and has produced about

15,000 barrels of oil as of the first of the year.

Calling your attention down to the Lovington East field, in Section 4 of Township 17, South, Range 37 East, we have the Getty State U Number 1 that has produced about 19,600 barrels of oil before being temporarily abandoned and plugged back to the Paddock. In Section 32, we have the Getty State P Number 1 which has produced 419,000 barrels of accumulated production as of the first of the year.

So we can see that we could have very marked changes in our porosity and permeability development and these wells also exhibited producing characteristics that were very close, one to the other.

Q Referring you to Exhibit Number 6, would you explain what that is?

A Exhibit Number 6 is a copy of the acoustic log on the Shipp Number 1 well. I have depicted sections here that include what has been determined to be pay sections at short, perforated intervals.

I have shown here, and it's a little hard to see, but I have assumed the minimum porosity below which production will not occur as being 4 percent.

In other words, we have a 4 percent porosity cut-off line and the average porosity line as exhibited by the sonic log, is approximately 4.8 percent. We understood

that Pubco had cored their Number 2 Shipp, but the information was not available to us, so I needed to make some calculations utilizing porosities that were a little more representative because I felt this one here was low.

I utilized the sidewall neutron logs, mainly because they were the best logs available, and they were porosity logs from the wells in Sections 16, 17, and 20.

In analyzing these logs, I arrived at an average porosity of approximately 8 percent which was used in my calculations. I see now, from the datum that this was probably high by some 25 percent.

Q I refer you know to Exhibit Number 7, will you explain that?

A Exhibit 7 is a comparison of the reserves calculated by the volumetric method. The fluid samples on this well indicate a bubble point of 2893,000 pounds and an accumulative production of 10,090.

On Exhibit 7, bottom hole pressure was again measured and was found to be 4,188 pounds and from eliciting data from the fluid analyses, we were able to determine the formation volume factor that was initially representative of the oil formation and was representative of a pressure of 4,188 pounds.

Utilizing the simplified version above the bubble point I was able to calculate from available data, the amount of stock tank oil originally in place in the reservoir. The figure was calculated to be 741,609 barrels of oil. Without having better datum, I just assumed for estimation purposes, that the recovery would be approximately 20 percent and Pubco has shown it to be 16.67 percent, I believe.

I might point out two things that might alter the calculations of reserves. It is very possible that, in view of the fact we do have bugular porosity we should have matrix porosity due to the fact that the pressure buildup has been so rapid.

It is my feeling that the rapid pressure buildup is probably occurring from the bugular porosity of the reservoir and the pressure measured here probably is pressure contribution from the bugular porosity of the reservoir, as opposed to the matrix porosity.

So, if we had a longer shut-in pressure, we might show that the pressure drop was not quite as severe as we have observed here.

Also, the fact that we have bugular porosity, I think our recovery factor could possibly be somewhat higher than the standard 20 percent. I think the datum indicates that we have a very limited reservoir and

indicates that this field is right in line with what we have seen in the Lovington East and Lovington Northeast fields where those reservoirs have indicated that they are somewhat limited in size.

Referring back to Exhibit Number 1, I think reference has been made to the three wells in Sections 6, 5 and 4 of 17 South, 37 East. These wells are essentially drilled on 160 acre spacing and the well recoveries shown indicate to me, that they are not draining the acreage. We don't know what they are draining because they are all uneconomical wells so it is immaterial whether they are on 40, 80 or 160 acre spacing.

They are not draining a very large area and just because you have water spacing, it doesn't mean you can generate more reserves. So I think we need to look at the basic requirements in view of the reservoir characteristics.

Referring back to Exhibit Number 7, I think that I mentioned before that the sonic log on the Shipp Number 1 indicated 4.8 porosity and the average porosity from Pennsylvanian oil wells, was about 8 percent. I felt 8 percent was near right, but was probably high; but on the other hand, 4.8 was low. Anyway, that was the number I utilized on my calculations.

Again, I estimated the recovery of stock tank oil

to be placed at 20 percent. Utilizing the original formation volume factor, I made a volumetric calculation of oil in place per acre foot and found it to be 52 barrels of oil per acre foot.

My calculations of the net pay from the sonic log of the Shipp Number 1 well was substantiated not only by the log, but from the time log which indicated that we do have rock that is more easily drillable here for, I would suppose, greater porosity.

I determined from this 46 feet of net pay and I then calculated the recoverable barrels of oil on an 80 acre basis and on a 40 acre basis. On a 40 acre basis, the total was 95,000 barrels and on 80 acres, 191,000 barrels.

Now, if we assume that the average porosity in the area of the Shipp Number 1 well is approximately 25 percent too high, and that would be indicated by the Pubco data, that would reduce the 80 acre drainage by 25 percent and put it at 150,000 barrels which agrees with the 148,000 barrels figure.

So this data indicates that we are dealing with a reservoir that might not be bigger than 80 acres to start with. I hope, for the sake of the operators, that it proves to be larger, but the data on hand to date does not indicate that it should be larger.

We could take the 80 acre total and multiply by two and show we would get 400,000 barrels by draining 160 acres, but I think the data that has been calculated indicates that we do not have a reservoir that big.

I would say that it doesn't really matter and that it is immaterial if you don't have a reservoir larger than 80 acres, you couldn't expect to drain an area larger than 80 acres.

Q Is that all you have in connection with Exhibit 7?

A I believe so.

Q Referring you to Exhibit Number 8, would you explain that?

A Exhibit 8 is a study of the economic development. In arriving at item number 1, we utilized $3.44 per barrel of oil and $0.22 per MCF of gas. I utilized an average of 1,000 cubic feet per barrel of oil, which is probably a little low.

I estimated taxes and operating costs and ran this out mathematically and showed that to pay out for the drilling and preliminary tests, the taxes and operating costs, it would require approximately 90,000 barrels of oil.

If we reduced our average porosity to 6 percent instead of the 8 percent, it would show that on 40 acre spacing it would be uneconomical.

On 80 acre spacing, I think we probably have a reasonable prospect, we certainly would get our money back, plus some more and changes are that we might develop more reserves by means of two things. One, the recovery might be greater than 20 percent and this would be a major thing that I think we might see. And, also, the pressure that we have measured might be a little higher than we think, at least this is my opinion. Of course, if the pressure is higher, we should show more oil in place.

Now, I might mention that the pressure taken in the Shipp Number 1 was after production of some 10,900 barrels of oil. At that time, calculations should have been made as to what the volumetric oil in place should have been.

Q Do you have any comments with respect to any of the Exhibits introduced by Pubco?

A I might make a comment on Exhibit Number 5, their Exhibit Number 5. Again, I believe the location of their well Number 3 would probably be just about on this line (indicating), I'm not sure of that though.

This would indicate it would be sharing the drainage area that the Harding Number 1 is sharing and which would indicate that we now have essentially three wells which might be sharing recoverable reserves of

150,000 barrels of oil.

Q What conclusions have you come up with as a result of your studies in this area?

A It is my conclusion that 80 acre proration units would be preferable in developing the field because of the erratic nature of the porosity and permeability. This erratic nature would cause risks in getting dry holes and these risks would escalate very rapidly on 160 acre space outs.

The rapid changes would not only affect drainage, but actual pay development. We have said that these wells, in this area, do change very rapidly and we have seen where a well will recover a lot of oil right next to a dry hole.

The communication between the Harding well and the Pubco well is obviously very good and I think that the risk that is inherent in this reservoir was exhibited by Pubco in its desire to drill their well as close to the discovery well as they could get.

With the risks involved in this reservoir, I probably would have done just what they did, get as close to the producer as I could because I don't want to drill a dry hole. I would rather share the reservoir with someone than get a dry hole.

Q Do you have any further conclusions?

A You have good rock development in the reservoir and the economics of 80 acre spacing will be very adequate. If you did not have good rock development the fact you drilled on 160, or 320 acre spacing would not help you economically because, with poor rock development, you are not going to be able to drain a very large area anyway.

Q Is it your opinion, then, that the adoption of temporary 80 acre spacing will be in the interest of conservation, of hydro carbons and the prevention of underground waste?

A Yes, sir.

Q Would adopting 160 acre spacing protect correlative rights?

A I would say no, because you might miss, completely miss, the development of a porosity or permeability zone.

Q Do you have anything else that you would like to add?

A I think that possibly the Exhibit of Pubco, Pubco's Exhibit Number 5, that indicated bottom hole pressure that we do see that apparently the pressure is beginning to turn or curve and this could possibly indicate that we are seeing some pressure coming out from the matrix of the reservoir which might support the fact that we have a little higher pressure than we think we do, I certainly hope so, because that would mean there would

be more reserves to be produced.

MR. HINKLE: We would like to offer Exhibits 1 through 8.

MR. UTZ: Exhibits 1 through 8 will be entered into the record of this case.

(Whereupon, Harding's Exhibits 1 through 8 were entered in evidence.)

MR. UTZ: Any questions?

* * * * *

CROSS-EXAMINATION

BY MR. SPERLING:

Q Mr. Williamson, referring again to Exhibit Number 2, I believe it is, and the three producing wells that you referred to and the one dry hole which are in the Lovington Northeast Pool area, do you have an opinion as to the extent of the area that those wells are draining and have drained?

A Yes, I have. Look at this (indicating) and it is my opinion that those wells are very capable of obtaining a production that they had exhibited from 80 acre spacing.

Now, this line will show what the pay interval is. In other words, there has not been sufficient testing in those wells to indicate how far the pay zone extends below the pore formation.

So, by referring to Exhibit 5, we can see the perforated intervals are in the top of the indicated porosity zone.

In considering the volume of oil produced from some of those that have been drilled on 80 acres -- well, I think the highest -- well, I don't think we are looking for 900,000 barrels -- naturally, we will be looking for it.

Q Even on 160 acre spacing, it could occur?

A What about 160 acres?

Q It could occur on 160 acre spacing?

A Oh, yes.

Q Now, if this -- if your conclusion concerning the extent of this reservoir as possibly being confined to 80 acres is true, should not the next step be taken in order to confirm whether it is or not?

A If we determine this from subsequent pressures, I, personally, if I were an operator spending my money, wouldn't drill another well anywhere here before I got a large pressure buildup. I feel it is a greater risk stepping out on a 160 acre basis because you are very likely to miss part of the reservoir these wells are producing from.

This well was not taken to the Strawn zone by Pubco, obviously they did not feel the well justified going any

deeper to the Strawn.

Q I believe you already reduced your volumetric calculations some 25 percent?

A Yes.

Q Now, in arriving at your net pay figure, how did you conclude there were 46 net feet of pay when there seems to be an indication of a maximum of 34 feet?

A I took all the net pay above the 4 percent porosity cut off which was confirmed by the log on the Shipp Number 1.

Q Would you consider this core information to be more reliable?

A I would suppose it would be, yes.

Q What kind of scale did you use for the 4 percent cut off in porosity?

A What kind of scale?

Q Yes, porosity scale.

A I calculated the matrix velosity for the reservoir and used the time equivalent equation to calculate what 4 percent would be.

Q Now, if I understood your testimony correctly, I believe you suggested temporary 80 acre spacing. What exactly do you mean by that?

A Well, as I understand it --

MR. HINKLE: That is what the Application is for,

temporary.

Q (By Mr. Sperling) Well, are you suggesting the possibility that, at some time in the future, this be expanded to 160 acre spacing?

A I have no feel for that, as far as I am concerned, permanent 80 acre spacing rules could be adopted.

Q Do you think that Pubco's Exhibit 5 shows that the Harding well is draining in excess of 80 acres?

A It shows 90.4 acres.

Q Do you agree with that?

A If we assume the reservoir is homogeneous within the circle, yes. If it is not homogeneous, we could have a limited reservoir that is smaller than 90.4 acres.

Q But you don't have any evidence of that?

A No, there is none in existence.

Q Did your studies indicate the presence of fractures insofar as these zones are concerned in the Strawn and possible communication between them?

A I have no data as to fracture conditions in the reservoir, perhaps the core analysis would show it.

Q Mr. Williamson, on your Exhibit Number 2, I notice you have a location shown to indicate your Number 2 well in Section 11?

A Yes.

Q What are your plans as to the drilling of that well?

A I will defer that to the operator.

MR. HINKLE: The next witness will cover that.

Q (By Mr. Sperling) Do you know about the Pubco well drilling, the well just to the north of your location?

A I was told that it was around 9,000 feet, that's all the information I have had to date.

MR. SPERLING: I have no further questions.

MR. UTZ: Any other questions?

(No response.)

MR. UTZ: If not, the witness may be excused.

(Witness excused.)

* * * * *

JAMES JUSTICE,

was called as a witness and, having been already duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HINKLE:

Q State your name, residence and position, please.

A My name is James O. Justice; my residence in in Dallas, Texas; and I am chairman of the board and chief executive officer of Harding Oil Company.

Q What is the relationship between Harding Oil Company and the Spencer and Hudson partnership?

A We have a consulting arrangement and we work with them on a number of different prospective drilling opportunities

and took from them, at their recommendation, the Pubco farm-out that had been made to them previously in November of last year.

Q And you have assumed responsibility for complying with the Pubco contract?

A Yes.

Q And Harding Oil Company deepened the Pubco well and made the discovery?

A Right, there was a good opportunity from three standpoints, one, the potential of the reservoir; two, the opportunity for developing acreage significant to us, and third, the opportunity for return.

Q State, briefly, how the Harding Oil Company is operated.

A Basically we obtain prospects from consulting geologists of which Spencer and Hudson are major contributors. We offer these through an investing public.

Q Have you given notice to the public company of your attention of drilling the Number 2 well in the time provided by the farm-out agreement?

A Yes.

Q What procedure are you following?

A Shortly after completion of the Shipp Number 1 well we prepared our S-10 registration and submitted it to the Security and Exchange Commission for their review. There is a 120 day clause associated with this and we

recognized that because of the time this would be difficult to achieve.

Q Have you filed with the Security and Exchange Commission, a plat or plans for development not only of the Number 2 well, but of the acreage in general?

A Yes, in our initial registration with the Security and Exchange Commission, we filed for the development of the acerage on 80 acre spacing if it were oil and 320 spacing if it were gas.

This action was taken by us not only from the recommendations of the consulting geologists, but also on our own house investigation. We felt that, as a result of examining the area, from the way it drilled and the way it drained, that producing on 80 acres presented the optimum kind of spacing for the area. It was on that judgment and on that basis that we went ahead with the 80 acre proposition.

Q Now, if the Commission should approve 160 acre spacing, would this be difficult for you concerning your Application with the Security and Exchange Commission?

A There would be several adverse effects, a significant time delay would be associated with it, and it would require refinancing.

It would also require changing the ground rules under which the offers would be made. This would be a

difficulty not only with the Security and Exchange Commission, but I think it would put our contract in jeopardy so far as our ability to meet the time requirements of the contract are concerned.

Q Do you have any intention after drilling the Number 2 well, of drilling additional wells in the area?

A Yes, we have applied -- we have made application to drill two additional wells. These applications are being held pending the outcome of this hearing.

Q Can you tell the locations of those wells?

A The locations are shown on Exhibit 2, and they are designated the numbers 3 and 4 wells. There's one to the east and one to the northwest.

Q And, if 80 acre spacing is adopted, you intend to proceed on the basis outlined and drill these wells?

A Yes, that is correct.

Q From all the information which has been available to you and from employing consulting firms, have you formed any conclusions as to how the area should be developed?

A Yes.

Q From a conservation standpoint?

A Yes. First of all, we feel the original assessment and conclusions have been confirmed.

Secondly, we feel that it would be in the interest of our investors to continue on 80 acre spacing.

Third, we feel that in the interest of conservation, it will effectively and efficiently drain the acreage based again on the assessments obtained form the consulting engineers.

Fourth, we feel that it will also preserve the correlative rights of others in the area, that 160 acre spacing, in our view, would jeopardize.

Q Have you any objections, or any favorable comments from any operators in the area concerning your Application for 80 acre spacing?

A We have gotten letters of support from several people in the area; Mr. H. L. Brown, Atlantic Richfield, and I think, probably one other who may have communicated by telegram or letter supporting 80 acre spacing.

Q Are these from owners who have acreage in the area that are supporting your Application?

A Yes, sir.

Q Do you have anything further?

A Nothing other than -- I realize these business aspects are not really germane to the Commission's deliberations, nonetheless, I wanted to take the opportunity to point them out because, in our perspective, they are significant factors that influence our operations. We feel that from a business aspect there is good and sufficient reason for continuing on 80 acre spacing for

the reasons that have been outlined here today and which support our initial judgment in making this particular arrangement.

MR. HINKLE: We understand there have been letters or telegrams sent to the Commission.

MR. HATCH: There is a telegram from Pennzoil, a telegram from Atlantic Richfield, both in support of Harding's Application. There is also a letter from Texas Independent Petroleum supporting Harding Oil Company's Application.

MR. HINKLE: I believe that's all we have.

MR. UTZ: I would like to ask a question in regard to the Number 2 well. How much longer do you have to get the approval of the Security and Exchange Commission to complete the well?

THE WITNESS: We have made application and expect comment this week from them.

MR. UTZ: Any other questions?

* * * * *

CROSS-EXAMINATION

BY MR. SPERLING:

Q Did you have separate registration for each of these prospects, Mr. Justice?

A We have filed separately on the first and second, on the subsequent ones, we might not.

Q What are the economic risks to Harding under your

arrangement?

A We have economic risks in terms of the cost of the acreage that we are dealing with here, along with the initial acquisition risk. We have legal fees and risks in terms of meeting our contract obligations. Some of the risks are more than economic.

Q Well, assuming the cost of the well to be $300,000, how much of that represented investment by Harding?

A I can't give you the precise figure off the top of my head, but our investment in that would be a small percentage of the total investment.

Q What is your participation in production?

A We will participate in production by less than 20 percent.

Q So, in effect, the wells are being paid for by your investors?

A Yes.

Q And you receive a 20 percent interest without a substantial investment in the cost of drilling the well; is that a fair statement?

A I think that's a fair statement, yes.

Q Referring to the contract and the acreage that you have under the Pubco farm-out, you have a double number of locations available to you on 80 acre spacing -- or to your investors, than you would have on 160 acre spacing?

A I haven't counted them up, but it seems logical to say that.

MR. SPERLING: I think that's all I have.

MR. UTZ: Any other questions?

(No response.)

MR. UTZ: If not, the witness may be excused.

(Witness excused.)

MR. UTZ: Does that complete your case?

MR. HINKLE: That concludes our case.

MR. UTZ: Any statements?

MR. BUELL: On behalf of H. L. Brown, Jr., we would like to support the Harding Application and oppose the Pubco Application.

On the 80 acre spacing, we feel it would be prudent to require drilling either in the SE/4 Quarter or the NE/4 Quarter of any section.

MR. UTZ: The northeast?

MR. BUELL: The NE and the SW, I'm sorry.

MR. UTZ: Anything further?

MR. SPERLING: I would like to say just briefly, Mr. Examiner, that we feel that the data which is based on reliable information and not on speculative data which was presented concerning the reservoir, certainly supports the Application of Pubco for 160 acre spacing.

While it is true that there are only two wells

presently drilled and completed in the pool, the information which is available at this time from the standpoint of reservoir information is much more abundant than any other two well fields I have ever seen before. I think this information shows conclusively that it would be economically prudent to develop this field on 160 acre spacing.

MR. HINKLE: The well was deepened on information given to Harding by Pubco which showed on its face that this was possibly a very limited area. It has been brought out here in testimony, that drilling in the Strawn area in the vicinity of the northeast and east areas have been very erratic and it is clear that this is a stratographic formation or pool and that you can have a dry hole right next to a producer.

I think that in summing up all the evidence together that has been introduced by both sides, would indicate that it is a limited reservoir and I think that Roy Williamson's testimony shows very definitely that he wouldn't even advise an operator to drill another well if the pressure continues to drop. I don't think the Commission can assume here that the reservoir has sufficient development to justify 160 acre spacing, at this time.

So I believe the thing to do at this time would be for the Commission to adopt temporary 80 acre spacing rules on the basis of one year and to take a look and see what develops

because it has been indicated that there are going to be several other wells drilled in the meantime.

MR. SPERLING: The obvious answer to that is, you can't undrill wells that are already drilled.

MR. UTZ: Any other statements?

(No response.)

MR. UTZ: If not, the case will be taken under advisement.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, RICHARD E. McCORMICK, a Certified Shorthand Reporter, in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings to the best of my knowledge, skill and ability.

Richard E McCormick

CERTIFIED SHORTHAND REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4748 heard by me on August 28, 1972.

New Mexico Oil Conservation Commission

I N D E X

E X H I B I T S

APPLICANT'S	OFFERED	ADMITTED
PUBCO PETROLEUM CORPORATION		
Exhibit 1	6	42
Exhibit 1-A	7	42
Exhibit 1-B	14	42
Exhibit 2	26	42
Exhibit 3	27	42
Exhibit 4	28	42
Exhibit 4-A	30	42
Exhibit 5	31	42
Exhibit 6	34	42
Exhibit 6-A	35	42
Exhibit 7	37	42
Exhibit 8	38	42
* * * * *		
HARDING OIL COMPANY		
Exhibit 1	47	71
Exhibit 2	47	71
Exhibit 3	47	71
Exhibit 4	49	71
Exhibit 5	60	71
Exhibit 6	62	71
Exhibit 7	63	71
Exhibit 8	67	71

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

GOVERNOR
BRUCE KING
CHAIRMAN

LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

July 17, 1972

Mr. James E. Sperling
Modrall, Sperling, Roehl, Harris & Sisk
Post Office Box 2168
Albuquerque, New Mexico 87103

Re: Case No. 4748
Order No. R-4337
Applicant:

PUBCO PETROLEUM CORPORATION

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Copy of order also sent to:

Hobbs OCC x
Artesia OCC
Aztec OCC

Other Mr. Clarence Hinkle, Mr. Sumner Buell

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 4748
Order No. R-4337

APPLICATION OF PUBCO PETROLEUM
CORPORATION FOR SPECIAL POOL
RULES, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on June 28, 1972, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 17th day of July, 1972, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Pubco Petroleum Corporation, seeks the promulgation of special rules and regulations for the Humble City-Strawn Pool, Lea County, New Mexico, including provisions for 160-acre spacing units and wells to be located within 150 feet of the center of any quarter-quarter section.

(3) That the evidence presented at the hearing disclosed that the wells completed in the subject pool to date have experienced a rapid decline in bottom-hole pressure which would indicate that the pool reserves are either extremely limited or the area of drainage is very small or both.

That the evidence indicates that no well in the pool would have 160 productive acres to be dedicated to it.

(4) That the applicant has not established that the wells in the Humble City-Strawn Pool can efficiently and economically drain and develop 160 acres or that the establishment of special rules and regulations providing for 160-acre spacing units, even on a temporary basis, would prevent the economic loss caused by the drilling of unnecessary wells, avoid the augmentation of risk arising from the drilling of an excessive number of wells, prevent reduced recovery which might result from the drilling

of too few wells, or otherwise prevent waste or protect correlative rights.

(5) That the subject application should be denied.

IT IS THEREFORE ORDERED:

(1) That the subject application is hereby denied.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

BRUCE KING, Chairman

ALEX J. ARMIJO, Member

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

S E A L

dr/

748.
Hearing 6-28-72
Rec. 6-29-72.

Denies the 160 Ac. Spacing request of Pubco.

1. There is little reason to believe the pool covers 160 Acres ~~Acres~~ Evidence is that it would cover the 640 to be dedicated to the 4-160 Ac. units, that would be dedicated to the 4 wells drilled or being drilled now.

2. The pool is now actually developed on 40 Acres.

DOCKET: EXAMINER HEARING - WEDNESDAY - JUNE 28, 1972

9 A.M. - OIL CONSERVATION COMMISSION CONFERENCE ROOM, STATE LAND OFFICE BUILDING - SANTA FE, NEW MEXICO

The following cases will be heard before Elvis A. Utz, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 4735: (Continued and readvertised from the June 7th examiner hearing)
Application of El Paso Natural Gas Company for capacity production, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Rules 14 (A), 15 (A), and 15 (B), of the General Rules and Regulations for the prorated gas pools of Northwest New Mexico, to produce six wells located in Sections 29, 30, 31, and 32 Township 32 North, Range 9 West and Section 36, Township 32 North, Range 10 West, Blanco-Mesaverde Pool, San Juan County, New Mexico, at full capacity for approximately one year from February 1, 1972.

Applicant further seeks authority to offset any over-production accrued to the above-described six wells during the one-year period by underproduction attributable to any underproduced wells or marginal wells located within the participating area of the San Juan 32-9 Unit.

CASE 4739: Application of Texas Pacific Oil Company for rededication of acreage, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to dedicate the 160-acre non-standard gas proration unit in the Jalmat Gas Pool comprising the NW/4 of Section 1, Township 23 South, Range 36 East, Lea County, New Mexico, simultaneously to its Emery King "NW" Wells Nos. 1 and 4 located, respectively, in Units E and F of said Section 1 and to produce the allowable for the unit from either well in any proportion.

CASE 4740: Application of Amoco Production Company for downhole commingling, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks authority to commingle gas and condensate production from the Flora Vista-Gallup and Basin-Dakota Pools in the wellbores of its L. C. Kelly Wells Nos. 3 and 5 located, respectively, in Unit F of Section 4 and Unit I of Section 3, Township 30 North, Range 12 West, San Juan County, New Mexico.

CASE 4741: Application of Robert, Koch & Cartwright for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Morrow formation underlying the W/2 of Section 16, Township 19 South, Range 25 East, Eddy County, New Mexico.

(Case 4741 continued)

Said acreage to be dedicated to a well to be drilled 1980 feet from the North line and 660 feet from the West line of said Section 16. Also to be considered will be the costs of drilling said well, a charge for the risk involved, a provision for the allocation of actual operating costs, and the establishment of charges for supervision of said well.

CASE 4728: (Continued from the June 7, 1972, Examiner Hearing)
Application of Texaco Inc. for special pool rules, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the promulgation of special pool rules for the East Weir-Tubb Pool, Lea County, New Mexico, including provisions for 80-acre proration units and a limiting gas-oil ratio limitation of 4000 cubic feet of gas per barrel of oil.

CASE 4742: Application of Tenneco Oil Company for dual completions, McKinley County, New Mexico. Applicant, in the above-styled cause, seeks authority to complete its Well No. 12 located in Unit B of Section 13, Township 17 North, Range 9 West, McKinley County, New Mexico, in such a manner as to inject gas into Lone Pine-Dakota "D" Oil Pool through tubing and produce gas from the "A" zone of the Dakota formation through the casing-tubing annulus. Applicant also seeks authority to complete its Well No. 13 located in Unit F of said Section 13 in such a manner as to produce oil from the Lone Pine-Dakota "D" Oil Pool through tubing and gas from the "A" zone of the Dakota formation through the casing-tubing annulus.

CASE 4743: Application of Tenneco Oil Company for pool contraction, redefinition of a pool and special pool rules, San Juan County, New Mexico. Applicant, in the above-styled cause, seeks to contract the horizontal limits of the Basin-Dakota Pool by deleting therefrom all of Section 17 and 20, Township 21 North, Range 8 West, San Juan County, New Mexico. Applicant further seeks to redefine the Snake Eyes-Dakota "D" Oil Pool as a gas pool with horizontal limits comprising the above-described Sections 17 and 20. Applicant further seeks the promulgation of special pool rules for the redefined pool including a provision for 320-acre spacing.

CASE 4744: Application of Yates Petroleum Corporation for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Morrow formation underlying the E/2 of Section 8, Township 19 South, Range 25 East, Eddy County, New Mexico. Said acreage to be dedicated to applicant's Johnston "BE" Well No. 1 located 330 feet from the North and East lines of said Section 8. Also to be considered will be the costs

(Case 4744 continued)

of drilling said well, a charge for the risk involved, a provision for the allocation of actual operating costs, and the establishment of charges for supervision of said well.

CASE 4745: Application of Yates Petroleum Corporation for pool redefinition and special pool rules, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks the redefinition of the Penasco Draw San Andres-Yeso Pool, Eddy County, New Mexico, as an associated oil and gas pool. Applicant further seeks the promulgation of special rules for said associated pool, including provisions defining a gas well as one producing with a gas-liquid ratio of 10,000 or more cubic feet of gas per barrel of oil, a gas-liquid ratio limitation for oil wells of 3,000 cubic feet of gas per barrel of oil, and 320-acre spacing units for gas wells. Applicant further seeks authority to commingle on the surface gas production from various wells prior to metering and to report said gas production on a lease basis. Applicant further seeks authority to commingle on the surface all casinghead gas prior to metering and to allocate said casinghead gas to the various wells on the basis of gas-oil ratio tests.

CASE 4746: Application of Mobil Oil Corporation for an unorthodox well location and amendment of Order No. R-2914, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to drill a producing well at an unorthodox location 1450 feet from the North line and 70 feet from the West line of Section 19, Township 18 South, Range 34 East, in the E-K Queen Waterflood Project Area authorized by Order No. R-2914. Applicant further seeks a procedure whereby additional production and injection wells at orthodox and unorthodox locations may be approved administratively.

CASE 4747: Application of Union Texas Petroleum, a Division of Allied Chemical Corporation for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests below the base of the Devonian formation underlying the N/2 of Section 33, Township 25 South, Range 37 East, Crosby Field, Lea County, New Mexico. Said acreage to be dedicated to its well to be located 1650 feet from the North line and 2310 feet from the East line of said Section 33. Also to be considered will be the costs of drilling said well, a charge for the risk involved, a provision for the allocation of actual operating costs, and the establishment of charges for supervision of said well.

CASE 4748: Application of Pubco Petroleum Corporation for special pool rules, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the promulgation of special pool rules for the Humble City-Strawn Pool, Lea County, New Mexico, including provisions for 160-acre proration units and wells to be located within 150 feet of the center of any quarter-quarter section.

CASE 4749: Application of Harding Oil Company for a discovery allowable and special pool rules, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the promulgation of special pool rules for the Humble City-Strawn Pool, Lea County, New Mexico, including a provision for 80-acre proration units and for the assignment of an oil discovery allowable to its E. D. Shipp Well No. 1 located in Unit K of Section 11, Township 17 South, Range 37 East.

CASE 4750: Application of Cities Service Oil Company for an unorthodox location, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to drill a producing well in its Southeast Maljamar Grayburg-San Andres Unit Waterflood Project Area at an unorthodox location 1155 feet from the South line and 1385 feet from the East line of Section 29, Township 17 South, Range 33 East, Maljamar Pool, Lea County, New Mexico. Applicant further seeks a procedure whereby additional injection and production wells within the project area at unorthodox locations may be approved administratively.

CASE 4751: Application of Sun Oil Company for pool extension, Lea County, New Mexico. Applicant, in the above-styled cause, seeks the extension of the horizontal limits of the Lusk-Morrow Gas Pool, Lea County, New Mexico to include all of Sections 15 and 16 of Township 19 South, Range 32 East.

CASE 4752: Application of Claude C. Kennedy for permission to flare casinghead gas, McKinley, County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Order No. R-4070, to flare casinghead gas produced by his BSK Edna Well No. 1 located in Unit F of Section 8, Township 17 North, Range 8 West, Lone Pine Dakota "D" Pool, McKinley County, New Mexico.

J. R. MODRALL
JAMES E. SPERLING
JOSEPH E. ROEHL
GEORGE T. HARRIS, JR.
DANIEL A. SISK
LELAND S. SEDBERRY, JR.
ALLEN C. DEWEY, JR.
FRANK H. ALLEN, JR.
JAMES P. SAUNDERS, JR.
JAMES A. PARKER
JOHN R. COONEY
KENNETH L. HARRIGAN
PETER J. ADANG

DALE W. EK
DENNIS J. FALK
FARRELL L. LINES
ARTHUR D. MELENDRES

LAW OFFICES OF
MODRALL, SPERLING, ROEHL, HARRIS & SISK
PUBLIC SERVICE BUILDING
P. O. BOX 2168
ALBUQUERQUE, NEW MEXICO 87103

JOHN F. SIMMS (1885-1954)
AUGUSTUS T. SEYMOUR
(1907-1965)

TELEPHONE 243-4511
AREA CODE 505

June 6, 1972

Case 4748

Mr. George Hatch
Attorney
Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: Pubco Petroleum Corporation's Application -
West Knowles Prospect

Dear George:

Please refer to the Application of Pubco Petroleum, which I left with you yesterday, June 5. In reviewing the application, I find an error on page 2, the last line of paragraph numbered 2, recommending well spacing. The tolerance requested, which currently reads, "a well may be located within a radius of 150 feet from the center of a governmental quarter section," should be amended to read, "within a radius of 150 feet of any quarter-quarter section." I would appreciate it if you would correct the application by interlineation accordingly.

Thank you very much.

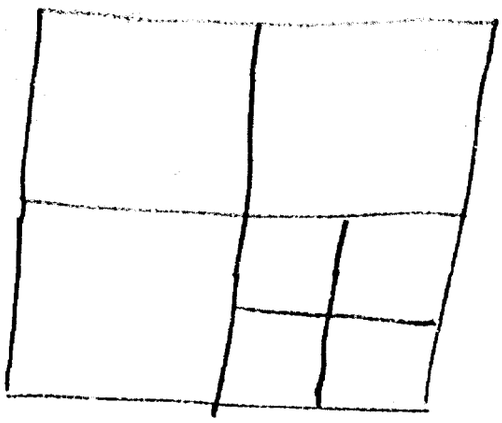
Very truly yours,

James E. Sperling

JES:jv

cc: Mr. Jim Johnson
Pubco Petroleum

DOCKET MAILED
DATE 6-13-72



WELL AND COMPLETION DATA
HUMBLE CITY-STRAWN POOL

1.	Company and Well	Harding O&G Shipp #1	Pubco Petroleum Corp. Shipp #2
2.	Location of Well (Sec. 11-17S-37E)	2080' FWL & 2310' FSL	2150' FEL & 1980' FSL
3.	Total Depth	11,673'	11,685'
4.	Top of Strawn Limestone (Middle-Lower)	11,400' (-7639)	11,425' (-7668)
5.	Top of Pay	11,420' (-7659)	11,430' (-7673)
6.	Completion Date	March 9, 1972	June 10, 1972
7.	Perforated Interval	11,420-11,452' 32	11,430-452' & 11,464-468' 26
8.	Treatment	2,000 gals. acid	5,000 gals. acid
9.	Initial Potential, BOPD	286	758
	Choke Size	10/64"	24/64"
	GOR	1000	1662
	FTP	1600	700
	FCP	Pkr.	Pkr.
	Oil Gravity, °API	45	45
10.	Net Pay	34'	30'
11.	Average Porosity	5.1%	6.30%
12.	Permeability	--	20 md.
13.	Water Saturation	25%	25%
14.	Reservoir Temperature	165° F	168° F
15.	Initial Reservoir Press.	4800 psi	3473 psi

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 3
CASE NO. 4748
Submitted by
Hearing Date

EXHIBIT 3

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 27
CASE NO. 4748

PUBCO PETROLEUM CORP.

Shipp No. 2

Sec. 11 T17S R37E

LEA CO., NEW MEXICO

11425 (-7668)
STRAWN

11430'
11452'
11464'
11468'

CORE 1
CORE 2

5½" casing

DST 3 11,434-11,481
10"-90"-199"-225"
GTS in 1hr. 5 min. on ISIP
MTS in 1hr. 34 min. FFP
DTS in 3hr. 8 min. FFP
Flowed 1450' water blanket
Rec. 90' O & GCM
(3)

MFE 900 cc oil
HP 5354-5354#
FP 1130-2506#
SIP 3473-3473#
BHT 168°

20 10 0
POROSITY (%)

GR
Caliper
NEUTRON
F-Curve

11634 (-7877)
ATOKA

EXHIBIT 4

HARDING OIL CO.
Shipp No. 1
Sec. 11 T17S R37E
LEA CO., NEW MEXICO

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 4-A
CASE NO. 4748
Submitted by
Hearing Date

11400 (-7639)
STRAWN

11,420'

DST 2: 11,420- 1475 1500' WB
GTS in ~~1 hr. 0 min.~~ @ 260,000 CFPD @ 26 lbs.
Rec. 150' O & GCM, 1550' O & GCWB, 135 FO
IFP (5") 752# ISIP (60") 4800#
FFP (120") 791# FSIP (180") 4800#
HP 5279#

2

11,452'

4½" casing

11500

11600

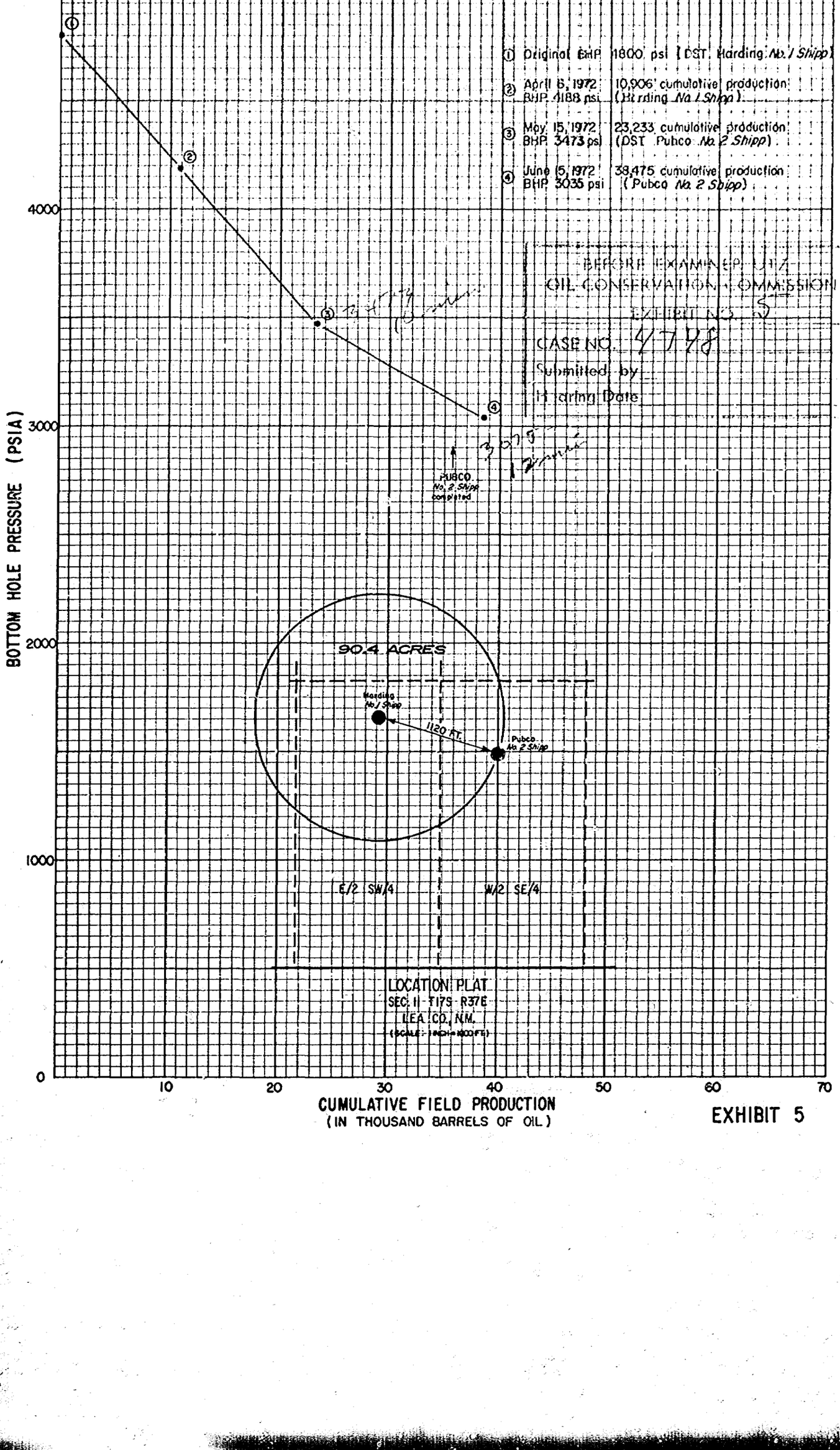
11604 (-7843)
ATOKA

SCHLUMBERGER - MOBIL
POROSITY SCALE FOR STRAWN
STANDARD POROSITY SCALE 21,500 F.R.S.

EXHIBIT 4A

HUMBLE CITY — STRAWN POOL

BOTTOM HOLE PRESSURE VS CUMULATIVE PRODUCTION



BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 5
CASE NO. 4778
Submitted by
Hearing Date

EXHIBIT 5

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS
June 2, 1972

Pubco Petroleum Corporation
P. O. Box 869
Albuquerque, New Mexico 87100

Attention: Mr. J. C. Johnson

Subject: Core Analysis
Shipp No. 2 Well
Wildcat
Lea County, New Mexico
Location: Sec. 11-T17S-R37E

Gentlemen:

Diamond coring equipment and water base mud were used to core the subject well. The cores were sampled by a representative of Core Laboratories, Inc., under the direction of an employee of Pubco Petroleum Corporation. The analysis was performed in our Midland laboratory. Results of the analyses are presented in tabular and graphical forms on the attached Coregraph.

Strawn formation analyzed between 11,440 to 11,492 feet is interpreted to be oil productive where sufficiently permeable. Average core analysis values and theoretical maximum recoverable oil estimates, calculated from estimated original reservoir fluid characteristics, have been prepared and are presented on page one of this report.

We sincerely appreciate this opportunity to serve you.

Very truly yours,

Core Laboratories, Inc.

R S Bynum (R)
R. S. Bynum
District Manager

RSB:AB:dl
1 cc. - Addressee
1 cc. - Mr. M. E. Causey
Pubco Petroleum Corporation
Midland, Texas 79701

EXHIBIT 6

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

 File WP-3-3465
Well Shipp No. 2

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: Strawn 11,440.0-11,492.0

FEET OF CORE RECOVERED FROM ABOVE INTERVAL		50.0	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE		52.9
FEET OF CORE INCLUDED IN AVERAGES		21.9	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	(c)	34
AVERAGE PERMEABILITY: MILLIDARCYS	Max.:	20	OIL GRAVITY: °API	(e)	45
	90° :	10			
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	Max.:	438	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	(e)	1000
	90° :	219			
AVERAGE POROSITY: PER CENT		6.0	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	(e)	1.58
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE		3.8	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT		234

Calculated maximum solution gas drive recovery is 30. barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 48 barrels per acre-foot, assuming full maintenance of original reservoir pressure, 100% areal and vertical coverage, and continuation of production to 100% water cut. *(Please refer to footnotes for further discussion of recovery estimates.)*

FORMATION NAME AND DEPTH INTERVAL:

FEET OF CORE RECOVERED FROM ABOVE INTERVAL		AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	
FEET OF CORE INCLUDED IN AVERAGES		AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	
AVERAGE PERMEABILITY: MILLIDARCYS		OIL GRAVITY: °API	
PRODUCTIVE CAPACITY: MILLIDARCY-FEET		ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	
AVERAGE POROSITY: PER CENT		ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE		CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	

Calculated maximum solution gas drive recovery is barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is barrels per acre-foot, assuming full maintenance of original reservoir pressure, 100% areal and vertical coverage, and continuation of production to 100% water cut. *(Please refer to footnotes for further discussion of recovery estimates.)*

(c) Calculated (e) Estimated (m) Measured (*) Refer to attached letter.

These recovery estimates represent theoretical maximum values for solution gas and water drive. They assume that production is started at original reservoir pressure; i.e., no account is taken of production to date or of prior drainage to other areas. The effects of factors tending to reduce actual ultimate recovery, such as economic limits on oil production rates, gas-oil ratios, or water-oil ratios, have not been taken into account. Neither have factors been considered which may result in actual recovery intermediate between solution gas and complete water drive recoveries, such as gas cap expansion, gravity drainage, or partial water drive. Detailed predictions of ultimate oil recovery to specific abandonment conditions may be made in an engineering study in which consideration is given to overall reservoir characteristics and economic factors.

CORE LABORATORIES, INC. *Petroleum Reservoir Engineering*

COMPANY PUBCO PETROLEUM CORPORATION — FILE NO. WP-3-3465
WELL SHIPP NO. 2 — DATE 5-24-72 — ENGRS. BOONE
FIELD WILDCAT — FORMATION STRAWN — ELEV. 3757' KB
COUNTY LEA — STATE NEW MEXICO — DRLG FLD WATER B.SE. MUD — CORES DIAMOND 4 1/4"
LOCATION 2130' FEL 1980' FSL NW/4 SE/4, SEC 11-T17S-R37E — REMARKS SAMPLED AS DIRECTED BY CLIENT

COMPLETION COREGRAPH

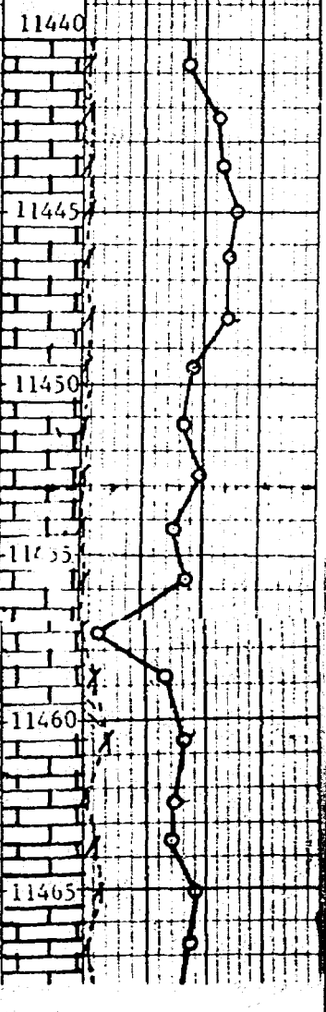
SAND, SHALE, LIMESTONE, DOLOMITE, CONGLOMERATE, OOLITES, CHERT, ANHYDRITE

SAMPLE CHARACTERISTICS
F=Fractured L=Laminated FG; MG; CG=Type Grain Size S=Stylolitic V=Vuggy

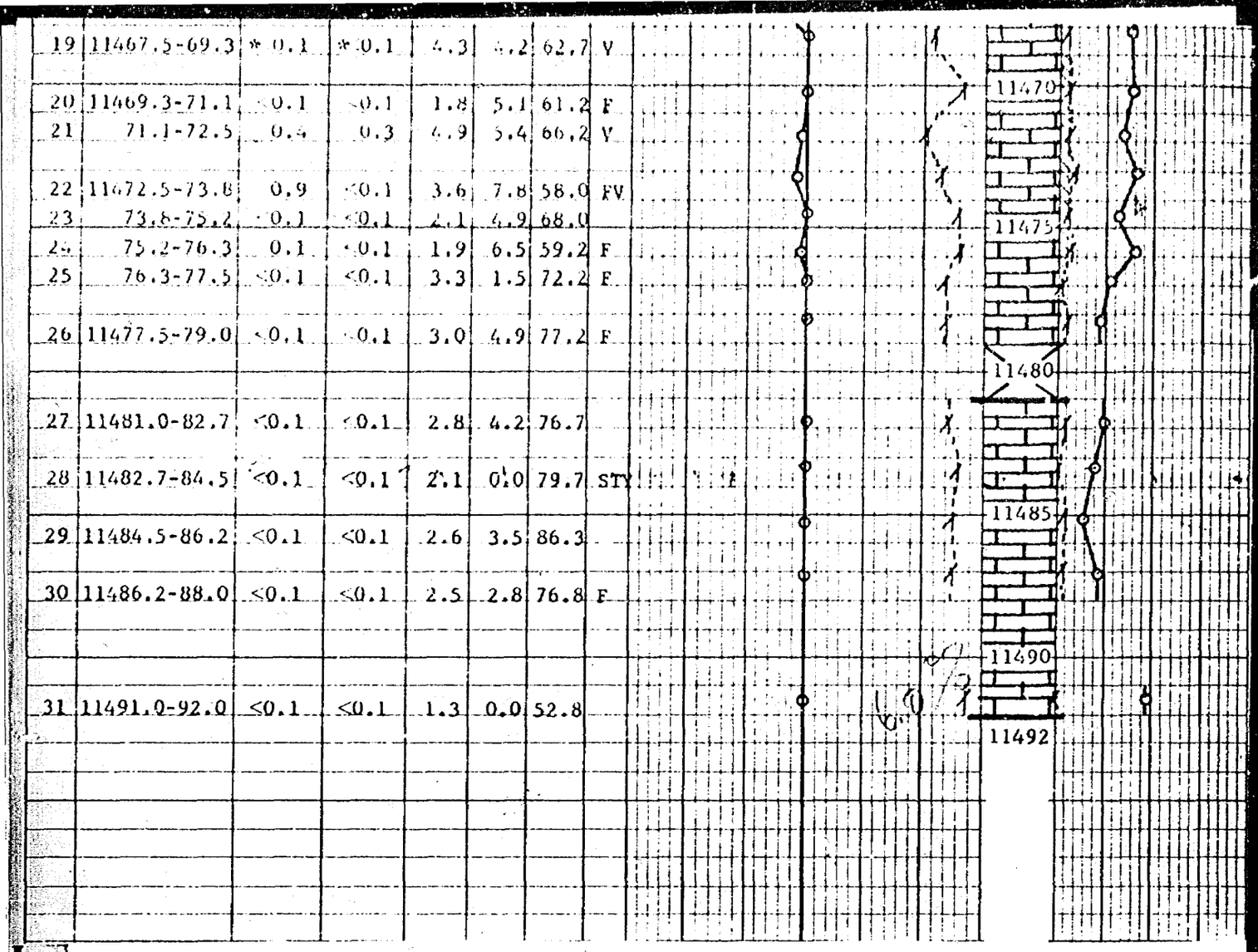
PROBABLE PRODUCTION
O=Oil W=Water G=Gas T=Transitional

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY, MD. * = Horizontal Perm Plug MAX	90°	POROSITY %	RESIDUAL SATURATION % PORE SPACE OIL	TOTAL WATER	
1	11440.0-41.5	140	97	11.8	2.6	57.2	V
2	41.5-43.0	76	2.3	8.7	3.3	43.6	V
3	43.0-44.4	35	23	9.3	2.9	42.5	V
4	11444.4-45.8	3.6	2.1	5.4	3.4	35.4	V
5	45.8-47.5	26	20	7.7	2.6	39.1	V
6	11447.5-49.0	0.9	0.2	5.3	3.6	39.6	V
7	49.0-50.5	13	9.6	5.3	2.8	53.7	V
8	11450.5-52.0	2.3	0.6	4.9	0.6	58.8	V
9	52.0-53.5	<0.1	<0.1	3.2	0.6	51.7	V
10	11453.5-55.0	*0.1	*0.1	4.2	0.0	62.2	F
11	55.0-56.8	<0.1	<0.1	1.9	1.6	57.0	F
12	11456.8-58.2	*<0.1	*0.1	5.8	0.0	92.0	F
13	58. -59.5	1.6	0.1	3.7	5.7	67.5	F
14	11459.5-61.4	<0.1	<0.1	2.3	10.7	58.8	V
15	11461.4-63.0	*0.2	*0.2	5.4	1.7	63.5	FV
16	63.0-64.5	*0.4	*0.4	6.7	5.2	64.7	F
17	11464.5-66.0	0.8	0.6	4.5	7.1	54.1	FV
18	66.0-67.5	3.6	0.5	5.2	1.0	57.2	

PERMEABILITY MILLIDARCYS 10 5 — POROSITY X---X PERCENT 10 5 — TOTAL WATER PERCENT PORE SPACE 75 50 25 — OIL SATURATION X---X PERCENT PORE SPACE 25 50 75



19	11467.5-69.3	* 0.1	* 0.1	4.3	4.2	62.7	V
20	11469.3-71.1	<0.1	<0.1	1.8	5.1	61.2	F
21	71.1-72.5	0.4	0.3	4.9	5.4	66.2	V
22	11472.5-73.8	0.9	<0.1	3.6	7.8	58.0	FV
23	73.8-75.2	<0.1	<0.1	2.1	4.9	68.0	
24	75.2-76.3	0.1	<0.1	1.9	6.5	59.2	F
25	76.3-77.5	<0.1	<0.1	3.3	1.5	72.2	F
26	11477.5-79.0	<0.1	<0.1	3.0	4.9	77.2	F
27	11481.0-82.7	<0.1	<0.1	2.8	4.2	76.7	
28	11482.7-84.5	<0.1	<0.1	2.1	0.0	79.7	STY
29	11484.5-86.2	<0.1	<0.1	2.6	3.5	86.3	
30	11486.2-88.0	<0.1	<0.1	2.5	2.8	76.8	F
31	11491.0-92.0	<0.1	<0.1	1.3	0.0	52.8	



Hearing Date 6-28-72

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS 75207

June 23, 1972

REPLY TO BOX 4937
MIDLAND, TEXAS
79701

625-7.1

Pubco Petroleum Corporation
P. O. Box 869
Albuquerque, New Mexico 87101

Attention: Mr. Charles Sanders

Gentlemen:

In accordance with your request we have performed a depletion drive study of the Strawn oil reservoir available to your Shipp Well No. 2, Lea County, New Mexico. Two cases of reservoir drainage per well were investigated: 80 acre and 160 acre. A summary of basic data and study results is presented below:

	80 Acre Case	160 Acre Case
Avg. Porosity, Pct.	6.3	6.3
Avg. Oil Permeability, Md.	5.3	5.3
Avg. Interstitial Water Sat., Pct.	25.0	25.0
Avg. Net Productive Thickness, Ft.	30.0	30.0
Oil FVF at 4800 psig, Vol/Vol	1.642	1.642
Oil FVF at 2835 psig (BP), Vol/Vol	1.707	1.707
Original Oil in Place, STB	535,783	1,071,568
Original Oil in Place, Bbl/Ac. Ft.	223	223
Ultimate Oil Recovery, Pct. of Oil in Place	16.76	16.76
Ultimate Oil Recovery, STB	89,815	179,630
Ultimate Oil Recovery, Bbl/Ac. Ft.	37.4	37.4
Ultimate Gas Recovery, MSCF	476,788	953,577
Total Primary Producing Life, Yrs.	5.9	11.8

Certain assumptions were made in the performance of the two cases. It was assumed that the average reservoir thickness, rock and fluid properties exhibited by the Shipp No. 2 would be constant throughout the two drainage areas considered. Also, it was assumed that the reservoir would produce under the primary influence of a solution gas drive mechanism to an abandonment reservoir pressure of 500 psig. To arrive at the producing life it was assumed that productivity would decline in accord with the effects of increasing reservoir gas saturation on relative oil permeability.

We are enclosing copies of our computer output pertaining to core data grouping and averaging and the two cases of depletion drive material balance. Table II of the material balance for each area case presents the time-rate calculation results.

EXHIBIT 6A

If you have any question regarding this study or require additional assistance in this regard, please do not hesitate to call.

Very truly yours,

CORE LABORATORIES, INC.

C. K. Osborn,
Division Engineer

CKO:wjy
Enclosures

BEFORE EXAMINER UTZ
OIL CONSERVATION COMMISSION
EXHIBIT NO. 6A
CASE NO. 4748
Submitted by Pubco.
Hearing Date 6-28-72

RECOVERABLE OIL RESERVES
HUMBLE CITY-STRAWN POOL

BASIC DATA

		Log	Core
Average Porosity - Harding Shipp #1		5.10%	--
Average Porosity - Pubco - Shipp #2		6.30%	6.00%
Assumed Average Porosity, Field	6.30%		
Average Feet of Pay, h	30'		
Water Saturation	25%		
Recovery Factor	16.76%		
FVF @ original BHP 4800 psi	1.642		

VOLUMETRIC CALCULATION

$$\text{Original Recoverable Oil, Bbls/Ac-Ft} = \frac{7758\ \phi\ (1-Sw)}{(FVF)} \times (RF)$$

$$\frac{(7758)\ (0.063)\ (0.75)}{1.642} \times (0.1676) = 37.4 \text{ Barrels Oil Per Acre Foot}$$

Where,

ϕ = Fractional porosity of rock

Sw = Interstitial water saturation, fraction of pore space

h = Vertical feet of net pay

FVF = Formation volume factor, barrels oil at original reservoir conditions per barrel stock tank oil at normal surface conditions.

RF = Recovery factor, fractional part of original oil in place recoverable by solution gas drive mechanism.

EXHIBIT 7

ECONOMICS FOR
HUMBLE CITY-STRAWN POOL
LEA COUNTY, NEW MEXICO

	80-Acre Spacing	160-Acre Spacing
Revenue For Average Well		
80-acre - 89,815 barrels oil per well @ $3.56	$ 319,741	$
476,788 MCF per well @ $0.25	119,197	
	$ 438,938	
160-acre - 179,630 barrels oil per well @ $3.56		639,483
953,577 MCF per well @ $0.25		238,394
		$ 877,877
Less Royalty @ 18.75%	82,301	164,602
Less Taxes @ 7.1%	31,165	62,329
Total Revenue	$ 325,472	$ 650,946
Expense		
Drilling, Completion, Tank Battery	$ 230,000	$ 230,000
Pumping Equipment	30,000	30,000
Operating Cost		
80-acre - 5.9 years @ $6,000	35,400	
160-acre - 11.8 years @ $6,000		70,800
Total Expense	$ 295,400	$ 330,800
Net Profit	$ 30,072	$ 320,146
Profit to Investment Ratio	0.12	1.27

NOTE: The analysis does not consider any dry holes that may be drilled. Estimated dry hole cost is $162,000.

One (1) producer on 160-acre spacing will support two (2) dry holes.

Five plus (5+) producers on 80-acre spacing will be required to support one (1) dry hole.

EXHIBIT 8

BEFORE THE OIL CONSERVATION COMMISSION

OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF PUBCO PETROLEUM CORPORATION FOR ADOPTION OF SPECIAL POOL RULES FOR AN UNDESIGNATED STRAWN PENNSYLVANIAN POOL, LEA COUNTY, NEW MEXICO, TO PROVIDE FOR 160-ACRE DRILLING AND SPACING UNITS AND FOR THE ESTABLISHMENT OF AN OIL ALLOWABLE BASED ON 160-ACRE SPACING

Case No. 4748

A P P L I C A T I O N

Comes now PUBCO PETROLEUM CORPORATION, hereinafter called "Applicant," and states:

1. Applicant is the owner and operator of Pubco Shipp No. 2 Well located 2130 feet from the east line and 1980 feet from the south line of Section 11, Township 17 South, Range 37 East, N.M.P.M., which said well is producing oil from the Strawn Pennsylvanian Formation, said well having been drilled to a total depth of 11,685 feet. The discovery well drilled in said pool is designated as the Harding Oil & Gas Company Shipp No. 1 Well located 2080 feet from the west line and 2310 feet from the south line of Section 11, Township 17 South, Range 37 East, said well having been drilled to a total depth of 11,672 feet and completed for initial potential of 286 barrels of oil per day and repotentialled at 624 barrels of oil per day. Both of said wells are producing from the Strawn Formation of Pennsylvanian age. Spacing is presently governed by state-wide rules of this Commission. A plat showing the location of said wells and surrounding acreage within the hereinafter proposed pool limits is attached hereto as Exhibit "A" and made a part hereof. The names of operators in the area and the acreage to which their operating rights pertain are shown on the plat and a list of the operators affected by

this Application is attached hereto as Exhibit "B" and made a part hereof.

2. Special pool rules and regulations should be adopted by this Commission concerning the drilling of oil wells in said pool and the production therefrom, including, but not limited to, provisions for drilling and proration units. A proration unit should be established as a governmental quarter section of the U. S. Public Lands Survey consisting of not less than 160 acres and the unit well should be located at least 660 feet from the boundary of each governmental quarter section and at least 330 feet from the boundary line of each governmental quarter-quarter section; provided, however, that such unit well may be located within an area having a radius of not to exceed 150 feet from the center of each governmental ~~quarter~~ quarter-quarter section.

3. Geological and engineering data presently available indicate that the wells described above are completed in a common oil reservoir and that one well will efficiently and economically drain the recovery oil in place in the Strawn Formation underlying an area in excess of 160 acres.

4. Reasonable geological inference dictates that the horizontal limits of the pool should be established as comprising Sections 1, 2, 3, 10, 11, 12, 13, 14 and 15, in Township 17 South, Range 37 East, and Section 6, 7 and 18, in Township 17 South, Range 38 East.

5. It is economically wasteful to drill wells in the pool on drilling units containing less than 160 acres and closer spacing would constitute waste by permitting the drilling of unnecessary wells.

6. The establishment of drilling and spacing units, as herein requested, is necessary for the orderly development of the common source of supply in the reservoir in which the

above-identified wells are located and the drilling of future wells on the space pattern hereinabove set forth will protect the correlative rights of all parties affected, will prevent physical and economical waste and will eliminate the drilling of unnecessary wells, provide for the orderly development of the pool and will promote the recovery of oil from said pool in an efficient and economical manner.

WHEREFORE, Applicant respectfully requests this matter be set for hearing after due notice as prescribed by law and upon such notice and hearing, the Commission issue its order establishing special pool rules for this pool as designated by the Commission and providing for 160-acre drilling and spacing units, as hereinabove set forth, and for allowables based on 160-acre spacing, and for such other and further relief as the Applicant may show itself entitled to receive. Applicant requests this matter be set for hearing before an Examiner on June 28, 1972.

Respectfully submitted,

PUBCO PETROLEUM CORPORATION

By: MODRALL SPERLING ROEHL HARRIS & SISK

By: James E. Sperling

James E. Sperling, its attorneys
Post Office Box 2168
Albuquerque, New Mexico 87103

WORKING INTEREST OWNERS

NAME	LOCATION	ADDRESS
Pubco Petroleum Corp.	Sec. 34, 35 & 36, T-16S, R-37E Sec. 1, 3, 10, 11, 12, 13, 14 & 15, T-17S, R-37E & Sec. 18, T-17S, R-38E	P. O. Box 869 Albuquerque, N.M. 87103
Getty Oil Company	Sec. 33, T-16S, R-37E, Sec. 4, T-17S, R-37E	Box 1231, Vaughn Bldg. Midland, Texas 79701
Cox, John L.	Sec. 33, T-16S, R-37E	408 West Wall Midland, Texas 79701
Texaco	Sec. 13, T-17S, R-37E, Sec. 18, T-17S, R-38E, Sec. 33, T-16S, R-37E	Box 3109 Midland Savings Bldg. Midland, Texas 79701
Conoco	Sec. 36, T-16S, R-37E Sec. 4, T-17S, R-37E	Box 431 Permian Building Midland, Texas 79701
Mobil Oil Corporation	Sec. 31, T-16S, R-38E	Box 633, Wall Towers West Midland, Texas 79701
The Louisiana Land & Exploration Co.	Sec. 31, T-16S, R-38E, Sec. 6 & 7, T-17S, R-38E	1605 Wilco Building Midland, Texas 79701
Freeport Oil Company	Sec. 31, T-16S, R-38E, Sec. 6 & 7, T-17S, R-38E	1005 V&J Tower Midland, Texas 79701
Depco	Sec. 7, T-17S, R-38E	1025 Petroleum Club Bldg. Denver, Colorado 80202
Rebel Oil Co.(Howell Spear)	Sec. 14, T-17S, R-37E	Box 96, 101 N. Turner Hobbs, New Mexico 88240
Western Reserves Oil Co.	Sec. 14 & 15, T-17S, R-37E	Bldg. of the Southwest Midland, Texas 79701
Roy Barton	Sec. 14, T-17S, R-37E	P.O. Box 968, 300 W. Taylor Hobbs, New Mexico 88240
Ralph Lowe Estates	Sec. 22, T-17S, R-37E	Box 832 Midland Tower Building Midland, Texas 79701
Citgo	Sec. 15, T-17S, R-37E & Sec. 22, T-17S, R-37E	800 Vaughn Building Midland, Texas 79701
Southern Union Gas Co.	Sec. 9 & 16, T-17S, R-37E	Fidelity Union Tower 1507 Pacific Ave. Dallas, Texas 75201
Consolidated Oil & Gas	Sec. 9 & 16, T-17S, R-37E	Lincoln Tower Building 1860 Lincoln Street Denver, Colo.
ARCO	Sec. 10 & 21, T-17S, R-37E	Box 1610 Atlantic Richfield Bldg. Midland, Texas 79701
Pennzoil United, Inc.	Sec. 10, T-17S, R-37E	Drawer 1828 Wall Towers West Midland, Texas 79701

EXHIBIT "B"

Case 4748

Harding Oil Company	Sec. 11, T-17S, R-37E	4317 Oak Lawn Dallas, Texas 75219
Tom Brown & H. L. Brown	Sec. 2, T-17S, R-37E	Box 5706 315 Midland Tower Bldg. Midland, Texas 79701
Gulf Oil Company	Sec. 2, T-17S, R-37E & Sec. 9, T-17S, R-37E	Box 1150 Gulf Building Midland, Texas 79701
Kewanee	Sec. 2-17S-37E	Box 1859 209 1st Savings Bldg. Midland, Texas 79701
Midwest Oil Corp.	Sec. 3, T-17S, R-37E	1500 Wilco Building Midland, Texas 79701
Humble Oil & Refining Co.	Sec. 3 & 4, T-17S, R-37E	Box 1600 Humble Building Midland, Texas 79701
Phillips Petroleum Corp.	Sec. 4, T-17S, R-37E	4th & Washington Phillips Building Odessa, Oklahoma 79760
L. C. Harris (Lawrence C)	Sec. 4, T-17S, R-37E	Box 1714 Hinkle Building Roswell, New Mexico 88201
Kirby Petroleum	Sec. 13, T-17S, R-37E	Box 1745 1200 1st City Nat'l Bk Bldg Houston, Texas 77001
Texas International Petroleum	Sec. 3 & 12, T-17S, R-37E	1720 Wilco Building Midland, Texas 79701
Fortson "A" Corporation	Sec. 15, T-17S, R-37E	c/o The Eastland Oil Co. 704 Western United Life Bldg Midland, Texas 79701
Everett Hass	Sec. 9, T-17S, R-37E	28 Midway Street Bristol, Tennessee 37620
Amerada	Sec. 31, T-16S, R-38E	P.O. Box 2040 Tulsa, Oklahoma 74102

DRAFT

GMH/dr

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE No. 4748

Order No. R-4337

APPLICATION OF PUBCO PETROLEUM CORPORATION FOR SPECIAL POOL RULES, LEA COUNTY, NEW MEXICO.

~~NOMENCLATURE~~

7-10-72

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on June 28, 1972, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this _____ day of July, 1972, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Pubco Petroleum Corporation, seeks the promulgation of special rules and regulations for the Humble City-Strawn Pool, Lea County, New Mexico, including provisions for 160-acre spacing units and wells to be located within 150 feet of the center of any quarter-quarter section.

(3) That the evidence presented at the hearing disclosed that the wells completed in the subject pool to date have experienced a rapid decline in bottom-hole pressure which would indicate that the pool reserves are either extremely limited or the area of drainage is very small or both.

That the evidence indicates that no well in the pool would have 160 productive acres to be dedicated to it.

(4) That the applicant has not established that the wells in the Humble City-Strawn Pool can efficiently and economically drain and develop 160 acres or that the establishment of special rules and regulations providing for 160-acre spacing units, even on a temporary basis, would prevent the economic loss caused by the drilling of unnecessary wells, avoid the augmentation of risk arising from the drilling of an excessive number of wells, prevent reduced recovery which might result from the drilling of too few wells, or otherwise prevent waste or protect correlative rights.

(5) That the subject application should be denied.

IT IS THEREFORE ORDERED:

(1) That the subject application is hereby denied.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

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

CASE 4748: Application of PUBCO FOR POOL CREATION AND SPECIAL POOL RULES, LEA COUNTY, N. MEX.