BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
June 13,1969

REGULAR HEARING

IN THE MATTER OF:	
(De Novo) Application of Paul M. Mershon, Jr., for compulsory pooling, Eddy County, New Mexico.	Case No. 4088

BEFORE: DAVID F. CARGO, Governor
A. L. "PETE" PORTER, Secretary-Director

TRANSCRIPT OF HEARING

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date JUNE 13, 1969 TIME: 9 A.M.

NAME	REPRESENTING	LOCATION
Dick Booker	Cities Service Oil	Midland
Bill Cordill	Phillips Pet. Co	"
J. J. Savage	Texas Inv	"
D. R. Ryan ✓	Pan Am. Petr. Corp.	Tulsa, Okla.
J. E. Leasher	" " " "	Midland
Roy Johnson	Amerada Petr Corp	Houston
Walter Lawrence Jr	Lawrence Oil	Hobbs N. Mex
W. T. Loyd	Navajo Refining	Artesia, N. M.
John B. Braswell	ARCO	Midland
C. W. Briggs	Gulf Oil Corp.	Midland
R. L. Denton	Admiral Crude Oil Co	"
W. Wilkinson ✓	W A & E R Lucas	Ft. Worth.
Ralph L. Gray	" " "	Artesia
Jason W. Kellahin	Kellahin & Fox	Santa Fe
Theo E Ware	Ralph Nix, Jr	Farmington
J. M Glendenning	Mobil Oil Corp.	Midland
[illegible]	Rock Island Oil Co	DENVER
Harold [illegible]	El Paso Natural Gas	El Paso

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date JUNE 13, 1969 TIME: 9 A.M.

NAME	REPRESENTING	LOCATION
J C Hoot	Shell Oil Co	Midland
Nina S. Williams	RW Byram	Santa Fe
John Yuronka	John Yuronka	Midland

MR. PORTER: The hearing will now come to order; the record will show there is a quorum present in the persons of the Chairman, David F. Cargo, Governor, and the Secretary-Director.

Before we take up the allowables, the allowable cases, I want to announce Cases 4017 and 4043 have been continued to the Regular Hearing, July 16, 1969, and all of the interested parties have been notified of this action.

I would also like to announce that Cases Nos. 4088 and 4089 have been continued to a Special Hearing date, which will be June 26th, and all of the parties in those cases have been notified by letter; each individual interested party. Now, Cases 4088 and 4089 will be heard at 8:00 o'clock A.M. here in Morgan Hall, June 26th, which is a Special hearing date.

We will take up now the consideration for oil allowable for the month of July; and I will ask Mr. Don Ryan and Mr. James E. Kapteina to stand and be sworn.

(Witnesses sworn)

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, KURLEEN E. McCUTCHEN, a Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing is a record of the proceedings had before the New Mexico Oil Conservation Commission on June 13, 1969; that the same was reported by me; and that the same is a true and correct record to the best of my knowledge, skill and ability.

Kurleen McCutchen
Court Reporter

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
March 26, 1969

EXAMINER HEARING

- -

IN THE MATTER OF:

Application of Paul M. Mershon, Jr., for an unorthodox gas well location, Eddy County, New Mexico.

Case No. 4089

- -

BEFORE: Elvis A. Utz, Examiner

TRANSCRIPT OF HEARING

MR. UTZ: Case 4089, application of Paul M. Mershon, Jr., for an unorthodox gas well location in the Indian Basin Upper Pennsylvanian Pool, Eddy County, New Mexico.

MR. LOSEE: A. J. Losee of Artesia, representing the applicant. I have one witness.

MR. UTZ: Any other appearances?

MR. MORRIS: I am Richard Morris of Montgomery, Federici, Andrews, and Morris, Santa Fe, appearing for Marathon Oil Company.

MR. KASTLER: I am William Kastler with Gulf Oil Corporation, appearing on behalf of Gulf.

MR. KELLAHIN: I am Jason Kellahin, Kellahin and Fox, appearing on behalf of the Standard Oil Company of Texas, Hanagan Petroleum Corporation, and Monsanto.

MR. UTZ: Who is going to offer testimony besides Mr. Mershon?

MR. KELLAHIN: We will have one witness, Standard Oil of Texas.

MR. MORRIS: Mr. Examiner, we may have one witness.

MR. UTZ: Let the record show that the witness, Paul M. Mershon, Jr., is the same Mr. Mershon who was

sworn in the last case.

(Whereupon, Applicant's Exhibits 1 through 4 were marked for identification.)

PAUL M. MERSHON, JR.

called as a witness on behalf of the Applicant, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. LOSEE:

Q You are Paul M. Mershon, of Denver, Colorado, Consulting Geologist?

A Yes, I am.

Q Are you familiar with the application in Case No. 4089?

A Yes, I am.

Q Will you state what is the purpose of this application?

A The purpose of this application is seek an unorthodox location 990 feet from the north and east lines of Section 21, Township 22 South, Range 23 East.

Q Please refer to what has been marked as Exhibit Number 1, being a field map on the right, and an area map on the left, and referring to the field map on the right, explain what is portrayed by this exhibit.

A This exhibit shows by the solid line the structure on top of the reef. It shows in a general way the thickness of the pay zone in the dashed lines. It shows the relation of the gas-water contact on the east side of the field; and on the west side of the field, it shows the controlling fault.

This data, as I previously stated, is essentially from a symposium published by the Roswell Geological Society, called the Symposium of Oil and Gas Fields of Southeast New Mexico, 1957.

I have made some minor alterations in that data --

MR. KASTLER: Mr. Examiner, I move to object to this testimony on the ground that it is not pertinent to this hearing. This is an unorthodox location, and Rule 2440 specifies that unorthodox locations may be justified by topographical conditions or the recompletion of a well previously drilled to another horizon, but they are not based upon considerations of structures of the pay zone.

MR. LOSEE: I think the Commission's rule also provides that if the location is unorthodox -- and although I don't have a set of rules with me, Jason has them behind me -- the Commission can approve the unorthodox location after hearing, and take such action as it may deem necessary to

offset the advantage of the location.

MR. PORTER: What rule did you quote?

MR. KASTLER: I am reading from Rule Five of Special Rules and Regulations for the Indian Basin Upper Pennsylvanian Gas Pool established by Commission Order Number 2440, I believe, part 2440 out of Case No. 2779.

MR. PORTER: Mr. Kastler, does that refer to administrative approval?

MR. KASTLER: Yes, it does.

MR. PORTER: Then it would not apply to a hearing, is that right?

MR. KASTLER: My objection is based on the fact that it would apply to a hearing, unless the hearing were advertised as not a single exception, but as a change of pool rules. But that single exception may be administratively approved, if not objected to. But when objections are filed and appearances are made objecting to it, then it is not administrative, within administrative grounds to grant.

MR. UTZ: Mr. Kastler, to rule with you, I would have to rule against the Commission on many other cases. We have given unorthodox locations based on hearings in many, many cases before, based on structure. You may proceed.

A As I pointed out, there are some minor alterations.

However, the primary purpose of the map on the left is not to determine pay for producing areas. It was brought here for those present, so they could see the relation of interests on the left with the total pool.

The red outline on the plat on the right shows the primary interests in the area in which we have more detailed control.

Q Please refer now to the area of interest map on the left hand side of this Exhibit 1, and explain what is portrayed by this exhibit.

A This exhibit shows the structure as mapped on the top of the reef. These are the solid lines, and the contour interval is 50 feet. These lines in general vary from those lines drawn by a typical subsurface geologist without benefit of additional data.

In the instance of this map, I have a regional geophoto study. I applied the strike and dip, and other pertinent data from that geophoto study to my structural analysis of this field.

I feel that this analysis is critical in explaining the water in the Gulf No. 2 Helbing Federal in Section 22.

Q That area of interest actually enlarges upon the

same data that is presented on your large field map, does it not?

A Yes, it does.

Q Does it also show the proposed location, unorthodox location?

A Yes, it shows this location, and it is spotted 990 from the north line and 990 from the east line of Section 21.

Q What distance is this location from the nearest producing wells in the Indian Basin Field?

A It is slightly more than 5000 feet to the Standard of Texas No. 5 Bogle Flats unit in Section 16, and slightly more than 5000 feet to the Gulf No. 1 Helbing Federal in Section 15. These are the closest two producing wells.

Q Your dark line along the left hand side of this map portrays what?

A This portrays the fault, which I believe is the essential trapping mechanism for the field. I base this line on my subsurface study of the area, as well as the geophoto study that I had.

Also in this map, I had a line of section, which is marked A to B, and this includes the Standard of Texas No. 3 Bogle Flats coming down off the reef, to the Standard of Texas No. 5 Bogle Flats further south, to the

Hanagan No. 1 Indian Federal, parallel to the reef edge, approximately, to the No. 2 Helbing Gulf in Section 22, north again on to the reef, to the Gulf Oil No. 1 Helbing in Section 15, off the reef again to the east, to the Marathon No. 1-BB.

Q All right. Now, you have shown water here, I take it. Would you discuss this gas-water contact in the right hand portion of your area of interest map?

A This line, this estimated gas-water contact, is one that is generally used in the industry. It cannot be, as far as I know, determined accurately from electric logs, because the water in this field is extremely fresh. However, the testing of various wells along the margin of this contact, along the eastern side of the field, has generally made this 3,750, an approximate gas-water contact from the field.

I might add that it could be plus or minus 30 feet from this figure. I do not feel it is critical to our problem, however.

Q Would you refer to the water in Section 22 around the Gulf No. 2 Well, and explain its presence, if you are able to do so.

A Gulf drilled a No. 2 Federal Helbing as a normal fill well on normal spacing. When they got to the reef, they found an adequate reef section both from sample, and

examination, and log examination, and ran pipe. They foresaw no problems. They did not DST the well, nor did they run electric logs, only a sonic gamma ray log.

The top of this well is minus 3,401, as I interpret the top of the reef. This is 350 feet above the gas-water contact to the east. Gulf perforated this well and acidized it, and swabbed water. On no test did the well produce gas in any quantity. However, Gulf was convinced that the well was tied to the reservoir, and had been in their project.

I feel that this water, being at least 300 feet -- I will have to say this differently. This water which is from the base of the pay, approximately 200 feet above the gas-water contact of the field, is anomalous and requires explanation. Without excellent structural control, which we have previously referred to, I would not be able to draw this structural nose in Section 23 that I believe controls the entrapment of this water in Sections 22 and 23.

The problem involved in analyzing this particular little pot of water is one of simply saying that when this pool filled with water, this small irregularity along the edge of the reef, downbent in the syncline, simply would not permit water to flow down dip, because there was an

anticlinal axis to the northeast of the syncline. Therefore, the water is simply caught stagnant in this area.

I do not know actually how far northward or westward this water will go, and I will say that I have it on a minus 3,300. This figure could change plus or minus 50 feet, or maybe 100. Control does not permit this analysis.

Q Now, you earlier referred to your cross section running from A to B, pointing out its structure location. Before you go into your cross section, will you explain your isopach, these dotted lines shown on this map?

A These dotted lines represent the gross producing zone, which is the flat base of the reef to the top of the reef, and the limestone and dolamite, and minor shales, except in Section 21 where a major shale break was noted in the Hanagan No. 1 Indian Federal, and that shale was eliminated from that isopach interval.

This unit represents to me the maximum extent at which I would anticipate production to occur in.

Q Now, referring to what has been marked as Exhibit 2, being your cross section of the six wells, would you explain what is shown on this cross section, Exhibit 2?

A Exhibit 2 shows the wells that I discussed briefly a few moments ago. On this section, the following things may be noted: one, my pick on the top of the reef, which can be carried across the section from right to left. This is the point that I used to map structure. I have hung this cross section on a line I call datum base of reef; and below this point, generally I found no clean dolamite or limestone, and it was a strong correlative point, I felt, within the mapped area.

The zone I have isopached is within this interval, top of reef to base of reef, with the exception of that shale interval in the Hanagan No. 1 Indian Federal, which is the third log from the left in the section. That unit marked SH, from approximately 7,366 to 7,389, was eliminated from my isopach interval.

Q And that was on the preceding map?

A Yes, it was.

Q Did you obtain the data all from electric logs?

A I have at my disposal sample logs of every well on this section. These logs were essentially prepared, sample logs were essentially prepared by the Permian Basin Logging Company of Midland, Texas, and their primary function to the industry is to run samples and interpret them. I consider

their work impartial.

Q What else his shown by this exhibit?

A There were no cores on most of the wells in this particular section. I show perforations, and this can be found on each of the wells in the center column, either by circles and bars on wells that were perforated in long intervals, or by small arrows when there were single entry perforations.

I also show all the reported drill stem tests over this -- over any interval of the reef.

Q Now, throughout this reef, you have denoted dolo, which is dolamite, and "ls" for limestone. Can you give us your opinion of the geological history on this dolamite and limestone?

A In my opinion, this zone was originally deposited as a complex bank of limestone. After deposition occurred, this rock was altered to dolamite. It is thought by the industry in general that the dolamite is the primary producing horizon in the Indian Basin Field. However, we find this relation not 100 percent valid.

There are two wells in the field, the Williamson well in Section 19 of 21 South, 23 East, that I

believe produces from 100 percent limestone. The well due north of this is an infill well in Section 18 of 23 East. This well also produces, I believe, from 100 percent limestone.

I shall later show a log on the Pan Am well, which is on this plat, and this well is the No. 1 Hanagan Federal in Section 13, in which they have perforated and acidized a thickness of limestone, and this limestone may contribute to the reservoir.

MR. UTZ: What was that well you referred to, Pan American, Hanagan Federal, 13?

THE WITNESS: Yes, sir.

Q Now, you also referred to two other wells that in your opinion were entirely producing out of the limestone. Will you go back and encircle those, and the only place you can find them is in your Exhibit Number 1 on the right hand side portion, to show that they are out of your isopach? Give the section.

A The two wells that I believe are producing from 100 percent limestone are in Section 19 of 21 South, 23 East, J. C. Williamson well. The other well is an infill well in Section 18 of 21 South, 23 East.

Q Is that all you wish to explain with reference to your limestone and dolamite, their relationship?

A Well, on examination of the section, we see that the relationship is rather complex, because laterally, the stratigraphic unit of limestone grade leads imperceptively into dolamite. The rate that this occurs is not predictable. Sample examination, in general, has reported visual porosity in the limestone within the unit I am calling reef.

Q Mr. Mershon, would you please refer to what has been marked as Exhibit 3, and explain what is shown by this exhibit?

A Both of these logs are on the same well, the Hanagan No. 1 Indian Federal. The log on the left is the gamma ray density. In the center column of this particular log, I have portrayed graphically the amount of the various lithologic units detected by sample examination. The diagonal barred rock denotes dolamite. The brick shape denotes limestone. Shale is denoted by the dashes, and in that interval from 7,390 to 7,420, I have an interval that has bricks with diagonal in it. This denotes limestone that was called dolamite, dolamitic by the technician examining the samples.

On the right log, this log is a sonic neutron log, and is run for the purposes of determining porosity, and I might also add, an aid in determining

lithology by the combination of two logs.

I have shown the perforations of this well in the center column. And in a general way, very specifically, I show the top and the bottom of the perforations -- of the DST zones across this interval. I show that a DST from 7,326 to 7,400 flowed 550,000 cubic feet of gas per day during a DST.

The pressures are shown on Exhibit 2 of this log. There is also a DST run from 7,405 to 7,480. Gas surfaced here in seven minutes, but it was too small to be measured. Too small to measure, I might add, in my opinion, covers a wide range. I don't know whether this was 1,000 or less, or 70,000 or 80,000, but it does denote a show of gas in the lower interval.

Q Now, this is the Hanagan well that is drilled in the northwest quarter of Section 21, is it not?

A That's correct.

Q What is the footage location on this well?

A This well is 1,650 from the north line, and 1,980 from the west line.

Q Mr. Mershon, in your opinion, was this well properly treated?

A I think it was treated normally as the industry

in general would have treated it. However, I noted that Pan Am fracked the well in a similar section a short distance from here, and have a very similar section, and have a marginal well. This well may have been assisted by fracking.

Q Did it have a problem with respect to deliverability?

A Yes, since it flowed only an estimated 150,000 to 200,000 MCF per day, it was plugged and abandoned. I have from the record on this log this note on completion, acidized perforations with 26 gallons in three stages; high flows estimated at two million cubic feet; flow decreased to stabilized flow estimated at 150 MCF to 200 MCF. The well was plugged and abandoned.

Q Please refer to what has been marked as Exhibit 4, being a log of this Pan American well. Before discussing the log, would you point out its relative position with respect to Section 21?

A This log is on the Pan American No. 1 Honolulu Federal, now called HOC Gas Unit Well in Section 13, and it is approximately two and a half to three miles northeast of our proposed location.

Q And it is shown on your area of interest map?

A On our area of interest map, 1650 from the north and east lines of Section 13.

This log is a sonic gamma ray log of the Pan American well. In the center column, I have depicted graphically the lithology of the well as taken from the samples of the Permian Basin sample log description. I have also written just to the immediate right of this column, the percent of dolamite and limestone observed by this technician, as he ran the samples. Also, I show on this log the only DST run on this well, which was 700 -- which was from an interval of 7,715 to 7,897.

This well flowed at a rate of 820 MCF per day for an hour and forty-five minutes.

On the immediate left of the lithologic column, I have the perforations.

Q What was the initial potential of this well?

A This well had an initial potential flowing of 1,700,000 MCF per day on a 22/64 inch choke. This is not an absolute calculated open flow, and in my opinion, in a calculated open flow test on this well would be higher.

Q What treatment was given this well?

A This well was initially acidized and fracked, and at a later date was again acidized and fracked. It is currently producing, but it is marginal.

Q Was the limestone in this well fracked?

A All perforations, according to the records, were treated in both cases.

Q Would you have anything to offer with respect to a comparison of this Pan American well and the Hanagan well as to the pay section and the treatment given the two separate wells?

A I would like to point out that from the standpoint of geologic correlation, it appears that the lower limestone section is equal to the dolamitic limestone section of the Hanagan well, and that the upper two dolamite and limestone sections in the Pan Am well correlate approximately to the three dolamite zones in the Gulf well.

From the standpoint of geologic correlation, I feel that is a strong and valid correlation.

I would like to point out that the difference in the DST of these two wells is slightly less than 300,000. The Pan American well may well be commercial. The Hanagan well has been plugged and abandoned. I feel that they are certainly very close to being commercial in the Hanagan well.

Q You think this Pan American well indicates that the limestone in this reef contributes to the production from the Upper Pennsylvanian formation?

A The section is not attracted to me. However, Pan American chose to perforate it, and their examination of the data certainly should be considered.

Q Mr. Mershon, have you made a study of the pressure histories in this Indian Basin Field?

A Not from a standpoint of an engineering study in which I plotted bottom hole pressures against draw down, nor have I made a comparison of shut in pressures as taken from the surface to a datum, but I have examined the shut in pressures for 1966, 1967, and 1968, as available from the Engineering Committee of New Mexico, and I find that draw down throughout the field is rather consistent, which leads me to believe that the field is essentially one unit. This would corroborate the evidence I have geologically.

Q Now, what bearing does the communication throughout the field have to your proposed unorthodox 990 location?

A If I have a well 990 from the north and the east lines of Section 21, and I have a proration that is in direct proportion to the area of the producing zone under my lease relative to 640 acres, it really doesn't make any difference where my well is relative to another well, since draw down, apparently, and communication within the field is well established. So that so long as I am not immediately on top

of a well, I can see that no location drilled in 21 into the permeable section, so long as there was an adjustment for the producing area within 21, would affect adversely any operator, and yet protect the correlative rights.

Q And you earlier pointed out that the two closest producing wells were over 5,000 feet from your proposed location, over a mile?

A That's correct.

Q Mr. Mershon, in summarizing, what would you offer to the Examiner in summarizing the data that you submitted with respect to this unorthodox location?

A If I were permitted to drill this location, I would want to feel that I would be far enough away from the syncline that comes out of Section 28, that I would not have a water problem as Gulf did.

Two, that the total reef section contained and demonstrated by me in Section 21, that could possibly contain hydrocarbons, contains 561 acres, the pressure data indicates that there is communication throughout the field, and if I receive a proration equal to that area that produces under Section 21, I will not adversely affect any offset operator, and I will be able protect my correlative rights. I feel like the location 990 from the north and east also

minimizes my risk that might be involved when drilling on the edge of the field.

Q Were Exhibits 1 through 4 prepared by you?

A Yes, they were.

MR. LOSEE: I will offer Exhibits 1 through 4.

MR. UTZ: Without objection, Exhibits 1 through 4 will be entered into the record of this case.

I think we will adjourn this case until 8:30 o'clock tomorrow morning.

(Whereupon the hearing was adjourned until 8:30 o'clock the morning of March 27, 1969.)

(Whereupon the hearing was reconvened at 8:30 o'clock A.M. on March 27, 1969, and the following proceedings were had:)

MR. UTZ: The hearing will come to order, please. I believe when we adjourned last night, we had just finished the direct testimony with Mr. Mershon. Therefore, we are ready for cross examination, if there is any.

CROSS EXAMINATION

BY MR. MORRIS:

Q Mr. Mershon, I am a little confused on the number of exhibits here. I believe I am referring to Exhibit Number 1 in Case 4089, which is your double plat exhibit?

A Yes.

Q Referring to the exhibit on the right hand side of that exhibit, I am somewhat confused about a statement you made on direct examination concerning a couple of wells that are in the township north of the township we are concerned with here, and I am referring to the two wells up in Sections 28 and 19, lying just east of the fault, that are shown to be producing wells, but lie outside of the zero gross pay interval shown on that map.

A Yes, I see the wells you are referring to.

Q What was your comment there with respect to why you

left those two wells outside of the contour line?

A As I originally pointed out, this map was essentially prepared by the symposium published by Roswell in 1967, and the contoured interval for the isopach, which are the dashed lines, represents that dolamite facies within the reef complex. These wells do not produce from the dolamite, but produce from the limestone.

Q Then that portion of the interpretation that is shown on this exhibit was not prepared by you, is that correct?

A That's correct. However, I have examined the logs on both of these wells.

Q How much of this particular plat did you prepare, and how much of it was prepared by the Roswell symposium?

A I would say that 75 percent of the work was prepared by the symposium. I altered the position of the fault on the west side of the field slightly. I introduced a structural nose in the south portion of the field in Township 22 South, 23 East.

Q Now, that structural nose appears down in the area of interest that is shown on the other plat?

A Yes, sir.

Q By that nose, now, are you referring to the nose there that appears in Sections 22 and 23?

A Actually, there are three noses in this area. There is one in 23 that plunges southeast. There is one on the west side of 22 that plunges south southwest. And a small one in the center plunging south of Section 21. These noses in general would differ from that published data from the symposium.

Q So the changes that were made from the symposium, you say that constitutes about 25 percent of the right of the map, on the right hand side of the plat, those changes would predominantly occur in the area of interest that we are talking about here?

A Yes, that's correct. I might point out that the right side of the map was not prepared as any point of argument, but really to show the relation of our prospect area to the field, and that the left plat was prepared to show more detailed information.

Q Do you have a copy with you of the original plat of the Roswell symposium which you used in preparing this exhibit?

A No, I do not have that with me.

Q Now, referring to your area of interest portion in this plat, I believe yesterday on direct examination you made a comparison between the Pan American well and the Hanagan well as to their geology and gross pay intervals.

How much gross pay interval would you have if you drilled at a standard location in the northeast quarter of Section 21?

A At the proposed location?

Q No, at a standard location. If you were drilling at a standard location in the northeast quarter of Section 21, how much gross pay interval would you have?

A Approximately 100 feet.

Q I refer you to the well up in Section 14, the Marathon IBB Federal No. 1, am I correct that you have that showing 108 feet of gross pay interval in that well?

A Yes.

Q Are you aware that this is a top allowable well in this field?

A Yes, I am.

MR. UTZ: Excuse me, which well was that?

Q I am referring to the Marathon IBB Federal in Section 14, shown as having 108 feet of gross pay and being a top allowable well.

On the basis then of the gross pay, Mr. Mershon, comparing the Marathon well to a well that could be drilled at a standard location in the northeast quarter of Section 21, you could expect to obtain a top allowable well

at a standard location, could you not, solely on the basis of gross pay interval?

A Solely on the basis of gross pay interval, your statement is correct. However, this is not a predictable factor, because if you will note in the Pan Am well, I have 98 feet of gross pay, which is approximately 100 feet, and this well is a marginal well, so the comparison grossly is one that is difficult to make.

Q Well, you say that gross pay is not a predictable factor, but have you made any interpretation here in Section 21 with respect to net pay?

A I did a study of the dolamite facies alone. However, I have not made a net pay map.

Q Have you made any study of the expected permeability that you would expect to encounter in Section 21?

A No, I have only used those wells that I felt were important in my analysis of this problem, and they are these wells in Sections 13, 14, 22, and 21, and their relationship between permeability and thickness, as we discussed awhile ago, is one that is rather difficult to determine in advance.

Q What is your exhibit number that shows your cross section?

A Exhibit 2.

Q According to Exhibit Number 2, the note that is shown below the Hanagan well states that the perforations were acidized with 26,000 gallons of acid in three stages, flowed at stabilized rate of 150,000 to 200,000 cubic feet of gas per day. What do you mean in that statement by stabilized rate?

A I would assume that the operator reporting this had a flat flow rate, meaning no decline at that point, and this is as taken from the Commission's records.

Q Do you know over what period of time this so-called stabilized rate was reported?

A No, I do not. But I believe the testing period was in the neighborhood of seven to twelve days, but this is an approximation.

Q Mr. Mershon, would you argue with me if I said that this rate of 200,000 cubic feet per day was a 24-hour test at 20 pounds pressure, after which time the tubing pressure fell to zero?

A This, to my knowledge, was not reported to the Commission, and so I would have to say is there evidence to this, and I know of no such evidence.

Q Coming back to your Exhibit Number 1, are you moving in a northeasterly direction from what would be a standard

location?

A Diagonally, approximately 800 feet northeast. That is not correct? Pardon me. We can scale this, if you would like.

Q It would be what, the hypoteneuse of a triangle whose sides are 660 feet each?

A That's correct. The square of 72,000? It is less than 900 feet, I believe. 932 feet.

Q Now, by moving 932 feet in a northeasterly direction, you are moving to a point where you, by your map here, I am back to your Exhibit Number 1, you would be moving to a point where you would expect to penetrate 125 feet of gross pay as opposed to 100 feet of gross pay at a standard location, is that correct?

A That's correct.

Q By gaining this advantage -- assuming at least for the moment here the correctness of your map, by moving from a standard location where you would have 100 feet of gross pay to a proposed location of 125 feet gross pay, are you recognizing this as an advantage in making any recommendation to the Commission as to how much the Commission should cut the allowable to be assigned to this well by virtue of moving and gaining that advantage?

A I recognize this as an advantage to eliminate possible risk in having low permeability, possible risk in perhaps finding another perched water table, and I do recognize that some adjustment for area that is productive within Section 21 should be made.

MR. MORRIS: That is all I have at this time.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Mershon, as I understand your testimony, you recommended an allowable based on 561 acres?

A No, I didn't make that recommendation. However, I have planimetered the gross reef complex in Section 21 as 561 acres, and stated that it was reasonable to expect that this area could furnish some gas to the reservoir.

Q If you say this area could furnish some gas to the reservoir, then you are saying in effect it is your opinion these are the productive acres in Section 21, would that be correct?

A Yes, so long as you consider that permeability and ability to deliver is demonstrated to be poor when you get to the thin portion of this pay zone.

Q Then are you saying you would have something less than 561 acres contributing to a well at your proposed location?

A I really am not capable of answering that question from an engineering standpoint, because we have to deal with the standpoint of time when we deal with the ability to drain this rock.

Q You would have to take into consideration something other than gross pay to determine productive acreage in this section, would you not?

A I would say that that could be a fair statement.

Q And that would be permeability and porosity, among other things, would it not?

A Yes, so long as these planimeters are chosen realistically.

Q Well, you show a zero line running through the south portion of Section 21. That, as I understand from your testimony, is the line at which there is two percent porosity or less?

A No, sir, I haven't presented any porosity.

Q You don't have any, do you?

A This map was not prepared on a porosity peak.

Q You don't have any porosity information on this section, do you? You haven't made an analysis?

A I haven't made an analysis on that.

MR. KELLAHIN: That is all I have. Thank you.

MR. UTZ: Are there any other questions?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Mershon, is it your estimate and your testimony -- and I don't believe you said this directly, but you inferred this -- that the closer you get to your zero gross pay line, that the probability of the permeability pinchout occurs, the permeability lessens?

A This is the conclusion I draw. There are so few wells to make this true analogy, that I don't think we can without qualification say that, but I think it is a fair assumption. This would be true in most carbonate reservoirs.

Q So you would admit then that it is likely that there would be less than 561 acres that would be productive partially, because of lack of permeability?

A The problem I have in answering that question is, one, in a gas reservoir where you have a commodity that readily transmits itself through extremely tight rock, how do you say where is the true zero line and where is the true permeability line? I think I have forgotten exactly what your question was, but it is, I think, that is an assumption that some place near the zero line you can say this may not produce to the reservoir because it is an extremely low

permeability rock.

Q Now, had you drilled on a standard location, or had you proposed to drill on a standard location, you would have undoubtedly expected to get 640 acres dedicated to the well, is that true?

A Yes, that is true.

Q Now, your 990 location is -- well, half as close to the unit line as a standard location would be, is that correct?

A That's correct.

Q Therefore, it is 50 percent nonstandard, so to speak?

A So to speak, yes.

Q Now, Mr. Morris questioned you some about the Marathon No. 1 Well in Section 14.

A Yes.

Q As being a top allowable well, and yet it was just slightly more than -- well, approximately 118 foot of your gross pay?

A Yes, I have 108 feet on the map.

Q 108?

A Yes, sir.

Q And your standard location down here would actually

be on 100?

A Yes, sir.

Q Now, in your opinion, what would be the reason that your standard location wouldn't be as productive as the Marathon well?

A In my opinion, the reason it would not be as productive as the Marathon well is because of the low flow rates in the Hanagan well, and we would only be approximately 1,700 feet from the Hanagan well.

Q If you had as much gross pay in a standard location as the Marathon well, then the only difference in productivity of the two wells would have to be permeability, wouldn't it?

A Yes, sir.

Q On your Exhibit Number 2, can you tell me what kind of a well the Bogle No. 5 is? That would be the second one from the right.

A I believe it is a top allowable.

Q I was noticing the similarity of the Bogle No. 5 log with the dolamite section of the Hanagan well. That is from about, well, 7,326 -- no, that would be about 7,326 to somewhere around 7,355?

A Yes, sir.

Q Now, do you agree that the similarity of the log

for this dolamite section is very comparable to the No. 5 Well in the -- well, I believe you call it the reef section, the way you described it on this cross examination?

A Yes, sir, I think that these are correlative in part -- not in part. I think these zones are correlative.

Q Would it follow then, or would it be reasonable to assume then that the part of the reef section that produced some gas in the Hanagan well would be that part under discussion here, the dolamite section, that the reason it didn't make a well is just that it didn't have enough dolamite?

A That my be correct.

Q And you feel by moving 932 feet farther up from the corner of Section 21, that you will probably increase this section of the dolamite?

A Yes, sir.

Q And you not only have a fault trap in this field, you have some reason to believe there is a permeability trap, too?

A Yes, sir, the south boundary of the field in this area does go to a zero permeability and porosity conditions, so that in a gross aspect, this reservoir reasonably would appear like a porous tube that is trapped against the fault on the west side of the field.

Q We haven't gotten into costs very much in this case, but we have gotten into the amount of productive acreage to a large extent. How little acreage could you afford to dedicate this well and still afford to drill?

A This is the problem I have had to face.

Q And you don't have any idea how much that would be?

A I have shown this gross area, or this isopach map in Exhibit 1, in which I show the maximum limit of the field. I certainly think that I could not ask for more acreage than this, and I think it is reasonable to assume that there could be some downward adjustment from this amount of acreage, provided the proper planimeters for cutoff of permeability and porosity could be established.

MR. UTZ: Any other questions of the witness?

REDIRECT EXAMINATION

BY MR. LOSEE:

Q Mr. Mershon, in connection with the question that Mr. Morris asked you with respect to the changes that you had made both in your Exhibit 1 and your field map on the right hand side, and your area of interest map on the left hand side, from the map presented by the symposium and published by the Roswell Geological Society in 1967, did you have any additional information that was available to you which

indicated a change should be made in that map, as far as the area of interest is concerned?

A Yes, I had all the logs of the wells, and the completion cards, as well as a surface geophoto study, in order to interpret the structure, and so the changes that were made were essentially these that we see in Section 22 -- or in the area of interest map.

Q Now, the Examiner asked you the question that if the changes in the location from the standard, which I suppose to be the 1,650 feet out of the north and east corner, to a location 990 out of the north and east corner, was equidistant out of the northeast corner of the section, and your answer was yes. Have you subsequently calculated how far your 990 location is out of the corner?

A Yes, and I was in error, and this location scales to the section corner line 1,400 feet.

Q And the distance previously furnished you by some of the witnesses or counsel closer to the northeast corner from 1,650 to 990, the location was 932 feet?

A Yes.

Q So that actually the moving of your location from 1,650 to 990 is two-fifths of the way to the northeast corner? You would be dealing with a square of 660 feet on the side,

moving from 1,650 to 990? Moving from 990 on to the corner, you would be dealing with a square of 990 feet on the side, so you would be moving two-fifths of the distance closer to the northeast corner, or if you wish to make it 932 feet, over 1,400 feet?

A That is the proper ratio, 932 to 1,400.

Q Or really 932 to 2,332, that is how much closer you would be moving to the northeast corner?

A Yes, and I testified they were equal, and they are not.

MR. LOSEE: That is all.

MR. UTZ: Any other questions of the witness? The witness may be excused.

MR. MORRIS: Mr. Examiner, on behalf of Marathon, I would like to move that the testimony and the Marathon Exhibit Number 1 introduced through Mr. Roy Young in the preceding case, including the cross examination of Mr. Young, be incorporated by reference into this case so as to obviate the necessity of just repeating that testimony.

MR. UTZ: I would see no reason, unless we have an objection.

MR. LOSEE: Mr. Examiner, I have no objection to the motion, as long as it is limited to the fact that I will

be granted the right to further cross examine Mr. Young about his exhibit; not about the matters covered in cross examination yesterday.

MR. MORRIS: That is fine with me, Mr. Examiner. I have just a couple of additional questions I want to ask Mr. Young, but I don't see any need to cover the ground again.

MR. UTZ: All right. Marathon's testimony in its entirety?

MR. MORRIS: Yes, through Mr. Young.

MR. UTZ: As presented in Case 4088, will be incorporated in Case 4089.

MR. MORRIS: May I ask Mr. Young to take the stand again. He was sworn in the previous case. May the record show that he is still under oath.

ROY M. YOUNG

called as a witness on behalf of Marathon Oil Company, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

(Whereupon Marathon's Exhibit Number 2 was marked for identification.)

Q Mr. Young, for the record you are the same Mr. Young

who testified for Marathon Oil Company in Case 4088 yesterday afternoon, is that correct?

A Yes, I am.

Q Mr. Young, in arriving at your opinions concerning the existence and extent of the existence of permeability in Section 21, did you rely upon any information that was furnished to you by Hanagan Petroleum Corporation concerning the attempted completion on its well in that section?

A Yes, sir, I did.

Q And is this informtion that you relied upon embodied within Marathon's Exhibit Number 2 in Case No. 4089?

A Yes, it is. It is a letter dated March 21, 1969, addressed to me from Hugh E. Hanagan, partner in Hanagan Petroleum Corporation.

Q I won't ask you to refer to all of the information shown in that letter, but will you please refer to the completion data in which they attempted to make a production test?

A Well, of course, they made several production tests in between their different acid treatments.

MR. LOSEE: Excuse me. Mr. Examiner, I would like to review the letter, if I may, if he is going to testify.

MR. UTZ: I think you are entitled to that.

MR. LOSEE: Mr. Examiner, I would like at this

time to object to Mr. Young's use of the hearsay evidence from Hanagan Petroleum Company, on the grounds that, one, it varies from or at least is more extensive than the report to the Commission. It is matters that took place two or three years ago, and I would like to have the right to cross-examine Hanagan with reference to their memories or where the information came from, and it is surely hearsay as far as proving the fact of the matters purported to be testified to.

MR. MORRIS: In that regard, Mr. Examiner, of course, if anyone should know, Hanagan should. But the evidence is offered here as backup evidence for Mr. Youngs's statement as to what he considered in forming his opinions concerning the permeability, existence of permeability in Section 21, and offered for that purpose. So the hearsay objection would not be valid.

I might further comment there has been an awful lot of hearsay offered here by the applicant, including the portion of his basic map here that was prepared by the Roswell symposiu, that has come into evidence. So I think all of these things should be considered by the Examiner in ruling upon this objection, which we resist.

MR. UTZ: Do you have any rebuttal?

MR. LOSEE: Well, with what has come in the past, I have no rebuttal. It is already before the Examiner as to whether it is or isn't hearsay. The time to object was then. I think if he merely states that in his determination of permeability, he relies upon information furnished by Hanagan, he has accomplished the purpose to which Mr. Morris indicates this evidence is to be used for. I am concerned that I don't know whether the evidence is correct or not.

But I do think to the point of admitting it to show the fact as to the ability of the well to deliver, and pressure not reported to the Commission, it is surely hearsay, and there is nothing wrong with the witness testifying that he obtained information from them for the purpose of forming his opinion. But when the information, itself, is admitted, then it also goes to prove the fact of that information, and I think that is hearsay.

MR. UTZ: Mr. Young, this is a letter from Hanagan, one of the Hanagan brothers?

THE WITNESS: Yes, sir, from Hugh E. Hanagan.

MR. UTZ: Is this a report from him, by him, or is this a report from another engineer that did do his work for him?

THE WITNESS: I personally talked to Mr. Hanagan

on Friday, March 21st, in an effort to obtain more information about his well than is normally reported on the scout tickets, which are a normal part of doing business in the petroleum industry. All engineers and geologists use scout tickets. It is a commercial service that furnishes information on all wells drilled in the state. The scout ticket that I refer to was a little bit brief in some of the details in his attempt to complete the Hanagan No. 1 in Section 21. Therefore, I called him personally on the telephone and asked him if he could furnish me any information about his completion attempt, and this letter of March 21st which we are attempting to introduce as Marathon's Exhibit 2, was his answer to me from that telephone call.

MR. UTZ: Do you know who wrote this report, though? Is it Hugh Hanagan, or was it an engineer that worked for him?

THE WITNESS: I couldn't answer that.

MR. MORRIS: Mr. Examiner, maybe I can solve this dilemma by my questioning in a different way.

MR. UTZ: Without introducing this as an exhibit?

MR. MORRIS: Yes.

MR. UTZ: I think that would be agreeable.

BY MR. MORRIS:

Q Mr. Young, in reaching your conclusions, your opinions concerning the permeability or lack thereof in Section 21, did you rely upon information furnished to you by the Hanagan Petroleum Corporation?

A Yes, sir, I did.

Q What information did you rely upon with respect to the -- in this regard?

A It has been reported that the Hanagan Indian Federal No. 1 in Section 21 was perforated over a close interval from 7,332 to 7,419, and I believe the applicant's witness in this case has testified to that fact. He further testified that the well had been treated on three different occasions with a total of 26,000 gallons of acid. He further testified that the well as reported to him had flowed at a stabilized rate of 150 to 200 MCF per day.

The information which I received from Hanagan indicated that that well did produce 100 to 150 MCF per day, but the pressure after the well was opened and placed on production would bleed down to zero to twenty pounds in two hours. This occurred on several days tests between January 7, 1967, and January 16, 1967. In all cases, in about two hours it would blow down to about zero to twenty pounds.

From this, I have concluded, and it is my opinion that the permeability in the Indian Basin pay zone in the Hanagan well in Section 21 is extremely low.

MR. MORRIS: That is all I have.

MR. UTZ: Any questions of the witness?

CROSS EXAMINATION

BY MR. LOSEE:

Q Now, maybe I misunderstood you yesterday, Mr. Young, your Exhibit 1 being the isopach of the net gas pay, it was my understanding that you used porosity as your cutoff, and actually did not include permeability in drawing your isopach?

A The only information that we have on permeability in this area of interest, in my opinion, is a permeability in a qualitative sense in the Hanagan No. 1.

Q Well, let me go back and see if I can get an answer to my question. Your isopach was not drawn considering permeability?

A No, sir.

Q In your conversations with the Hanagans, did they tell you whether they had or had not fractured the limestone section present in their well?

A I did not discuss this particular point with the Hanagans.

Q Well, you have received an extensive report from them as to their treatment. Would you examine it and tell me whether it shows whether or not it was fractured?

MR. MORRIS: I might state, if Counsel wishes to have that report introduced into evidence as an exhibit, we will be glad to oblige.

MR. LOSEE: I didn't ask for that.

A I think the answer to the question is that, as we have testified previously, both myself and the witness for the applicant, the well is perforated over a gross interval from 7,332 to 7,419. Now, the interval, gross interval from 7,332 through 7,356, is in what my opinion is the dolamite, and I believe which will agree with the applicant's cross section.

Now, the interval from 7,394 to 7,419 is probably in the lime section, so in effect Hanagan has both dolamite and lime open in this well, and in treating it, he treated it all.

Q Well, he acidized it?

A And he acidized it.

Q Did he fracture it?

A Not that I know of.

Q Now, in preparing your isopach on the exhibit which

was your Exhibit 1, you show 14 feet of pay in the Hanagan well?

A Yes, sir.

Q Is that all dolamite with two percent or more porosity, or is there any limestone in that with two percent or more porosity?

A I believe that is basically all dolamite.

Q Well, is it not correct that in that well there is eight feet of limestone with porosity up to ten percent?

A I am not aware of that.

Q Well, is there any limestone with more than two percent porosity?

A In my analysis, I give no porosity or net pay to the limestone. It was all confined to what I considered was dolamite.

Q Do you know the porosity of the limestone that was in that reef section?

A I would have to say, from my recollection, that it was all greater -- or less than two percent porosity.

Q Would you say I would be wrong if I said there was eight feet that had more than two percent porosity of limestone, in addition to 14 of dolamite with two percent or more?

A Would you repeat your question?

Q My question is, would you say it would be wrong that there was eight feet or more of this well of limestone with two percent or more porosity, in addition to the 14 feet of dolamite with two percent or more porosity?

A Well, I believe this is a matter of interpretation. It is possible to have that.

Q Well, if my statement is right that there is eight feet of limestone with two percent or more porosity, and in addition to the 14 feet of dolamite with two percent or more, would that not change the amount of net pay from 14 feet to 22 feet on your isopach?

A Yes, sir, it would change it slightly, if that would be correct.

Q And that would also again move your isopach lines to the south in Section 21, the zero line?

A Yes.

Q Now, referring to the Gulf well in Section 22 again, you heard the applicant testify with respect to the trapped or perched water in Section 22, 300 feet above the gas-water contact in the field. Do you agree that his testimony is a possibility with respect to why this Gulf well encountered water?

A Well, I am still not sure what he meant by trapped

water. My testimony yesterday was that the well produced only water. Therefore, there is no net pay as far as gas is concerned.

I think we all admit that this whole south end is fairly complicated geology, and for the full explanation as why the Gulf No. 2 produced water, I can't explain it. I don't understand it. But, at the same time, I conclude that there is no net gas pay, and as far as I am concerned, you have to have net gas pay to have productive acreage, which I believe is one of the contentions in this area.

Q Mr. Young, do you think Mr. Mershon's explanation of the perched or trapped water is reasonable? You say it is a complicated area to calculate. Do you think his is a reasonable assumption?

A I would say it is a possible explanation.

Q Then, if the water is in somewhat the area that he lists, and if the Gulf well had 32 feet of dolamite with two percent or more porosity, would that not also change your isopach lines in Section 22?

A Not one bit, as far as I am concerned, because this is an isopach of net gas pay. And as long as it is filled with water and is only water-bearing, water productive,

it still is, in my opinion, zero net pay.

Q Well, Mr. Young, if the water is trapped toward the east half of Section 22, and yet the porosity is present in the well, in the Gulf well, so that actually there is no water over in the east side of Section 22, and yet there is 32 feet of dolamite porosity present, that would move your lines down, would it not?

A You are speaking of the west half of 22 now?

Q Yes.

A Well, that is strictly interpretation, and I don't know whether I could say that the zero line was any further south. All we have got for control is the two dry holes in Sections 21 and 22.

Q But if the dry hole in -- or the wet hole in the east half of Section 22 is caused solely by trapped water, and the porosity in the reef is present on the west side of Section 22, as evidenced by porosity in the wet hole, your isopach line in Section 22, your zero, and 20, and 40 foot contours would swing down, would they not?

A I suppose from the interpretation of the trapped water that he has, it is possible.

MR. LOSEE: That is all.

MR. UTZ: Any questions?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Young, do you agree with Mr. Mershon that the lime is productive in some areas of this field?

A From my examination of all available data from this field, I have concluded that there are four wells in the field which produce from the lime. There is two on the northwest side of the field, and I believe the applicant's witness testified to those two.

Q Sections 18 and 19?

A Yes, sir. Then I believe another well that produces from the lime is the Pan American well, Indian Basin 3-C in Section 25, 21-23, and also the Penrock No. 1 in the northeast quarter of Section 19, Township 21-24.

Now, the remainder of the wells, in my opinion, actually produce from the dolamite. The dolamite is the gut production of the field.

Q Well, would you agree that this Hanagan well, what little gas it produces, some of it could be from the limestone?

A It could be, certainly.

Q In other words, if some of the pay was from the limestone, then that would cause you to bring your isopach a little further south?

A Slightly.

Q That could be done irregardless of what happened up here in Section 22?

A Yes.

Q Could it not, on a reasonable basis?

A Yes. I still want to point out, though, that in my opinion, everything we have shown on our Exhibit 1 is still a maximum when it comes to speaking of productive acres, because of Hanagan's failure to make a well in Section 14 -- correction, Section 21.

MR. UTZ: Any other questions? The witness may be excused. Does that complete your case?

MR. MORRIS: Yes, Mr. Examiner.

MR. UTZ: Do you have some testimony, Mr. Kellahin?

MR. KELLAHIN: Yes, I do.

JOHN T. CAMERON

called as a witness by Standard Oil Company of Texas, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

(Whereupon Standard Oil Company's Exhibits 1 through 5 were marked for identification.)

Q Will you state your name, please?

A John T. Cameron.

Q By whom are you employed and in what position?

A Standard Oil Company of Texas. I am a senior proration engineer.

Q Where are you located?

A Houston.

Q In connection with your duties as senior petroleum engineer, do you have any jurisdiction in the State of New Mexico for your company?

A Yes, sir, we cover New Mexico also.

Q Does that include the area which is the subject of the application of Paul Mershon in Case 4089?

A Yes, sir.

MR. KELLAHIN: Are the witness's qualifications acceptable?

MR. UTZ: Yes, they are.

Q Mr. Cameron, you heard the testimony presented by the applicant and by Marathon Oil Company in Case 4089, did you not?

A Yes.

Q Did you hear the testimony of Mr. Mershon with reference to his Exhibit Number 1 regarding the presence of

water which, I believe he refers to as trapped water or perched water in the section adjacent to Section 21?

A Yes, I did.

Q Have you any information in regard to the presence of water in this pool, in the Indian Basin Upper Pennsylvanian?

A Yes.

Q Referring to what has been marked as Standard's Exhibit Number 1, would you point out the significant information regarding the presence of water in this basin?

A Exhibit 1 is a contour map on the gas-water contact. That is to say, Indian Basin Upper Pennsylvanian Field, we are convinced that the gas-water contact is not a level horizontal surface, but is tilted from the extreme west end to the extreme east end of the field; the gas-water contact varies from something on the order of minus 3,100 feet to something deeper than minus 4,000 feet.

When this field was originally -- when development commenced in this field, a gas-water contact at minus 3,750 feet was established in one of the early wells, and that contact was generally accepted by most of the operators for some time. However, Standard of Texas began noticing certain anomalies to that minus 3,750 foot gas-water contact, not only the anomalous contact of the Gulf dry hole

in Section 22, but also some 13 other anomalies that were proven by production or drill stem tests.

I have circled on this particular exhibit in red the 14 wells in which a positive gas-water contact determination was made, that differed from the minus 3,750 foot contact that was originally felt to be consistent throughout the field. For example, on the west side of the field, there are three wells which established a contact above minus 3,300. For example, our Bogle Flats Unit No. 6 in Section 8, by drill stem test determined the gas-water contact to be minus 3,135 in that well.

Further to the west, in Section 7, all water productive tests in our Bogle Flats No. 7 established a water contact somewhere above minus 3,279.

Similarly, drill stem tests in a Sun well in Section 6 established a water contact above minus 3,343. As I have said, all of these 14 wells established some sort of contact that differed from the minus 3,750 foot.

On the east side, several wells have encountered the gas-water contact at something considerably deeper than minus 3,750. One by drill stem test in Section 24, Township 21 South, Range 23 East, established a contact of minus 4,102 and minus 4,202. The explanation for these

anomalies, we are convinced, are a tilted gas-water contact that is caused by hydrodynamic forces. By hydrodynamic forces, I mean that the water, the aquifer to which the hydrocarbon accumulation is connected is not static, that is to say it is flowing from west to east. It doesn't take a high rate of flow of bottom water to cause gas-water contact to tilt. It is very common. A few feet of the water movement will cause the gas-water contact to tilt because of creating pressure gradients.

Hydrologists within our company have studied the hydrodynamics in this field, and determined that the water in the aquifer is moving from southwest to northeast, and that explains the tilted gas-water contact. I personally can't see that the tilted gas-water contact and the anomalous production in the 14 wells I have marked can be explained in any other manner. Faulting is not the answer. These wells are obviously in pressure communication, and they are all obviously in the same reservoir.

We also can't see any way to explain it with the use of perched water levels, as Mr. Mershon has tried to do in Section 22. You have to be able to map a closed low in order to have a perched water table. Even Mr. Mershon's map, as I understand it, does not show a closure,

which would explain the water production in the Gulf well.

Furthermore, even if you could map Section 22 to show a perched water level in that area, I see no possibility of drawing 14 separate perched water levels in this rather large field.

In the area in which we are interested, in Section 21, Township 22 South, Range 23 East, the water level varies from about minus 3,170 feet at the northwest corner to about minus 3,350 feet in the southeast corner. The applicant's proposed 990 foot location would encounter the gas-water contact at about minus 3,275. A regular location 1,650 feet out of the northeast corner of that section would encounter the gas-water contact at about minus 3,260 feet.

Now, I will show on our next exhibit that a well at either location will encounter the top of the Cisco Canyon carbonate well above this. As a matter of fact, in the proposed location, the top of the Cisco Canyon carbonate will be about 100 feet above the gas-water contact. At a regular location, the top of the Cisco Canyon carbonate will be encountered about 100 feet above the gas-water contact. In other words, the water is not going to be

the problem of establishing commercial production in Section 21. The loss of the net pay is going to be the problem in that area.

There will be no advantage that we can see to Mr. Mershon to move his location from a regular location at 1,650 to the proposed 990 location, as far as the water is concerned.

Q Mr. Cameron, Mr. Mershon's Exhibit Number 1, the left hand portion of it, the area map would seem to indicate a fault line which would cut off your well in Section 8 from the other wells in the pool, is that correct?

A Yes, sir.

Q Would that have any effect on your conclusion as to this water situation?

A No, sir, I don't believe it would. Now, I think the fault that you are asking about is the separate fault that runs across Sections 16 and 9.

Q If we assume that fault to be present, would it have any effect?

A No, sir, he doesn't show that to be a ceiling fault. There is no ceiling fault there, in my opinion. The well in Section 8 is in pressure communication with the other wells. Pressure history of all the wells is very consistent, and there

is no question in my mind but that they are in pressure communication.

Q Referring to what is marked as Standard's Exhibit 2, would you identify that exhibit?

A Standard's Exhibit Number 2 is a structure map on the top of the Cisco Canyon carbonate, which is the pay zone in the Indian Basin Upper Penn.

Q Please continue.

A This structure map doesn't really differ drastically from the structure introduced by the applicant. The only point I wish to make as to the structure is that his regular location at 1,650 feet from the northwest corner -- I am sorry, the northeast corner, would encounter the top of the carbonate at about minus 3,150, which, if I remember correctly, would give him about 110 feet of interval between the top of the carbonate and the gas-water contact.

The 990 foot location would encounter the Cisco Canyon carbonate at minus 3,175, which would give him about 100 feet of interval between the top of the Cisco Canyon carbonate and the gas-water contact.

Q Then he would have about 10 feet difference if he moved to an unorthodox location?

A Yes, sir.

Q And that is as to the gross pay?

A Yes, that's correct.

Q Have you prepared a net pay map on this area?

A I have prepared an isopach of net pay times porosity.

Q Is that your Exhibit Number 3?

A That is Exhibit Number 3. This map was prepared by examination of all the electric logs in the field, all the porosity logs. In general, those are sonic logs of a few formation density logs. All of those logs were examined. We have used, like Marathon has, a porosity cutoff point of two percent, and the porosity logs that we use being direct reading, that is to say the porosity can be read directly off the log, if an appropriate scale is put on the log. Then using the porosity cutoff point that we have used, you can simply planimeter the sonic log or the formation density log, and the area under the sonic log curve will give you the product of porosity times net effective pay.

Of course, you do have to exclude any shale that is not contributing, and you also exclude anything that is below the gas-water contact, if it happens to be encountered in that particular log.

Q Now, in connection with your preparation of this map and your study of the logs with reference to Section 21,

did you have a log available for that section?

A Yes, sir.

Q Did you find in there the porosity development in the dolamite?

A Yes, sir.

Q Did you find any porosity development in the limestone above two percent?

A Yes, sir, I did. This field is predominently a dolamite pay field. However, as Mr. Mershon points out, there is productive limestone within it, and we have included any productive limestone above two percent porosity, just as we have any productive dolamite above two percent porosity.

The numbers next to each of the wells shown on Exhibit 3 shows the results of the planimetering of these logs. The well in Section 21, you will note, has a number, 0.88 feet. That is the product of porosity times net effective feet, whether limestone or dolamite.

I might say that in that particular well, in the Hanagan well, the number of feet that we have determined above two percent porosity is 24 feet, and that differs somewhat from the number used by Marathon, and that is because we have included the limestone in the lower part of the interval, of which Marathon has excluded from their

isopach map.

Now, using all the controls that we have available, we have drawn the map as it is here shown. The zero line cuts across the north half of Section 21, leaving 266 acres in what we consider to be productive acreage within that section.

I might elaborate a little bit on why we have used two percent porosity, and what that cutoff point means. Two percent porosity cutoff was used by Marathon in the 1967 field rules hearing. We concurred in it at that time, and we still concur in it. What we are really saying is that below two percent porosity, the effective permeability to gas approaches zero. Now, admittedly the use of any porosity cutoff point is somewhat arbitrary. It is used, however, in every field as far as I know, because there becomes some point below which any core space which contains gas has so little absolute permeability, that the permeability to the gas space becomes zero. And in this particular field there are only some eight wells, I believe, that have been cored, so that our data as to permeability is somewhat limited. It would be ideal if we could map permeability and show exactly the zero line of effective permeability to gas, but the permeability data that is available doesn't lend itself to

such a map. So it is common practice, and it's been done in this field and by practically everyone in the field, to make some correlations between porosity and permeability, and porosity, of course, can be mapped.

Now, our own correlations between porosity and permeability in the cores that we have available leads us to believe that there is no permeability to gas in any carbonate containing less than two percent porosity. We have also made correlations between porosity and capillary pressure, which indicates to us that below two percent porosity there is very little gas contained in the core space; that is to say, the water saturation is very high because of the fine core geometry.

Our correlations in regard to permeability indicate that this gas, if it is contained in the less than two percent carbonate, is not movable, so it would not be produceable from any well, and it would not contribute to the production in the reservoir.

Q Then the effect of your testimony is that the southern portion of Section 21 is not productive of gas in the Indian Basin Pool?

A That's correct.

Q Is that your conclusion?

A It is not productive of gas, and if it contains any gas whatever, that gas will not contribute to the production anywhere else in the field.

Q Either at a standard or nonstandard location?

A That's correct. I might say that the mapping in the manner that I have mapped here is borne out very well by production history in the field. We have found that anything between about zero feet and 1.0 feet of porosity pay will produce some gas, but will probably be noncommercial.

A cutoff point of commercial production seems to be something on the order of 1.0 net effective feet porosity. For example, the Hanagan well with 0.88 feet did have some movable gas, and we have given it credit for the porosity feet that we think it is entitled to. It did not quite make a commercial well. There is some possibility that it could have been made commercial if it had been fracture treated. I can't really say for sure that is the case.

However, further to the east and off of this map, just off the map in Section 13, the Pan Am Honolulu well has a porosity foot value of 0.97 feet, and that well did make a marginal commercial producer after a

fracture treatment. That, in itself, is consistent with our 1.0 estimate of commercial production.

There are two other wells in the field that are commercial producers that have net effective porosity feet between 1.0 and 2.0.

There is one additional dry hole which has 1.02 net effective porosity feet, and did not quite make a commercial well in that one, also.

I might also point out that in Section 14, unfortunately I don't have the well names on these, but this is a Marathon well discussed by both the applicant and by Mr. Young earlier. It is the well that has 108 feet of gross pay, according to Mr. Mershon's map, and there was some question about why that well was a good commercial producer, while the Pan Am Honolulu well was a marginal well, and the reason for it is that that well has a great deal more porosity feet than does the Pan Am Honolulu well. It has 5.44 porosity feet as compared to only 0.97 in the Pan Am Honolulu well.

So it seems to us that mapping this particular planimeter does give a good idea, not only where the zero limits are, but whether a productive well could be expected.

Q Mr. Cameron, could you give a statement of the difference in the net effective pay between the proposed location of the applicant and the standard location?

A Yes, sir. The proposed location should encounter about 2.5 porosity feet above pay, and I believe that he will be able to get a commercial well at that location.

At a regular location, he will encounter about 1.0 porosity feet, and at that location he will be right on the borderline between commercial production and noncommercial production. I think he will have a reasonable chance to make a commercial well at that location. Obviously, his risk is better at the 990 location. It would be even better at a 660 location or a 330 location.

Q If the Commission were to approve the unorthodox location and the dedication of 640 acres to the well, would that have any adverse effect on the correlative rights of other operators?

A I didn't understand.

Q If the Commission were to approve the unorthodox location, 990 feet out of the corner, and dedication of 640 acres to the well, would that have any adverse effect to the offsetting operators?

A Yes, it sure would. One of the other advantages

of this particular type of map is that it is a direct indication of the distribution of gas reserves. So that by a planimeter of this map will give you the pour volume in the reservoir. If you subtracted that volume occupied by the connate water volume, then you would have a hydrocarbon volume map, and that is directly related to the gas reserves.

Now, for example, the planimeter of this particular map in Section 21 shows that that section contains 452 acre feet of pour volume. By way of comparison, Section 16 immediately to the north, which is operated by Standard of Texas, contains some 5,120 acre feet of pour volume. So, since these figures are directly related to reserves, Section 16 contains some 11.4 times as much gas reserves as does Section 21. Therefore, if Section 21 is assigned a full 640 acre allowable, he will be effectively assigned 11.4 times as much allowable as is required to prevent drainage from one lease to the other.

Q Would this be true if he were assigned 266 acre allowable?

A Well, he would still enjoy a generous allowable even under a 266 acre allocation, simply because of the allocation formula. It doesn't consider the difference in either net pay thickness or in pour volume from tract to

tract. If he is assigned a 266 acre allowable, he will be assigned 4.77 times as much allowable in relation to reserves as is Section 16.

Q In other words, the 266 figure is simply the productive acreage, and not the volume of gas?

A That's correct.

Q It has no bearing on the volume of gas, necessarily?

A That's correct. I think the 266 acres, if it is assigned, would be more than generous.

Q When was Exhibit 1 prepared?

A 1966. I think it was June of 1966.

Q And that was prepared in the ordinary course of your business?

A Yes, it was.

Q Have you examined all the data shown on that exhibit?

A Yes, I have.

Q Are you in agreement with it?

A Yes, I am.

Q Were Exhibits 2 and 3 prepared by you or under your supervision?

A Yes, they were.

Q Referring you to Exhibits 4 and 5, would you

identify those exhibits?

A Exhibit 4, I believe that is the Standard well. Exhibit 4 is a copy of the sonic log in the section of interest, on Standard of Texas Bogle Flats Unit No. 5.

Q What information has been marked on that exhibit?

A We have marked the intervals that are considered net pay, that is to say, that have porosity above two percent. Unfortunately, the reproduction didn't come out quite as clear as we would like, but I believe it does show the area, the porosity that we have included within the two percent cutoff line. All of the area between two percent cutoff and the sonic log, itself, was planimetered to arrive at the number of porosity feet in that well, and in this case it turned out to be 7.62 percent.

Q Does that complete your testimony as to Exhibit 4?

A Yes.

Q Referring to Exhibit No. 5, would you identify that exhibit?

A Exhibit No. 5 is a copy of the formation density log in the Hanagan well in Section 21, and it is similarly marked to show the intervals that have been included as net pay. We call the lower shaded interval a dolamitic lime, and we have included it, it amounts to some eight feet of pay.

And the other net pay in that well is in the upper section, and it is a dolamite. And the planimeter of that log below two percent -- I am sorry, above two percent, amounts to 0.88 porosity feet.

Q Were Exhibits 4 and 5 prepared by you or under your supervision?

A Yes.

Q Did you make the net pay pick, yourself?

A The net pay picks had been made previously by our other geologist, but I have gone over them, and I agree with them.

MR. KELLAHIN: At this time, I offer Standard's Exhibits 1 through 5, inclusive.

MR. UTZ: Without objection, Exhibits 1 through 5 will be entered into the record of this case.

Any questions of Mr. Cameron?

CROSS EXAMINATION

BY MR. LOSEE:

Q Mr. Cameron, you have looked at the applicant's area map and the field map in which he shows the major fault to exist along the west side of the field. Do you agree with that interpretation?

A There is a major fault to the west side of the

field, and we do so accept it. I am not sure that the trend of it is exactly as Mr. Mershon has shown, but it is close.

Q Now, considering the existence of a major fault somewhere in that area along the west side, had you or Standard mapped the bottom of this reef, would that possibly have explained to you the presence of perched water in several, if not all of these 13 wells that you pointed to scattered throughout the field?

A I don't see how it could.

Q Did you map the bottom of the reef?

A I did not.

Q Do you know if Standard did?

A I think the base of the reef has been mapped. I haven't, myself, examined those maps.

Q Did you consider -- obviously, you didn't -- do you know whether that bottom of the reef map was considered in approaching this hydrodynamics theory, as opposed to the perched water theory of the water in this basin?

A I am sure it was considered, yes.

Q On your Exhibit 1, and I really am looking at a small version of it, referring to the Gulf Oil Corporation No. 1 Helbing Well in Section 15, you show 3,340 as a footage

depth. Would you explain that?

A Well, that symbol in front of the 3,340 means greater than minus 3,340. So that the gas-water contact is somewhat deeper than minus 3,340.

Q Actually, in that well they didn't encounter water?

A I believe that is correct. I would have to check some worksheets to make sure.

No, sir, they did not encounter water.

Q Actually, that 3,340 is the bottom of their perforations?

A I believe that is correct.

Q Now, what about the Marathon No. 1 Federal in Section 14 at which you show greater than 3,554? They didn't actually get water in that well, did they?

A No, sir, that's correct.

MR. UTZ: What section was that again?

Q Section 14 of 22-23.

Now, is the same thing true with respect to your Standard of Texas well in Section 16? You show greater than 3,120?

A That's correct.

Q You did not get water in that well?

A No, sir.

Q And that is really the bottommost perforations?

A Yes, sir.

Q At least on this small exhibit then, these contours do not actually show gas-water contact, do they?

A That's correct, that is the reason that we put the large map on, so that we could show the points of control. The points which are labelled either greater than or less than do not give a point of positive control for the gas-water contact. There are several wells which do, and all of those points were considered in drawing the large map.

Q But actually in the area where the application is concerned with respect to the proposed location, the only well that had water was the Gulf well, your only control point?

A Yes, sir, that's correct.

Q And these contour lines could move considerably without any more control than that?

A Well, you have control in other wells. Of course, to the north and west, there are several wells that have controls, and you map as smoothly as you can between the points that you do have as positive control points, always keeping in mind that you can't conflict with these deeper than or less than control points, also.

Q By the same token, your amount of control in the area of interest is rather slight to permit you to draw this contour as you have in these six or eight sections, surrounding sections around 21?

A I will admit that you could draw these contour lines in a different fashion, but I don't think you could change them too drastically. But the control doesn't nail each contour line down to exactly any one point, except where the more positive control points are available.

Q Now, you show this Ralph Lowe well in Section 28 as having encountered water. Was it tested in the producing reef zone?

A Yes, sir, it was. And it produced, as I recall, some 1,800 feet of sulphur water on a drill stem test.

Q Now, referring to what has been marked as Exhibit 2, Mr. Cameron, which is your structure map on the top of the Cisco Canyon. In the preparation of the preparation of this map, did you use any surface geology?

A Surface geology?

Q Yes.

A I don't believe that any surface geology was used, no.

Q Did you use any seismic picture in preparing the map?

A No, sir.

Q How about any geophoto data?

A No, sir.

Q It was entirely, then, made on subsurface geology?

A Yes, sir.

Q And so that actually as to this Exhibit 2, insofar as it differs from the Applicant's Exhibit 1, which does take these other factors into consideration and does reflect the existence of perched water --

MR. KELLAHIN: If the Examiner please, I object to the form of the question. There is no evidence here that that exhibit is based on seismic information, or the other information he has referred to.

MR. LOSEE: I beg to differ with you. The witness testified that it was for those reasons that he made the changes in the symposium map, and with the addition of the surface geology, and seismic, and geophoto.

MR. UTZ: What was your argument again, Mr. Losee?

MR. LOSEE: Well, in answer to his objection, my statement was -- my witness just corrected me in one area,

and I will remove that in the statement. That he did prepare this exhibit and make the changes in the map presented by the symposium, based upon geophoto data and surface geology, not seismic.

MR. UTZ: So you have no conflict then?

MR. KELLAHIN: All right, go ahead.

BY MR. LOSEE:

Q My question again, Mr. Cameron, I am sure both of us have lost the thought of it. Insofar as your Exhibit 2 differs from the Applicant's Exhibit 1 as to the area of interest, if you had used surface geology, and geophoto data, can you say that you would not have agreed with Mr. Mershon's theory of perched water in the area of the Gulf well?

A No, I would not have agreed with his theory of perched water, even if I accepted his structure map, because his structure map isn't consistent with that. As near as I can tell, it is not consistent with perched water. He does not show the area of perched water to be a closure, and I don't see how you could have perched water under that circumstance.

I believe I did say, however, when I presented Exhibit 2, that it does not differ significantly from the Applicant's Exhibit 1. I think in the area of interest, there isn't any significant differences.

Q Well, isn't it true that he shows greater plunging noses down here, more exaggerated than you do in your structure map?

A In what area is that, Mr. Losee?

Q Well, in the area below Section 21.

A I don't show any structural nose in that area, no, sir.

Q And his map does?

A Yes, sir.

Q And your map has not taken into account the surface geology, and the geophoto data?

A My map has not. Of course, I consider the subsurface data by far the best control for the structure.

Q Well, obviously, the most factors you can use would give you the best control, would they not?

A They would. But where you conflict, you certainly choose the subsurface rather than the geophoto or seismic.

Q Referring now to your Exhibit 3, looking on the west side of this exhibit, you have shown your isopach lines to dip up. You actually have no control to the west of the Hanagan well, other than the location up in Section 17?

A On the west end of this exhibit, the control is not only the control of the net pay in the wells, but also the

intersection of the top of the Canyon structure with the gas-water contact map.

In other words, the intersection of water would also determine your net pay thickness.

Q I am really referring to what control you have directly west of Section 21, which would cause you to swing all your isopach lines to the north, rather than continuing to curve them on to the southwest as they have started in the main portion of the map.

A As I say, they must curve up to meet the controlled contours inside the west half of Section 17.

Q What about the existence of the major fault occurring to the west of it?

A In this particular area, you run out of pay before you hit that fault. Farther north, that is not the case. But right here, your zero lines are controlled by the water contact.

Q Well, how far does Standard think the fault is west of Section 21?

A The fault runs right down the line separating Sections 7 and 8, and it runs within a few hundred feet of the west line of Section 17. I might add that that fault is still of some question within our company. We think that there is

some evidence that it is there, and we are showing it as a questionable fault at this time.

Q Where does it run through Section 20? It must be along toward the west line of Section 20?

A I would say about 900 feet from the west line of Section 20.

MR. UTZ: Which way from the west --

THE WITNESS: 900 feet east of the west line.

MR. UTZ: East of the west line?

THE WITNESS: Yes, sir.

Q Isn't it true that your contours on your Exhibit 3 can run into that fault, and actually swing south, as they have started to do in the north tiers of Sections in 16 and 17?

A You would run into the water contact before you got that far, and you would have to begin curving your lines north.

Q Now, you have talked about your study principally in this Exhibit 3 of the Hanagan well. Did you make a similar study of the Gulf well in Section 22?

A I don't have the information on the Gulf well in Section 22. I do not know how much net carbonate there is in that well. Obviously, there is some. It did produce some water.

Q Well, if there is some carbonate in the well, which

I understand you disagree with, but assuming Mr. Mershon's theory to be correct, and that there is some carbonate, your isopach lines running to the east out of Section 21 would curve down to account for the carbonate in that Gulf well?

A No, sir, this is an isopach of the net effective pay having greater than two percent or greater porosity, and it also excluded anything below water, and, of course, the Gulf well is below the water level.

Q If you assume the perched water theory to be correct?

A I am not exactly sure how it would work if you assume that theory to be correct. It still would have no net pay, whether the water is perched or a tilted water level.

Q You can't really say, if the perched water theory is correct and you move toward the western half of the section, that that net effective pay is not present considerably south of your zero line, if you admit, as I understand you do, there is some net carbonate in that Gulf well?

A There is some net carbonate in that well. However, in this area, the zero line is also determined by the intersection of the top of the carbonate with the gas-water contact. So it is excluded from any net pay isopach map.

Q But if the water is only in the eastern portion of

Section 22, and the net pay extended on to the western side, runs up into the perched water, your line, your zero line would actually swing to the south in Section 21, 22, would it not?

A I suppose it would, Mr. Losee. But I would really have to try to make a separate sort of a map using Mr. Mershon's theory of perched water, and I haven't done so. I don't believe -- I believe our idea of the tilted water level is more nearly the case.

Q But if it were a true assumption, you do admit that it would swing down to the south?

MR. KELLAHIN: If the Examiner please, this line of questioning is all based on speculation. There is no evidence to show whether water is or isn't present on the other side of that particular section, and all we have is a theory, and we are now asking for an answer based on a theory, based on speculation. I object.

MR. UTZ: Sustained.

Q Mr. Cameron, generally speaking, is the Indian -- isn't it true that the Indian Hills Upper Pennsylvanian Gas Field is a low porosity field?

A Relatively speaking, that's correct. The original porosity is four and a half percent or thereabouts.

Q Well, can you state for certain that the reef section, having less than two percent porosity, will not contribute hydrocarbons to the reservoir?

A I can only give my opinion. I don't believe that it will contribute.

Q Would you answer my question? Can you state that it will not.

MR. KELLAHIN: I believe he has answered the question.

A I can state that in my opinion it will not.

Q You mentioned the pressure communication, Mr. Cameron, throughout this field as being good. Now, with that fact before us, if the allowable assigned to Mr. Mershon's well is in direct relation to the gas reserves under Section 21, isn't it true that it would have no more adverse effect on Standard as an offset operator, or to have the location 990 or 1,650 feet from the line?

A That is correct.

MR. LOSEE: Nothing further.

MR. UTZ: Any other questions?

CROSS EXAMINATION

BY MR. UTZ:

Q Mr. Cameron, are the red circles on your Exhibit

Number 1, your control locations? Is that the way you understand those?

A Not exactly. They are locations which positively differ from the minus 3,750 foot original contact that was first thought to be consistent over the field. Some of them are positive control points, that is to say, they nail the contact down exactly. Some of them are less than or greater than a number that differs from 3,750.

In addition to the ones circled, there are a few positive control points which do not differ significantly from the minus 3,750 foot original contact.

Q So some of those wells that are circled in red did not have a water contact in them?

A That's correct, some of them did not have a contact in them. By the fact that they did not have a contact, we concluded that the contact is deeper.

Q Well, that would seem reasonable. But you don't know how much deeper?

A That's correct.

Q Can you say roughly how many control points you had in the field to contour that water table?

A I can't without counting them. I think I can count them.

Q All right, would you?

A I would like to include some where the contact is narrowed down within a relatively small interval, since we have some control points where we think we have it to the foot, and we have some contact where we think we have narrowed it down by test to an interval of 100 feet at best.

Q Well, I think that would be reasonable.

A We have eight control points that differ from the minus 3,750.

By my count, I get four additional control points that don't differ drastically from minus 3,750.

Q Then, altogether, you have twelve control points?

A Yes, sir, excluding the deeper than or less than control.

Q Well, that is a pretty good size area to contour with twelve control points?

A It is, I agree. However, the differences are significant, too. We have a control point here of that difference by more than 1000 feet from the control point over here. (Indicating.) In fact, in several cases, that is the case.

Q Well, you could say you were in the ballpark, but you are subject to some corrections?

A Yes. There is a certain amount of interpretation that must go into this.

Q As I understand your Exhibit 3, you made a pick of what you considered net effective pay, multiplied that by the average porosity for that net pay?

A Yes, sir.

Q And you had logs enough to where you, particularly in the area in question here, that you were able to read and interpret those logs on almost every well?

A That's correct.

MR. UTZ: Any other questions of the witness? You may be excused. Any further testimony?

MR. LOSEE: I am going to recall Mr. Mershon.

MR. UTZ: We will recall Mr. Mershon for further questioning.

PAUL M. MERSHON, JR.

recalled as a witness on rebuttal by the Applicant, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. LOSEE:

Q Mr. Mershon, I will hand you a partially redrafted version of Marathon's Exhibit Number 1, and ask if you have redrawn three of the contour lines, the zero, the 20, and the

40 foot contours in red pencil?

A Yes. And the purpose of that was, one, I examined the Hanagan well in Section 21 and agreed that there was at least 14 feet of porosity greater than two percent in the dolamite, as well as an additional eight feet of limestone with porosity greater than two percent. I come up with accumulative dolamite here of 22 feet, because I am convinced that my theory of the perched water table explains the water in the Gulf well in Section 22.

I took the net porosity greater than two percent, and the carbonate in that well, and determined that there were 32 feet. Based on this data, I have added two lines to the Marathon exhibit -- pardon me, three lines. These are the zero line, the 20 line, and the 40 isopach line. In general, I would say that the map is adequately drawn from the standpoint of interpretation.

However, all points when we discussed net feet are subject to somewhat of debate. I would like to point out that the Standard of Texas exhibit just presented included 24 feet in the Hanagan well, which is two feet greater than I have presented.

These contours show that based on the data I have used, that we might include approximately 80

additional acres greater than two percent in the Marathon exhibit. I would say that in an engineering committee, I might agree to a planimeter of this sort. I did not planimeter this data, and it is only an estimate.

Q Which would mean you shown 405 acres, approximately, above the zero line?

A Approximately, yes.

MR. LOSEE: We will move to offer this as Applicant's Exhibit Number 5, insofar as the red lines crossing 21 are concerned.

(Whereupon Applicant's Exhibit Number 5 was marked for identification.)

MR. UTZ: Without objection, it will be entered into the record as Applicant's Exhibit Number 5.

MR. LOSEE: That is all of our rebuttal.

MR. UTZ: Any other questions?

MR. KELLAHIN: If there are no questions of Mr. Mershon, I would like to call Mr. Cameron in connection with this.

JOHN T. CAMERON

recalled as a witness by STandard Oil Company of Texas, having been previously duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Cameron, you heard the testimony as presented by Mr. Mershon in the red lines which have been marked on a portion of his Exhibit Number 1, did you not?

A Yes.

Q On the basis of this testimony, it would appear that Mr. Mershon would move the zero contour on net pay to the south. Have you any opinion as to the validity of this type of calculation?

A Yes, I have. This is primarily the reason that we included the porosity planimeter in our map. An interpretation such as this assumes -- it is really an extrapolation of the net pay thickness, without regard to the quality of that net pay. What Mr. Mershon has not considered is that from the Standard of Texas well through the Hanagan well, and further south, not only does the net thickness decrease, but also the average porosity within that net thickness decreases, so that long before you reach the zero line as he has shown on his red contours, you are going to get below two percent porosity and run out of pay.

I still contend that the porosity planimeter should properly be included in the isopach map.

Q And that is what is included in the isopach map that you presented?

A Yes, it was.

MR. KELLAHIN: That is all I have.

MR. UTZ: Any other questions? The witness may be excused. Any further testimony? Any statements?

MR. MORRIS: Mr. Examiner, I don't intend to try to review the evidence and the conflicting contentions made here. I think that they have been very adequately presented to the Examiner, and the Examiner has them well in mind. I would like simply to make Marathon's position in this case clear, if I can.

In the first place, we believe that any time an applicant comes in and wishes to drill a well in a section where there has been a previous attempt made to complete a well, that the productive acreage is in question. Particularly is this so where the applicant is seeking an unorthodox location.

We believe that the Commission in a pooling case should establish -- and this goes back to the statement I made at the conclusion of Case 4088 -- that the Commission should establish as a unit nothing greater than the amount that is determined to be productive acreage to be

assigned to any additional well to be drilled in Section 21.

Then we have the question of where the wells should be drilled, and whether an unorthodox location should be granted. I would like to point out here, and I would ask the Commission to, of course, take notice of its own records, which it would do, anyway, that there are no unorthodox locations that have been granted in this field except under two circumstances. One, the unorthodox locations that were grandfathered in, so to speak, upon the establishment of rules. I will call these the prerules unorthodox locations. And the second category are the exceptions that have been granted due to topographic reasons, these exceptions having been granted by administrative approval. These two categories of exceptions were discussed quite thoroughly in some of the previous cases that have been brought before the Commission. I am particularly referring to the Penrock application, which was Case No. 3426, Order No. R-3098, dated August 2, 1966.

I think the Examiner will recall that this application was an attempt to locate a well at an unorthodox location 660 feet from the outer boundary of the unit, and the application was denied in toto. There was no granting of the application with any reduced allowable, but the Commission merely found, and properly found that the

drilling of a well at the unorthodox location would result in recovering a disproportionate share of the reserves in the pool, thereby impairing correlative rights, and accordingly found that the application should be denied.

The same thing is certainly true here. According to the applicant's own exhibit on gross pay, every indication was that a well could be located at a standard location in Section 21, and would enjoy the same amount of gross pay as the Marathon well, which is top allowable up in Section 14. Frankly, we don't believe it would be as good a well, but this is using the applicant's own exhibit. This is the kind of inconsistency that arises from the use of gross pay, and the applicant having chosen to base his case upon it, he should be bound by it.

According to his own exhibit, there would be nothing that would justify the location of a well at an unorthodox location in this section. So, first and foremost, we would be against the granting of the unorthodox location. We think the application should be denied.

Now, if the Commission should take the position that the unorthodox location should be granted, then in addition to limiting the size of proration unit that should be established for the well -- and, of course, limiting

the allowable, or establishing an acreage ratio for any well drilled in the productive portion of the section -- the allowable further should be reduced by the advantage that is being gained by moving into the more productive area of the pool. So we do not feel that even if the Commission should say that 320 acres should be established as a nonstandard proration unit for a well, that it should get half an allowable. We think the allowable should be further reduced due to the advantage being sought by the well being moved 932 feet closer to the productive area of the pool.

That is all I have.

MR. UTZ: Do you recall, Mr. Morris, whether your latter suggestion has ever been followed by this Commission?

MR. MORRIS: I don't know that we have had the particular and peculiar situation that we have in this case that has ever been presented to the Commission, where a well previously has been drilled in the section that effectively has condemned a portion of the proration unit that the applicant is seeking to assign to the well, so I think we have a peculiar situation in this case.

The only other case I can think of that comes close to it is the Penrock case, where there has

been a previous well drilled, very, very poor. In that case, the application simply was denied.

MR. UTZ: Mr. Kellahin.

MR. KELLAHIN: If the Examiner please, I am somewhat familiar with the Penrock case, and quite agree that there was evidence to show that there was a lack of productive acreage in the unit supposed to be dedicated, and that an unorthodox location was giving the operator an undue advantage; and I quite agree with Mr. Morris that the same situation prevails in this case.

Standard of Texas, Hanagan Oil Corporation, and Monsanto Company all oppose the approval of the unorthodox well location. I believe our testimony presented on behalf of Standard shows there is a reasonable chance to make a well at an orthodox location. Certainly the testimony which has been offered by the applicant in this case, which attempts to base their calculations as to productive acreage on the gross pay section, shows that they have a reasonable chance of getting a good well at an orthodox location, in that the gross pay at that location is approximately 100 feet, as compared to approximately 110 feet at the proposed location.

We have a peculiar situation here in that this case is coupled with forced pooling action, which

cannot be ignored in considering the productive acreage that should be dedicated to a well in the event the forced pooling is approved. We are not arguing particularly about the forced pooling, but we are unalterably opposed to the approval of the unorthodox well location.

The applicant here has given the Commission no information as to net pay, which would underlie the tract, or what portion of the tract they propose to dedicate to their well. They have given some rather vague statements to the effect that they want this location, because it minimizes the risk of drilling a well. We would agree it probably does minimize the risk of drilling a well. In their forced pooling case, when they were discussing a risk factor to be assigned to the drilling of this well, they pointed out that they were drilling between two dry holes. In effect, that is exactly what they are doing, and if they are drilling between two dry holes, it also means inevitably that they are proposing to dedicate dry acreage to the well at the unorthodox location.

There has just been no justification for the unorthodox well location. If we are going to assume that they are talking about the risk, of reducing the risk of drilling a well, we would have to assume that that reduction

of risk is based upon some speculation as to the permeability or the porosity pinchout, or both, which would reduce the productivity of a well at an unorthodox location to an economic level. This would have to be the crux of the applicant's argument in this case.

If we project diagonally on across the section, under this theory, then we would further assume that substantially all of the remainder of the section is nonproductive.

We feel that our testimony clearly shows that not more than 266 acres could be considered productive, having a porosity of above two percent. The approval of a well at an unorthodox location, we feel our testimony shows, even with a curtailed allowable, would give the operator an undue advantage of approximately seven times over the proration unit immediately offsetting it to the north. Certainly, if you gave it a 640 acre allowable, it would be considerably more than that, or even the 405 acres which Mr. Mershon just recently testified to in connection with the red lines he put on the last exhibit that was offered.

We submit that the application should be denied. But if the Commission does see fit to grant the unorthodox well location as requested here, we

further submit that the only competent testimony that has been offered here as to productive acreage would limit it to not more than 266 productive acres.

I also have a statement here from Hanagan Petroleum Corporation, which I would like to read into the record. I have furnished a copy of this to Mr. Losee.

"Hanagan Petroleum Corporation, as an operator and owner in the Indian Basin Field and especially as a past operator of Section 21 in the section in question, respectfully requests the subject unorthodox location be denied.

"We have been involved in this field practically since its discovery and have seen, with much pleasure, its orderly and practical development. True, there has been a few unorthodox locations granted, most of which were due to topographic problems, and a few in its early stage of development before the field limits were defined. On the other hand, there have been some drilled at much less favorably located spots in order to comply with the special rules and regulations of the field, in some instances resulting in a dry hole.

"As you are quite aware of, Hanagan Petroleum

Corporation did drill a Cisco/Canyon well in Section 21, T-22-S, R-23-E (1980' FWL & 1650' FNL) to a total depth of 7,585' and was plugged and abandoned 1/24/67 after extensively testing the field pay zone both by drillstem tests and production tests. The pay was predominantly limestone with a few stringers of low permeable dolomite at the top. After acidizing with a total of 36,000 gallons of 20% acid in three stages, only a small amount of gas was recovered with very rapid drawdown, that is in a matter of a few hours flowing tubing pressure would be 0 to 30#. We all are aware of the excellent reservoir characteristics of the Indian Basin Upper Pennsylvanian pay, mainly excellent permeability, so it would appear quite obvious that this particular well was not in the field reservoir, even though structurally it was situated quite favorably. We were convinced it was a dry hole along with our partners, four of which are companies and all four of whom had drilled and operated in the Indian Basin Field. It is quite apparent now, as it was before we drilled the subject well, that the further north you could drill on the section, the better your odds would be of obtaining production. No topographic problem existed in this section. The east offset drilled by Gulf

in Section 22, which was structurally lower and poorly developed, recovered some water and was plugged and abandoned. It was also an orthodox location in compliance with the field rules.

"In our opinion, the field limits have been defined in the subject area and at the very minimum the south three-quarters of Section 21 is nonproductive with the remaining north one-quarter being quite doubtful as to its productivity. However, due to the nature of the field reservoir, as much gas can be produced from a few good permeable feet of pay as 300 feet of pay, therefore we feel it is unjust to all the present owners in the field to permit a party to drill a possibly drain considerably more than his share of the gas in the reservoir. We have no personal axe to grind in this case, in fact we still own an overriding royalty interest in part of the acreage which would be included in the proposed gas unit. In all fairness, however, we wish to go on record as being opposed to this unorthodox location. Sincerely yours, Hugh E. Hanagan (Geologist), Hanagan Petroleum Corporation."

On behalf of Monsanto Company, Mr. Richard D. Jons, I would like to also state that Monsanto has an undivided 25 percent interest in an oil and gas lease

covering all of Section 16, Township 22 South, Range 23 East, which is located adjacent to Section 21, Township 22 South, Range 23 East. The other 75 percent interest is owned by Standard Oil Company of Texas and Marathon Oil Company. Monsanto concurs in the position of Standard of Texas taken in connection with this case. Thank you.

MR. KASTLER: Mr. Examiner, I have a short statement. Gulf Oil Corporation is an offset operator to this proposed unorthodox location, having a lease to the northeast in Section 15, and to the east in Section 22, Township 22 South, Range 23 East.

We object to the unorthodox location, because it is located in direct violation of the Indian Basin Upper Penn Gas Pool rules, and not for reasons called for in the rules, namely, topographical conditions or a well previously drilled to another horizon. The proposed unorthodox location is not a well previously drilled to another horizon, and it can be drilled standard, because the terrain is practically flat at that point.

The Commission's order R-2440, which created the Indian Upper Basin Gas Pool found, "that the temporary special rules and regulations should provide for limited well locations, in order to assure orderly development

of the pool, and to protect correlative rights."

The operators in this pool have complied with the well location requirement of Order R-2440, and the applicant should be required to also comply with these rules.

Gulf drilled this Helbing Federal 2 Well as a dry hole in Section 22, but locating it on the standard location. At that time, we knew we would have preferred to crowd the north line of this section as well. However, we drilled our well according to the rules.

Heretofore, the Commission has consistently refused to grant unorthodox well locations in this pool on the basis of structure alone. I am referring to the Penrock case. The applicant in this case is crowding our leases strictly to gain structure. Therefore, for protection of Gulf's correlative rights, we respectfully request that the unorthodox location be denied.

MR. UTZ: Mr. Losee.

MR. LOSEE: The applicant is here asking the Commission for an unorthodox location. We recognize that in conjunction to our request, that if granted, the Commission should offset such advantage of the unorthodox location by a penalty in the allowable provisions.

The testimony in the case with respect to communication throughout this gas field indicates that whether we do or don't drill our well, the protestants are going to get the gas out of the Indian Basin Upper Pennsylvanian Pool. The applicant is here to protest his correlative rights, and the rights of the other royalty and override owners under Section 21. His proposed location, 990, as he has testified, is to minimize the risk, and, two, to avoid the possibility of running into this water that existed in the Gulf well.

We actually think the communication throughout the field, together with the applicant's testimony and Mr. Cameron's admission, that the other operators are not going to be adversely affected from a 1,650 to a 990 location, so long as the allowable assigned to the well is in direct proportion to the gas underlying Section 21.

The applicant has explained his understanding, or his opinion and belief with respect to the existence of the trapped or perched water around the Gulf well. It obviously came as a surprise to them, because of their attempts to complete the well.

The applicant also thinks that the Hanagan well, which is plugged and abandoned, could well

have made a well had it been fractured, and I think Mr. Cameron in part inferred that that might be possible. Similar treatment favorably acted on the Pan American well with basically limestone. We think these alternatives are open at least with respect to allowable penalty. Unfortunately, in none of the presentation here is it possible to exactly define the southern limits of the field in Section 21. We recognize that the maximum would be 561 acres, but again we point out there are too many unknowns in connection with all of the exhibits introduced, for the Commission to exactly fix the penalty.

The lesser alternative is that proposed by, or at least shown by Standard on their map, 266 acres. They have used a two percent porosity cutoff, and although they state that nothing below that will produce gas, the admission of Mr. Young from Marathon was that he couldn't say that something less than two percent wouldn't produce, and eventually down the line contribute gas to the reservoir.

The alternative that I look at, and that I think the applicant would be acceptable to, would be to somewhere divide his maximum line with Standard's 266 acre contour line. Marathon's proposal by their map is 325 acres, and I think by their own admission that had the limestone porosity in the Hanagan well been included, the line would have

moved south.

The applicant also considered the porosity present in the Gulf well, and because of his perched water theory, moved it down, so that that redrafted exhibit contains of 405 acres.

Another possibility, I suppose, is that by virtue of moving what I believe to be two-fifths of the way from the 1,650 line up to the corner, would well end up in some kind of allowable of some 384 acres.

As I mentioned at the start, the applicant is here simply asking for the right to minimize the risk in drilling this border well to this field. He recognizes that an allowable penalty should be assessed against him for the advantage that he might incur. We think the evidence offered indicates no other alternative.

MR. UTZ: Thank you. Any other statements?

The case will be taken under advisement.

I N D E X

JOHN T. CAMERON

EXHIBIT	MARKED	OFFERED AND ADMITTED
Applicant's 1 through 4	3	21
Applicant's 5	87	87
Marathon's 2	38	
Standard's 1 through 5	51	70

Testimony of Roy M. Young in Case No. 4088 incorporated by reference in Case No. 4089, Page 38.

STATE OF NEW MEXICO)
) SS:
COUNTY OF BERNALILLO)

I, SAMUEL R. MORTELETTE, Court 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.

Samuel R. Mortelette

COURT REPORTER

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 4087 heard by me on May 20, 1969.

Examiner
New Mexico Oil Conservation Commission

PAUL M. MERSHON, JR.
789 CLARKSON STREET
DENVER, COLORADO 80218

PETROLEUM GEOLOGIST

TELEPHONE: 303 255-0716

'69 JUL 25 AM 8 30

July 24, 1969

Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Marathon Oil Company
P. O. Box 552
Midland, Texas 79701

Re: Proposed well with costs in the Indian Basin - Upper Pennsylvanian Pool
Sec. 21, T. 22 S., R. 23 E.
990' FNL & 990' FEL
T. D. 7600'

Gentlemen:

I intend to drill or cause to have drilled a well at the above captioned location, and in compliance with Order No. R-3736A, Case No. 4088 de nova I herewith enclose an itemized schedule of estimated well costs on the subject well. This order also states "That within 30 days from the date the schedule of estimated well costs is furnished to him, any non-consenting working interest owner shall have the right to pay his share of estimated well costs to the operator in lieu of paying his share of reasonable well costs out of production, and that any such owner who pays his share of estimated well costs as provided above shall remain liable for operating costs but shall not be liable for risk charges".

Marathon Oil Company being a lease owner in this section is hereby invited to join in the drilling of this well. The Marathon working interest is twenty-five percent (25%).

Very truly yours,

Paul M. Mershon, Jr.

Paul M. Mershon, Jr.

PMM:hj

encl.

PAUL M. MERSHON, JR.
PETROLEUM GEOLOGIST
789 CLARKSON STREET
DENVER, COLORADO 80218
TELEPHONE: 303 255-0716

Indian Basin Upper Pennsylvanian Gas Field
Sec. 21, T. 22 S., R. 23 E.
990 FNL & FEL
Eddy County, New Mexico

ESTIMATED WELL COST

	COMPLETED	DRY HOLE
Survey Location and Damages	$ 500.00	$ 500.00
Prepare Roads and Location	2,500.00	2,500.00
Drilling 7600' @ $9.00 per foot	68,400.00	68,400.00
Day Work 5 days @ $1,200.00 per day	6,000.00	6,000.00
Trucking	1,500.00	1,000.00
Mud and Chemicals	8,500.00	8,500.00
Cement and Services	8,000.00	6,200.00
Fuel and Water	7,500.00	7,500.00
Logging	4,000.00	4,000.00
Drill Stem Tests	1,700.00	1,700.00
Misc. Equip. (Stabilizers, shoes, etc.)	850.00	500.00
Float Equipment	750.00	400.00
Legal Fees	500.00	500.00
Supervision and Overhead	3,000.00	2,500.00
Plugging Costs		1,000.00
Casing and Tubing		
200 feet of 13 3/8 @ 7.50	1,500.00	1,500.00
2100 feet of 8 5/8 @ 3.20	6,720.00	6,720.00
7600 feet of 5 1/2 @ 2.50	19,000.00	
7500 feet of 2 3/8 @ .75	5,625.00	
Unit Time 4 days @ $700.00 per day	2,800.00	
Perforations	800.00	
Rental Equipment	350.00	
High Pressure Separator	5,800.00	
Well Stimulation	5,000.00	
Well Head and Flow Lines	4,000.00	
Installation Costs	700.00	
	$165,995.00	$119,420.00

OIL CONSERVATION COMMISSION

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

GOVERNOR
DAVID F. CARGO
CHAIRMAN

LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER

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

July 16, 1969

Mr. A. J. Losee
Attorney at Law
Post Office Box 239
Artesia, New Mexico 88210

Re: Case No. 4088
4089
Order No. R-3736-A & R-3737-A
Applicant:
Paul M. Mershon, Jr.

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 x
Aztec OCC

Other Mr. Richard S. Morris, Mr. Jason Kellahin, Mr. Bill Kastler, Mr. Frank Goerner, Monsanto Company, Houston, Texas

OIL CONSERVATION COMMISSION

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

GOVERNOR
DAVID F. CARGO
CHAIRMAN

LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER

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

April 22, 1969

Mr. A. J. Losee
Attorney at Law
Post Office Box 239
Artesia, New Mexico 88210

Re: Case No. 4088
Order No. R-3736
Applicant:
Paul M. Marshon, Jr.

DOCKET MAILED
Date

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 x
Aztec OCC

Other Mr. Dick Morris, Mr. Jason Kellahin, Mr. Bill Kastler

OIL CONSERVATION COMMISSION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

July 22, 1969

COPY

Mr. A. J. Losee
Attorney at Law
P. O. Box 239
Artesia, New Mexico

Dear Jerry:

Enclosed is a certified copy of Commission Order No. R-3736-A.

Very truly yours,

GEORGE M. HATCH
Attorney

GMH/esr
Enclosure