BEFORE THE

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

June 26, 1969

REGULAR HEARING

IN THE MATTER OF:

Application of Paul M. Mershon, Jr., for compulsory pooling, Eddy County, New Mexico. — Case 4088

Application of Paul M. Mershon, Jr., for an unorthodox gas well location, Eddy County, New Mexico. — Case 4089

BEFORE: A. L. PORTER, JR., Secretary-Director

TRANSCRIPT OF HEARING

NEW MEXICO OIL CONSERVATION COMMISSION

SPECIAL HEARING

SANTA FE, NEW MEXICO

Hearing Date JUNE 26, 1969 TIME: 8 A.M.

NAME	REPRESENTING	LOCATION
Bill Kastler	Gulf Oil Corp.	Roswell.
Hugh Hanagan	H & H	Roswell
Nolan Robinson	Self	Hobbs
Adelphe Altes	Marathon Oil Co.	Houston
Paul Kayll	Standard Oil Co of Texas	Houston
John R. Busby	Standard Oil Co of Tex	Midland.
Robert Enfield	Self	Roswell
Jason Kellahin	Kellahin & Fox	Santa Fe
Nina S. Dunham		Santa Fe
A. L. Losee		Artesia
Paul Marshon Jr	self	Denver
Richard S. Morris	Montgomery et al	Santa Fe
W. B. Leach Jr.	Marathon	Houston
Robert E. Hanagan		Roswell

MR. PORTER: The Hearing will come to order, please. This is a special Hearing called for the purpose of hearing of Cases 4088 and 4089, both of which are De Novo applications. 4088 is an application of Paul M. Mershon, for compulsory pooling in Eddy County, New Mexico. Case 4089 is an application of Paul M. Mershon, Jr., for an unorthodox gas well location, Eddy County, New Mexico.

These Cases were first heard by the Examiner. Orders were entered and we had an application for De Novo in both Cases, and our law requires that an application for De Novo hearing must be set for the next regular Hearing. This was done, and we brought the Cases on for June 13th, but because of tight schedules, we had to continue them to a special hearing date, and this morning we will proceed with Cases 4088 and 4089.

Before we start with the testimony and statement, I'd like to ask for appearances.

MR. LOSEE: A. J. Losee, Artesia, New Mexico, appearing on behalf of the Applicant, Mr. Paul Mershon, Jr.

MR. MORRIS: Mr. Porter, I am Richard Morris, of the law firm of Monrgomery, Federrici, Andrews, and Morris, Santa Fe, appearing on behalf of Marathon Oil Company; and with me, also appearing for Marathon Oil Company is Mr. Warren Leach of Houston, Texas, who is a member of

the Texas Bar.

MR. KELLAHIN: If the Commission please, Jason Kellahin, Kellahin & Fox, Santa Fe, appearing for Standard Oil Company of Texas, Hanagan Petroleum Corporation, Robert Enfield, and Nolan Brunson.

MR. PORTER: Mr. Losee, you are the attorney for the Applicant in this Case. Mr. Morris has requested permission to make a motion at the outset.

MR. MORRIS: If the Commission please at this time, Marathon Oil Company would move, and I believe that I will be joined in this motion by Mr. Kellahin on behalf of his clients, that Cases 4088 and 4089 be consolidated for the purposes of the Hearing, inasmuch as the evidence relating to the compulsory pooling case necessarily also concerns the application for the unorthodox gas well location, and vice-versa.

It would be unduly burdensome, and it would unduly prolong this Hearing to treat these Cases separately, and get into procedural difficulties of trying to, let's say, incorporate by reference the cross examination in the previous Case into the second Case, and vice-versa. If for some reason the Commission should not wish to consolidate these two Cases, at least the Hearing on the unorthodox

gas well location should be heard first, because until the evidence is presented to the Commission as to where this well is to be located and the problems surrounding that well, that proposed well location, the Hearing on the compulsory pooling application doesn't become meaningful. In other words, it is not meaningful to talk about what acreage is going to be pooled until we know what well location the acreage would be dedicated to. So we would strongly urge to the Commission that it consolidate these Cases for the purposes of hearing.

MR. LOSEE: Mr. Porter, in response to Mr. Morris' motion, and first saying that I do recognize the necessity for trying to abbreviate these as much as possible, I think the issue in the forcedpooling case, the only real adverse party in respect to that Case is Marathon Oil Company. The application for the De Novo in the unorthodox location is also opposed by Hanagan Petroleum Corporation, and Mr. Enfield, who have filed applications for De Novo, and also Standard of Texas. As a result, the Applicant, by proceeding in a consolidated action is forced to have not one, but four adverse parties in the forcedpooling application.

The evidence, as far as I can see, and at least

viewing the statutes and the Commission rules, the question in forced pooling, we have published the proposed location of the well in the forced pooling. The Commission in the earlier Hearing established a drilling unit less than 640. The evidence in the unorthodox location really with respect to how much acreage is or is not productive is solely for the purpose of establishing a penalty to be assessed against the operator for any advantage gained by his unorthodox location; and, as a result, the Applicant would ask that the forced pooling case be heard first and separate, and not consolidated, and then 4089, which is the unorthodox location.

MR. PORTER: These Cases were consolidated for the purposes of testimony in the first instance.

MR. LOSEE: No, sir, they were not.

MR. MORRIS: Mr. Porter, that was one of the things that got us into a lot of difficulty at the original Hearing, that they were not consolidated. In connection with the forced pooling case, we were put in a position of having to include the same testimony twice in connection with what acreage was productive and contained recoverable reserves, and then we had to do it for the compulsory pooling case, and we had to turn around and do it again on

the unorthodox gas well location case.

The Cases are obviously directly related, and I believe that in a De Novo case like this, the parties, if they are not adverse to Mr. Mershon, like in the compulsory pooling Case, they can certainly say so by their statement, and the record will be quite clear what everybody's position is.

MR. KELLAHIN: If the Commission please, of course we do join Mr. Morris in his motion. I think the problem is very clearly pointed out by the Orders that were entered by the Commission as a result of the Examiner Hearing, in which the same identical acreage was forced pooled in the one Case, and assigned to the well in the other. Certainly, we are dealing with productive acreage in both case, and it doesn'me make any sense to separate the two cases when the same evidence applies to both of them.

I think it is a burden on the Commission, and I don't see any reason for it.

MR. LOSEE: Just one further statement. The evidence in the Examiner hearing with respect to productive acreage that Marathon offered in the pooling case was admitted into the record in the unorthodox location, and

we frankly would have no objection to the same procedure, with the right of cross examination with respect to the unorthodox location.

MR. PORTER: For the purposes of taking testimony in the Case, the Commission will consolidate the Cases 4088 and 4089. Mr. Losee, would you like to proceed with your testimony, or would you like to make an opening statement?

MR. LOSEE: I would just as soon proceed with the testimony at this time. I would like a minute, if we are going to do it that way, to mark the other exhibits now.

MR. PORTER: That is fine. At the outset, I believe we will just swear all the witnesses at one time.

(Thereupon, the witnesses were sworn.)

(Thereupon, Applicant's Exhibits 1, 2, and 3 in Case 4088 were marked for identification.)

PAUL M. MERSHON

called as a witness by the Applicant, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. LOSEE:

Q State your name, please?

A Paul M. Mershon,Jr.

Q Where do you live?

A 789 Clarkson Street, Denver, Colorado.

Q What is your occupation?

A I am a Geologist and am self-employed.

Q Have you previously testified before this Commission in the Examiner Hearings 4088 and 4089?

A Yes, I have.

MR LOSEE: Mr. Porter, are Mr. Mershon's qualifications as an expert in geology acceptable to the Commission?

MR. PORTER: They are.

Q First, turning to Case 4088, Mr. Mershon, would you give a general statement of the purpose of the application in this Case?

A The purpose of this hearing is, one, pool all of Section 21 of Township 22 South, Range 23 East, for the purpose of drilling a well in that Section, which should be located 990 feet from the north line and 990 feet from the east line of the Section.

We would like a risk factor established for those non-consenting parties. We would like supervisory charge established also for those non-consenting parties,

and we would like to be designated as the operator of this well.

Q Mr. Mershon, are you familiar with the Orders entered by the Commission with respect to the establishment of special pool rules for the Indian Basin-Upper Pennsylvanian gas pool, being Orders No. 2440 and 2440-A?

A Yes. In part these Orders established that a full section or 640 acres will be dedicated to each well for the purposes of drilling in the Upper Pennsylvanian gas pool, and the Orders apply for any well located within one mile of the field boundaries.

Q Now, is your proposed location in this forced pooling case located within one mile of the outer boundaries of the pool?

A This section abuts the outer boundaries of the pool.

Q Referring to what has been marked as Exhibit 1 in Case 4088, would you explain what is detailed on this exhibit?

A This exhibit is an ownership plat showing that all the acreage in Section 21 of Township 22 South, Range 23 East is Federal acreage. I have outlined the various tracts on this plat. I have shown the record owners of

these various tracts and the expiration dates. I have also placed the location of the proposed well on the plat.

Q What is that location?

A That location is 990 from the north line and 990 from the east line.

Q Where did you obtain the information for this exhibit?

A This exhibit data was prepared by Federal Abstract Company, an organization located here in Santa Fe.

Q Are all of the lands within the section owned by the United States?

A They are.

Q How many separate leases are involved?

A There are five.

Q Now, do you own or have farm-outs on all of the working interests in this section?

A No, sir, I own the east half of the east half. I have farm-outs on the Union tract, on the Younger tract, and the Anderson tract. So I have in this respect 520 acres of the 640 acres in contract to me.

Q Do you have any farm-out with Marathon, or have they agreed to join with you in drilling this well?

A No, I have no farm-out with Marathon, nor any

other agreement pertaining to the drilling of this well.

Q Did the Federal Abstract Company give you the expiration date of Marathon's lease?

A Yes, they did.

Q What was that date?

A July 31, 1969.

Q Did you contact Marathon with respect to a farm-out, or joining with you in the drilling of this well?

A Yes, I did. In October, early in October of 1968, I called Truitt Butler, a landman with Marathon in Midland, Texas, and asked if they were interested in making some arrangements to drill a well in this section, and he advised me that I should contact him by letter.

On October 10th, I directed a letter and mailed it to Mr. Butler, requesting a farm-out on this particular acreage.

On the 11th of November, 1968, I received a negative response to this request.

Q Did you again contact Marathon in March of this year?

A Yes, in March, on March 7, 1969, I addressed a letter to Mr. L. C. Southward, and mailed such letter to him requesting a farm-out on the terms originally proposed

back in October, or if they chose not to farm-out under those terms, would they join me in the drilling of such a well. I pointed out also in that letter that I had applied for forced pooling hearing, and an agreement prior to this hearing would eliminate the need for such hearing. I had no response to that letter.

Q So that at the time of this hearing, Marathon has not agreed to give you a farm-out or join with you in the drilling of this well?

A They have not.

Q Please refer to what has been marked as Exhibit No. 2, being an AFE on the proposed well, and explain what is shown on this exhibit?

A This exhibit is an AFE of an estimated well cost for the location in question. This data was prepared by me in the following manner: I had three AFE's to examine that were prepared by Ralph Lowe. These AFE's were on wells in which the company I formerly worked for had an interest in, so I had an opportunity to examine them in detail.

I had an AFE prepared by Penrock, and I also discussed with one of the working interest operators an AFE prepared by Marathon on their No. 6 Indian Hills Unit. After examining this data --

Q Before you go ahead, Mr. Mershon, what was the total cost in Marathon's AFE for a completed well?

A On that particular well, the AFE was in excess of $169,000.

Q Go ahead.

A After examining these particular AFE's, I felt like that because of time, certain price changes would have occurred. So I discussed the problem of drilling in this area with Conrad Appeldorn, who is a professional Petroleum Engineer residing in Artesia, New Mexico, and does considerable work in this area in regard to certain costs; and I discussed it also with Ken Reynolds, who is an owner of a drilling company, and is familiar with costs,drilling costs in southeast New Mexico.

Q What does this exhibit show to be the estimated cost for drilling a dryhole?

A This shows that the estimated cost would be $119,420.

Q What is the estimated cost for a completed well?

A A completed well would cost $165,995.

Q From the information available to you, is that a reasonable estimate of the cost of drilling this well at this location?

A Yes, I feel it is a reasonable cost.

Q Mr. Mershon, do you have an opinion as to what would be a reasonable charge for well supervision of a well at that depth in this field, and if so, what would that amount be?

A A fair supervisory charge should be approximately $100.

Q Would that be in addition to direct expenditures for operating the well?

A Yes, it would be.

Q Have you ever, as an individual, drilled any wells?

A No, I have not.

Q Now, prior to the time you became an independent Geologist, by whom were you employed?

A Formerly, I was employed by Depco in Denver, Colorado. Prior to that, I worked for International Oil and Gas Corporation in Denver, Colorado. I was their Geological Manager. And while in the employment of International, I resided in Artesia, New Mexico, as their Primary Exploration and Exploitation Geologist.

Q Did you in that capacity have any supervision of any drilling of wells?

A Yes, during the period I was in Artesia, which

would directly relate to southeast New Mexico, I had direct geological supervision of approximately 75 shallow wells. I was responsible geologically for the completion of solely within our company of two Abo wells, and I was on a Committee in which we drilled over 40 Abo wells. In this Committee, we were responsible for choosing each location, picking perforations, setting pipe, establishing total depth. I further have had direct geological supervision of two deep tests drilled in Lea County.

Q During the drilling of this well, would you propose to be present?

A Yes, sir, I certainly would, and I would do the geological work.

Q What about the engineering work?

A I would employ the use of a Petroleum Engineer, and in this regard I have discussed this problem with Conrad Appeldorn, who I previously mentioned, in doing this particular work for me.

Q Mr. Mershon, would you relate the history of the development in this Indian Hills-Upper Pennsylvanian gas field?

A This field was discovered by a well that was completed in 1962. There followed this completion in 1962,

two additional step-outs, which were discoveries, and established in part the immense size of the field.

By 1966, this field was essentially developed. There are now 54 producers in this field, 7 of which are marginal producers, or produce less than allowable. And around this field, within a mile or two, there are approximately 26 dryholes.

Q Please refer to what has been marked as Exhibit 3, and explain what is shown on this exhibit?

A This plat shows Section 21 outlined in red, with the location of my proposed well. It shows all the deep tests drilled within the map area, and the various symbols indicate the completion or the dryhole which it means the status of the various wells in this plat.

There are 13 deep dryholes on this plat, and they are all double circled, and two shallow dryholes shown by a single circle and a conventional dryhole symbol.

Q How many producing wells are on that plat, did you say?

A There are 10 producing wells.

MR. NUTTER: How many deep dryholes did you say?

THE WITNESS: There are 3 deep dryholes; 13 deep wells.

MR. NUTTER: 13 deep wells, 10 producers, and 3 dryholes?

THE WITNESS: Yes.

Q (By Mr. Losee) Point out the area of the dry holes?

A In Section 21, the Hanagan No. 1 Indian Federal is a dryhole.

In Section 22, the Gulf No. 2 Helbing Federal is a dryhole.

And to the south of the proposed location, the Ralph Lowe No. 1 Marathon Federal is a dryhole.

Each of these penetrated the pay section of the Indian Basin Field, or penetrated an equivalent zone.

Q What is the surface location of the Hanagan well in Section 21?

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

Q Mr. Mershon, are you familiar with the joint operating agreements in existence in southeastern New Mexico?

A Yes, I am.

Q Are you familiar with the penalty assessed against a non-consenting working interest owner for failing to participate in the drilling of a well in those joint operating agreements?

A Yes, sir.

Q What is that penalty?

A Non-consent penalties are frequently 100 to 200 percent of the cost.

Q And they are sometimes actually 300 percent?

A They are sometimes, and I have heard this. I have never worked in a well in which a 300 percent penalty was assessed.

Q By 100 and 200 percent, Mr. Mershon, you are actually referring to the fact that the operator pays either one, or there is withheld from his share of production either one or two times the cost of the well?

A That's correct.

Q Are you familiar with the Ross Martin form of operating agreement, No. 610?

A Yes, I am.

Q Is that prevalent in use in southeasternNew Mexico?

A Yes, sir. And in this particular location, I am bound by my farm-outs to use this form.

Q What is the non-consent printed provision in that agreement?

A Non-consent penalty in this form is 100 percent

of costs.

Q In other words, the non-consenting party would pay twice the cost of drilling a well out of production, if he did not participate?

A 100 percent of cost, plus 100 percent penalty.

MR. NUTTER: What was that form called again, please?

MR. LOSEE: Ross Martin form 610.

Q Mr. Mershon, if you were advised that the New Mexico statutes authorizing compulsory pooling established that the maximum risk factor was 50 percent, do you have an opinion as to what would be a fair risk factor in the drilling of this well for a non-consenting party?

A In light of what the industry agrees to do when drawing up agreements among themselves, I would think that a penalty of 50 percent, which is the maximum penalty that the Commission can asess, should be given in this instance.

Q Would you state your reasons why you have this opinion?

A I believe in general that the Commission has in the past granted for development wells, penalties which range from 25 to 50 percent. And in examining the history of this field, I chose or went to the first well drilled in 1966,

which was in January, and counted each well.

Now, in that period from January 1, o966 to the present date, there have been 15 wells drilled for the Indian Basin field. Of these 15 wells, nine were dryholes. This indicates to me that a possibility of success is only 40 percent, or that the risk here is 60 percent of possibility of a dryhole. I have here the drilling between two dryholes essentially on this map, the Gulf No. 2 Helbing Federal which produced only water,and the Hanagan No. 1 Indian Federal which produced only a small amount of gas.

Further, I would like to point out that although the depth of this well is only 7,600 feet, which would penetrate the total potential pay section here, this is probably the highest cost to this depth in all of New Mexico, because of extreme lost circulation problems in the upper 2,200 feet of the section.

Furthermore, it seems inconceivable to me in drilling this location that you could test it simply by drilling to TD, and running logs and DST's.

It appears to me we would be faced with the very decision that Hanagan was faced with when drilling this well in Section 21 in running their pipe. That would create for the depth excessively high testing costs.

Q Mr. Mershon, in the drilling of this well, would you propose to dedicate what acreage to the well?

A I would propose to dedicate 640 acres to the well, because the Federal rules, Rules 2440 and 2440-A so state that 640 acres must be dedicated to a well. As far as I know, all of the 54 producing wells in this field have a full section dedicated to them. However, if Marathon chose not to dedicate their 120 acres to this well, I would be happy to accept 520 acres, a non-standard unit of 520 acres on which to drill this well.

Q Mr. Mershon, were Exhibits 1 through 3 prepared by you?

A Yes, they were.

MR. LOSEE: We will move the introduction of Exhibits 1 through 3.

MR. PORTER: Without objection, Exhibits 1, 2, and 3 will be admitted.

(Thereupon, Applicant's Exhibits 1 through 3 were admitted in evidence in Case 4088.)

MR. LOSEE: At this time, I would like to again renew my objection to the consolidation. I hope it is clear. I think at this point we have made a prima facie case for forced pooling.

If we proceed in Case 4089 on the unorthodox location, we will be carrying the burden of the adverse party or parties in the forced pooling case.

The Supreme Court has held in the Continental Case that the orders of the Commission would assume to be valid until there was substantial evidence showing change of conditions, and I quote, "We will assume that the former pure formula is valid until it is successfully attacked." The Supreme Court cited the Case of Hester versus Sinclair Oil and Gas Company, which was a 1960 Supreme Court of Oklahoma case appeal from the Corporation Commission, where the proof showed that the fault separatedan old field that had been on a 40-acre spacing, and the new discovery the Applicant asked for 80-acre spacing, the Court held in that Case that the previous Order remained in force until it was properly amended, modified, or vacated, and the burden was upon the party applying for a new and different pattern of well spacing to produce evidence to support such change.

In addition, Oklahoma has the Case of Wood versus Corporation Commission, which is 239 Pacific 2d 1013. Let me go back and give you the citation on the Hester versus Sinclair, 351 Pacific 2d 751. In the Wood Case, the Court refused to change the original spacing Order when no substantial changes in conditions were shown.

It is the Applicant's position here in the forced pooling case that each well drilled in the Indian Hills field and within one mile of the outer boundary is required to be spaced by theterms of those rules on 640-acre spacing. As a matter fact, all of the 54 wells in the field are so spaced, and we fell like that is a spacing in the forced pooling order until a protestant comes forth and establishes a change in conditions.

We don't think that the Applicant, in an unorthodox location, that we should carry the burden of the opposition in the forced pool case; and, as a result, at this point, I would again renew my objection to the consolidation of the two Cases.

MR. MORRIS: Mr. Porter, we simply abide by the Commission's previous ruling on consolidation.

MR. PORTER: Mr. Losee, the Commission has ruled that it has decided its first ruling will stand in this Case, and I think you might just as well go ahead and proceed with the testimony in Case 4089.

MR. LOSEE: Thank you, Mr. Porter.

(Thereupon, Applicant's Exhibits 1 through 9 in Case 4089 were marked for identification.)

BY MR. LOSEE:

Q Mr. Mershon, please refer to what has been marked as Exhibit 1 in Case 4089, and explain what is shown by this exhibit.

A Exhibit 1 has two maps, one on the right, one on the left. The map on the right is two-way scale of one to 8,000. It portrays the entire field and surrounding areas, in red, in Township 22 South, Range 23 East.

I have a further outline, which is the plat area on the left. There are a number of lines on this particular map. I will go over each one of these lines.

Q You are referring to the field map on the right now?

A That's correct.

Q Please proceed.

A The medium thickness solid lines denote structure on the top of the reef. The dashed lines are isopach thicknesses of the reef. These particular lines, as is the structure, were essentially presented in a symposium called the Oil and Gas Fields of Southeast New Mexico, published by the Roswell Geological Society, and authored by Mr. Hugh Frenzell, and the thickness does not necessarily denote pay thickness. These isopach lines are of the dolomite as Mr. Frenzell saw it.

MR. MORRIS: Excuse me. If the Commission please, at this point I would like to state an objection to the testimony with respect to this exhibit, unless and until it can be shown that this exhibit actually represents Mr. Mershon's opinion with respect to the geology of this area. His testimony to this point is simply that this exhibit is the work and the result of a symposium, and there has been nothing so far to indicate that he has done any independent work, or even that this represents his opinion with respect to this area, based upon independent study. Just at the outset of this testimony, I would like to state that we have an objection to this testimony. We have an objection to this exhibit, and we want to go on record at the earliest possible time with respect to this matter.

MR. PORTER: Mr. Losee?

MR. LOSEE: Two things, one, subsequently, Mr. Mershon, will testify that a portion of this work is his. But I submit that even if he did not do so, that a map prepared by the Roswell Geological Society on this field in a symposium in 1967, without any further testimony about anything prepared by Mr. Mershon would be proper evidence in this Hearing.

As a practical matter, he did do part of the work over it, but even if he did not, I think the map as

such would be admissible.

MR. PORTER: Mr. Morris, I believe that the Commission will overrule your objection, and allow the witness to proceed with a discussion of Exhibit No. 1.

A Further shown on this map on the heavy dark line at the extreme left of the field, and marked "F" at the top and the bottom, is a fault -- pardon me, this line represents a fault. This is interpretative on my part. The symposium also presents a fault in this approximate position.

I have altered this particular fault, because I felt like I had more control based on time, because this work was prepared in late 1966, and I have been able to update it; and I have work that I believe that Mr. Frenzell did not have, in the form of a geophoto analysis of the area.

Further shown on this map in the wavy lines that appear to be blue are areas that produced a hundred percent water.

On the extreme right side of the map, I have a note that says, "gas-water contact approximately 3,750." This is one that is commonly used in the industry.

I have reviewed recently the testimony used in establishing the pool rules in these Hearings, and the

gas-water contact was estimated at 3,770, so I feel although I may be 20 feet off here, I certainly am within the ballpark.

In the north, on the north side of the plat in Township 21 South, Range 23 East, essentially in Sections 1, 2, 11, and 12, there is a small patch of water. I would like to note at this time that there is a well in the northeast quarter of Section 11 of this Township, that is shown next to the water. This well is the No. 2 North Indian Basin, I believe, and the IP is for a considerable amount of gas, but also for a considerable amount of water. This well has, subsequent to being completed, has been abandoned, and another well has been drilled at a standard location in the section.

Q Who drilled those wells?

A These two wells in Section 11 were both drilled by Marathon. The last well drilled was the No. 7 Marathon in the North Indian Basin, I believe.

Q When you started your explanation of this exhibit, you said that this was prepared essentially from the map presented at the Roswell Symposium. What areas have you changed, and for what reason?

A Well, as I said, this map was prepared in the

latter part of 1966. The base map that I used to transfer this data from the Symposium is updated, as far as I know, to all wells in the area, so that I altered slightly, around the wells that were drilled, the appropriate data. The area of essential change occurs in Township 22 South, 23 East, where I had altered the structural configuration of the original work to fit the geophoto analysis that I made of the structure on a more detailed basis.

There is also some change because of considerable more control in Township 24 -- pardon me, Township 22 South, Range 24 East. However, these variations are extremely slight.

Q In view of your study of this field, do you have an opinion as to whether this map correctly depicts the information shown on it with respect to the Indian Hills-Upper Pennsylvanian gas field?

A I have, of course, looked at this map in detail, and I have examined all the electric logs in the field. I have examined essentially all of the sample logs on the wells in the field, and I would say that I agree very closely with the work presented in the Symposium. I will say that I found some areas in which there would be room for debate, but I found no serious error.

Q Now, my question is, Mr. Mershon, is this map, itself, a fair representation of the information?

A This map is a fair representation of the data. But I would point out further that we did not present this map for the sake of any argument. It is only to orient us more specifically to our area map on the left.

Q Let's refer to the area map on the left, and would you point out to the Commission what you consider of importance in this map?

A This map on the left is on a scale of one inch to two thousand feet, which gives a fair estimate of room for detail work. I have here shown all the producing wells of which there are ten, and these are double circled well with the conventional gas symbol.

There are shown also three dryholes, which are penetrated reef or reef equivalent in depth, and two shallow dryholes.

This map also shows my proposed location in Section 21, which is 990 feet from the north line, and 990 feet from the east line. Section 21 is outlined in red.

Q How far is that well from the nearest producing wells?

A This location is approximately one mile from the Standard of Texas Bogle Flats unit, and approximately one mile

from the Gulf Oil No. 1 Helbing Federal. These are the nearest two wells.

Q Does it also reflect the gas-water contact in the easterly portion on that area map?

A In the extreme right center of this map, there is a small area of wavy lines, which denotes an area in which a well should make a 100 percent water, based on an estimated gas-water contact of minus 3,750 feet.

Also, essentially in Section 22, I show a large amount of water by this wavy set of lines. This is around the Gulf Oil Corporation No. 2 Helbing Federal.

Q Do you have some later exhibits that will explain, in your opinion, the reason for this water encountered in this Gulf well?

A Yes, I do. However, at this point, I would like to discuss the Gulf Well. This water around the Gulf Well, I feel, is perched water, and a subsequent exhibit will show this.

Now, my following exhibit does change the outline of this water, but this exhibit is the same one I used in the previous Hearing; and although I have upgraded my idea and knowledge of this particular water, I did not change these lines, so that the Commission would not find an undue alteration

in the original work.

Q When was that Gulf Well drilled, Mr. Mershon? Do you remember?

A In 1966. However, I can't remember the precise month.

Q Please refer to the cross section or the line between the well, and explain the reason for its existence?

A In Section 9, you will see the Standard of Texas No. 3 Bogle Flats unit, a letter "A" immediately to the left of the well. From this point, there is a line that goes out to the Hanagan Indian Federal, thence eastward to the Gulf No. 2 Helbing Federal, then northwest to the Gulf Helbing Federal, thence to the Marathon No. 1 IBB. This is a line of cross section which we will show in a subsequent exhibit.

Also shown on this plat is the structure. These are shown on the solid lines, and the contour interval is 50 feet. The dashed lines here again represent gross reef thickness. They are somewhat of a different nature than those presented on the map on the right, which was from the Symposium. That set of isopach lines in the Symposium represented only the dolomite. My isopach lines represent all of the zone that I consider reef or reef equivalent.

Q Please refer to your cross section which has been marked Exhibit 2 in Case 4089, and point out the

matters on this exhibit that you consider important.

A In the preparation of this section, I used the electrical logs that were run on the various wells. Furthermore, I used and incorporated sample log data which I had at my disposal on each of these wells. This data on the sample logs was prepred by a professional logging company in Midland, Texas, and it is the function of this company to prepare an independent and impartial analysis of samples for the industry in general. I would like to qualify that the men generally working in this area are professional geologists, and I would consider their work adequate as to the quality of samples that they must work with.

Q Now, these are the same six wells that you just referred to as were shown on your Exhibit 1, are they not?

A That's correct. In constructing this so that it might be meaningful to us here, I had to pick a horizon that I felt like was correlative within the mapped area; and by examining the data available, I constructed this line called Datum Base of Reef. The section was dolomite.

However, I found a number of points that I felt like were critical in the analysis of this area. One is that approximately 20 to 30 feet below the kick, which is really a radioactive marker, a prominent shale and dirty zone.

You will notice that below this Datum Base of Reef, the section is generally quite dirty, and in samples commonly is very shaley or sandy, and shaley and limey. To my knowledge, there is no pay below the Datum Base of Reef.

I must correct that. I think that perhaps in one or two wells within 20 feet of that particular line, there may be a perforation or two. The contribution of that, of those perforations, I know not, but below that shaley zone which is very prominent in the Standard of Texas No. 3 Bogle Flats unit, at approximately -- it is very difficult to read -- 7,340 to 7,350 is a shaley zone, and I think that those present could see that this shaley zone carries pretty well across the cross section. It carries, furthermore, southward, and in the Hanagan Well -- pardon me, the Ralph Lowe Well to the south, there is no reef above that point. I could also find this point in all the five wells that offset my plat on the left side to the north, so that I feel that this is a strong correlative point.

In this regard, then, if I have my Datum Base of Reef as a correlative point throughout the mapped area, then we could see that the next fifty feet up would be correlative. For instance, the perforations which are from

approximately 7,226 to 7,293 in the Standard of Texas No. 5 Bogle Flats unit are directly correlative to the Hanagan section from approximately 7,392 to 7,423. The upper part of those perforations that I referred to in the Standard of Texas No. 5 Bogle Flats unit are probably correlative to the zone I have marked "Limestone" at approximately 7,354 to 7,366 in the Hanagan Well. These perforations correlate directly, and from examination of the gamma curve, northward into the Standard of Texas No. 3 Bogle Flats, and that well is not perforated in this interval, but in the top of the reef.

I could continue this type of extension of correlations across the base of the reef and in a certain part of the upper section of the reef, but I feel like the exhibit should speak for itself, that zones that generally are parallel to the base of the reef would be correlative from well to well at this same distance above the base in the mapped area.

This cross section also shows that there were no cores on any of these wells. If cores had been taken, I would have put them with the datum, because it would have been essential and useful in our valuation.

All the DST's that were run in the reef interval

that I am familiar with, and I believe I had adequate data, are shown on these particular wells. Also on the section, I have identified by "LS," and the symbol, "DOLO," and the sumbol "SH," the lithology of the various sections. This data, as I previously said, came from Permian Basin sample logs prepared by professional geologists.

Q Would you give us the relationship of the limestone and the dolomite in this field?

A The general consensus in the industry is that the dolomite is the primary producing zone in the field. However, we do have some exceptions in the field. These are of record in the previous Hearing.

There were four wells testified by Protestants that produced from limestone.

Q What are the names of those wells?

A These can be seen in the right map.

Q On your Exhibit 1, your large field map?

A On the right half of Exhibit 1, and they are the Enfield in Section 18 of Township 21 South, Range 23 East.

Q You are pointing to the upper lefthand corner of the map?

A The J. C. Williamson well in Section 19 of Township 22 South, Range 23 East. The well in Section 25 of Township 22 South, Range 23 East, is reported to be producing

from limestone. However, I felt like that there were some dolomite in this well, and I am not a hundred percent sure of the validity of the statement made by others.

The fourth well is the Penroc well in Section 19 of Township 21 South, Range 24 East.

Q Now, those four wells that you mentioned, do you feel like limestone section in those wells contribute to the pay?

A Yes, I do.

Going back to Exhibit 2, I have a line called Top of Reef, and I put reef in parenthesis. This is a geological interpretation, and in fact the reservoir may be a complex limestone bank that was subsequently altered to dolomite. The relation of the dolomite to the limestone is a complex one, and it requires considerable man-hours to unravel and interpret in its whole. But I think it is obvious that the lateral equivalents of some of the limestones, specifically in the Hanagan No. 1 Indian Federal, have core dolomite sections that are productive in offset wells.

Q Now, your Exhibit 3 in Case 4089, depicts two logs of this Hanagan Well in Section 21. Would you explain what is shown on the gamma ray density log on the left?

A The lefthand log, the lefthand most curve is a gamma ray curve. The other curve is on the right of this

column, and is the density curve, and is run to establish porosity or determine porosity.

In the center column, I have by symbols depicted from my sample descriptions. or the sample description prepared by the Permian Basin Sample Log Company, the lithology of this rock sequence.

The dashed lines are shale. The diagonal brick pattern denotes dolomite. The normal brick pattern denotes limestone, and I will discuss this portion somewhat.

In the interval from 7,330 to 7,350, we have essentially a dolomite section. The log indicates the zone is porous.

In the interval from 7,366 to 7,378, we have a shale sequence.

In the interval 7,378 to7,433 or 7,423, we have a sequence indicated as dolomitic limestone. You will notice that I have symboled this as bricks, with diagonal bars in the center column. This is the interpretation as presented on the sample log.

The bottommost interval here from 7,410 to 7,423 has a very good porosity break denoted on the porosity log.

On the log on the right side, this is a Sidewall Neutron Porosity Log. Again, it has a gamma ray curve, and

another curve which is the extreme righthand curve, which is used to determine porosity. These logs are frequently run in pairs, because they can be used in certain evaluations to determine lithology when one is somewhat in question of the samples, probably being more precise in their true interpretation in the typical samples that we get from oil wells.

The data, as I have evaluated it lithologically, would confirm the data represented by the sample examination. In other words, I have made a lithologic study based on Schlumberger charts of the lithology based on these two porosity curves. Also, on this log on the right side, I showed two of the DST's run in the Hanagan Well; DST No. 1, in which I have placed the correct depths of the test on Exhibit 2. I think I show rather boldly here, flow, 550,000 cubic feet of gas flowed at a rate of 550,000 cubic feet of gas per day.

The second DST flowed only a small amount of gas. It had gas to surface in seven minutes, and was reported to be too small to measure.

Q Was that well plugged and abandoned?

A Yes. However, because of the rather significant amount of gas in DST-1, it was decided by the operators

that they should run pipe, which they did. We perforated this well, and these perforations are shown by arrows, in the center column, and treated.

A general statement of this treatment is contained on the bottom of Exhibit 2 on the right log, and also -- pardon me, that should be Exhibit 3, and is also contained on Exhibit 2. I will read this: "Acidized perforations with 26,000 gallons in three stages. Highest flow estimated at 2,000 Mcf per day. Flow decreased to a stabilized estimated rate of 150 to 200 Mcf per day."

The 2,000 Mcf per day figure was given to me by one of the operators that had a back-in interest, and the stabilized flow rate I took from the well log that was given to the State Oil and Gas Conservation Commission.

Q Did the Hanagans make any effort to treat this well by fracturing?

A Not to my knowledge.

Q Has any limestone well in the field been fractured?

A I know of one well in which fracturing was done, on an edge well, and that is the Pan American No. 1 Honolulu Federal in Section 13.

Q Of the same Township and Range?

A The same Township and Range.

Q Please refer now to Exhibit No. 4, which is your gamma ray sonic log of that qan American Well, and explain what is shown of importance in this exhibit?

A Again, this is a gamma ray sonic log, a sonic portion of the log is run to make a determination of porosity. I have plotted in the center column the lithology of this well as determined by the Permian Basin Sample Log geologist, and I have also shown the percent of these lithologies just to the right of this column.

Also shown on this log are the perforations which are shown on the left side of the center column by a series of bars and circles. This well upon drilling was DST'd from 7,715 to TD, which I believe was 7,897; and flowed at a rate of 830 Mcf per day for one-hour-and-forty-five minutes through a 20/64 inch choke. It recovered 120 feet of oil and gas cut mud, and had an initial shut-in pressure of 2,873 pounds in one hour, and a final shut-in pressure of 2,853 in one hour.

I should say that I have the pressures of the DST's on the Hanagan Well on Exhibit 2 for comparison with the data presented on this log. After this well was drilled to total depth and tested, pipe was run. These perforations were performed, and the well was given a treatment that

consisted of a frac job, which contained some acid. It was completed for an IP of 1,700,000 cubic feet of gas per day on a 22/64 inch choke. This is not a calculated absolute open flow.

Q Is that well still producing?

A To my knowledge, this well is still producing. However, it does not make allowable.

Q Would you compare from those log studies that you made, this Pan American well with the Hanagan well?

A In my opinion, this section that is from 7,750 to approximately 7,800 in the Pan-Am well, and is limestone, is directly corrrelative with that interval at 7,388 to 7,423 in the Hanagan Well that is dolomitic limestone. In both of these wells, this section was perforated.

The shale break that I previously referred to in the Hanagan Well, I believe, is directly correlative to that shale that we find at 7,730 to 7,750 in the Pan American well, and that, therefore, those two dolomite and lime stringers from 7,702 to 7,730 in the Pan American well are correlative to the dolomite section in the Hanagan No. 1 Indian Federal from 7,328 to 7,366.

A comparison of these two wells would lead one to seriously question why the Hanagan Well did not make a

producer, whereas the Pan American Well has. In my opinion, the Hanagan looks better than the Pan American well, and in all instances of porosity, it appears there are more porosities in the Hanagan well than in the Pan American.

Q Mr. Mershon, please refer to your Exhibit No. 5 in Case 4089. Do you have anything further on Exhibit 4?

A No, I do not.

Q Will you explain what is shown by this aerial photo of --

A This photograph is a high altitude aerial photograph prepared by a company that does air photo on a contract basis, and is nationally known. It is presented in a guide book called the Guidebook of the Hueco Mountains, Guadalupe Mountains, and Franklin Mountains, Geology of the Carlsbad Caverns, presented by the West Texas Geological Society of the Delaware Basin in Exploration on October 31, November 1, and 2, 1968. This photo in the Guidebook, or picture in the Guidebook was taken from this particular picture that I am presenting here.

Q Now, the article in the Guidebook was prepared by whom, or submitted by whom?

A It was submitted in an article on the Air Photo of the Delaware Basin by William V. Trollinger of Trollinger

and Associates, specialists in the interpretation of air photos. Their Office is in Denver, Colorado.

Q Did you discuss with Mr. Trollinger this Exhibit 5?

A Yes, I did. This particular photo was taken in approximately the early months of 1964, and was used by Mr. Trollinger primarily to depict from a more detailed study the generalized interpretation of the air photo of this field. I have a more detailed study of this field, prepared by a different set of photos, which are the work of this study which was done on more detailed photos. The scale of this photo is approximately one inch to seven thousand feet. This is not exact.

Q Now, did you bring the information from this photo work in preparing your Exhibit 1, the area map?

A Yes, I did. I might point out the various interesting features on this particular map or this particular photo. One, the grid in the center of the photo is all of Township 22 South, Range 23 East. For purposes of questioning the correct orientation of this grid, which depicts the Township, I would like to point to the Sun No. 1 Weaver, which is in Section 6 of Township 22 South, Range 23 East. I've outlined the pad that is clearly visible here in blue.

In the lower right, you will find the Humble No. 2 Bandana point, the pad of that location is clearly visible.

By checking these two points against the known position of these wells on Exhibit 1 on the right side, you can see that this map is very adequately oriented. Actually, I think maybe it is 300 or 400 feet in mislocation, but for presentation here, I think it is adequate.

In the central part of the map, you will notice that I have located the Lowe No. 1 Marathon Federal, and I believe that the dark shadows seen in the center of that square indicates that the rig is on location. I think this would indicate the time that the picture was taken.

Q Would you care to discuss these form lines that are drawn across this grid?

A A number of things are shown on the interpretation of this particular photo. By analysis, through examination of magnified stereo pairs, trained geologists are able to determine the strike and the dip or the attitude of the beds, which is a poor term, I should use the rock that is exposed at the surface. From determination of this attitude, they prepare what they call a form line map. This is depicted by the lines that curve in general around the field. These are medium weight lines, and I am sure that all of

you would recognize these as somewhat following the structural trend as shown in previous exhibits.

Q That was Exhibit 1, actually?

A That's right.

Q Now, are these identical, the form lines on this air photo, with the contours on Exhibit 1?

A No, they are not identical, because, one, this is the surface rock. In my work, I must incorporate all sub-surface data, and I then, therefore, must adapt this air photo work to that sub-surface data. The combination of these two datas, in my opinion, present a structural interpretation of the field.

In the center of Township 22 South, Range 23 East, I have a square marked called Gulf No. 2 Helbing. I visited this location on the ground, and was able to determine the small flat topped hill that is to the immediate south and east of this pad, so that I could identify the position of the Gulf Helbing Well without benefit of scale, because I wanted to correctly position this to structure as determined by air photo work.

You will notice to the immediate right of the Gulf No. 2 Helbing Federal, a heavy dark arrow. This symbol means a plunging nose. This nose plunges southeastward.

On each side of this are two small arrows, which determines dip on each side and away from this nose.

Q Now, the importance of that plunging nose will be further shown on Exhibit 6. Have you completed Exhibit No. 5?

A Yes.

Q Please explain what is shown on Exhibit 6.

A Exhibit 6 is called the structure map, structure map on the base of the reef, The base of the reef here are these datum points found on Exhibit 2. Also, I show in the heavy dark line the fault on the west side of the field, and I have two arrows marked by wavy lines, which denote water. I show my location of the area of interest in red.

Q Refer to your area of water surrounding the Gulf Well in Section 22, and explain, if you have an opinion, it's presence.

A First, I would like to point the dashed line that is called "Southern Limit of Reef." This, in my opinion, represents the southern limit of the reef. In other words, a well drilled in the center of Section 27 of this Township would have no reef in it, so that any water present northward in the reef could not be found in this area south of the zero line, simply because there

is no rock of reef equivalent age that is capable of containing that rock.

The solid lines are the structure map on the base of the reef. If you will notice the Gulf Helbing Well on the plat shows a strong incline, which is a line in the east half of Section 22. In Section 23, there is a strong nose that plunges southeast. This strong nose that plunges southeast is clearly depicted in the air photo on Exhibit 5.

The structural map low, where the lines are looping up and around the Helbing Federal, are again depicted in the air photo. Now, what I would like to demonstrate from this is that a structure map is essentially the same as a contour map on the surface of the ground, and water being a fluid, seeks a level and is controlled by gravity.

In this area, we can assume -- we will not assume this. In this reef, after deposition, it was undoubtedly water-filled. After burial and proper compaction, hydro-carbons migrated into it. Upon this migration, water had to be displaced. If this structural low that I demonstrate in Section 22 was present, and I believe it was at the time of this migration, this water had to migrate down dip out of the reef to the

east. It was prevented from migrating southward, because of lack of reef, and it was prevented by the nose in Section 23 from migrating further to the east. So these structural contours that are similar to a surface contour map would simply say we have a pond of water, the dam being the zero line, and the structure contour lines being the edge of the lake. I think this should adequately explain the water at the Gulf Helbing Well.

There has been some talk of hydrodynamics in this field, and it may or may not be valid. For water to be tilted hydrodynamically, it must be in contact with some flowing fluid. Now, the Gulf No. 1 Helbing in section 15 is perforated in the bottom of the reef, it produces no water. The Marathon No. 1 BB Federal in Section 1 of Section 14 is perforated in the bottom of the reef, and produces no water.

Below the datum of the reef here, we have a very dirty section and some shale. In my opinion, that is an impermeable section, and would not permit this water to be in contact with anything below the reef. Therefore, even as hydrodynamics are in effect in this field, I cannot believe that this water is in contact with any fluid that may be tilted. Therefore, I believe that this is a perched

water table or a pond of water.

Q I don't believe, Mr. Mershon, you have earlier talked about the records showing the attempted completion of this Gulf Well, and if so, would you releate from memory the attempts made by Gulf to complete the well?

A Gulf upon drilling this well --

MR. PORTER: Is that the Gulf Helbing No. 2?

MR. LOSEE: Yes, sir.

A Gulf upon drilling this well, by sample examination, by geologists on location, had an adequate, and in fact attractive reef section. They are approximately 300 feet above the gas-water contact of the field, which is at a minus 3,750 feet, Because of this favorable structural position, they saw no problems, and they ran a gamma ray sonic, and no electrical logs. They did not DST the well. So they ran pipe. After running pipe, they perforated the well, and washed it with acid. Much to their surprise, they did not produce gas.

Subsequent tests produced water at rates, I believe reported at 115 barrels of water in six hours by swab, which indicates to me that there is adequate permeability in this well.

Gulf reported to me verbally or orally that

they felt like from the tests they performed, that this well was connected to the reef, and they were at a loss to explain the water in the well.

MR. NUTTER: Do you know the perforated interval in the well, Mr. Mershon?

THE WITNESS: Yes, and it is depicted on Exhibit 2, on the Gulf No. 2 Federal Helbing by small arrows.

MR. NUTTER: I see them now, all right. Was there one or two shots at each one of those points?

THE WITNESS: There is one or two. I'm sorry, I don't know.

MR. PORTER: Mr. Mershon, for the record, could you tell what those perforated intervals are there?

THE WITNESS: I can read them, or get the scout ticket, which is more adequate. Two shots per interval, 7,224, 7,264, 7,264 -- no, this is the wrong one.

Q (By Mr. Losee) Why don't you read them off your Exhibit 2, Mr. Mershon?

A 7,374 -- pardon me, 7,574, 7,606, 7,621, 7,636, 7,664, 7,684.

MR. PORTER: And there were two shots per interval?

THE WITNESS: I believe that's correct, sir.

Q (By Mr. Losee) Mr. Mershon, have you completed

your explanation of Exhibit 6?

A For clarification's sake, I show the water on the extreme right side of the map not conforming iwt the structure on the base of the reef. That line depicts the water configuration on the top of the reef, so if you drilled east of this pointin the wavy section, you would penetrate a hundred percent water.

The area I have shaded in blue along the 3,750 contour interval would indicate where the water struck on the base of the reef, and so that any point to the east of that, if porosity and permeability -- if porosity were present, one would have water in the base of the reef.

I also show on this plat in Section 8, that the Standard of Texas No. 6 Bogle Flats, unit, a closed low by hatchered marks. The DST over the bottom 60 feet of this well -- pardon me, the bottom 40 feet of the reef in this section produced water. This water is noted and recorded in other Hearings before the Commission. Thatis all I have on this map.

Q Please refer to your Exhibit 7, entitled "Isopach of Reef Porosity Greater Than 2 Percent," and explain the items you consider important from this map.

A This map is an isopach of the reef porosity greater than two percent. The source of the data are from

the various porosity logs run on each of these wells. In conjunction with the use of these various porosity logs, I examined the sample logs so that I could correctly identify the lithology associated with the various porosity logs. This is essential in correctly determining the porosity of the various lithologic unit.

You will notice that I do not have any contour intervals or lines in Sections 8, 9, and 10, and the reason for this is that we have two anonymously thin net pays in this area, and I felt to properly contour this area that I should examine in detail the net pay, the tier of wells immediately to the north, and I felt like this was beyond the need of this particular study. I did not perform that job.

Q You show your isopach lines running through this Gulf Well that produced water. Would you explain why?

A Yes, this map is a not a net pay map, but an isopach of the reef porosity greater than two percent. In order to correctly evaluate how net pay lines must be drawn around the Gulf Well, one has to first understand the trapping of the water in the Gulf No. 2 Helbing. This well does contain 34 feet of porosity greater than two percent in the reef rock.

The small dashed lines that I have drawn up from the various isopach lines marked zero, 25 and 50, would define the shape that the net pay lines should take in the vicinity of the Gulf Helbing Well. These trends must follow and conform with the edge of the perched water as described in Exhibit 6.

Q Mr. Mershon, have you planimetered the number of acres in Section 21 having reef porosity greater than two percent?

A Yes, I have. And I planimetered it to be 414 acres.

Q Please refer to what has been marked as Exhibit 8, and explain what is shown by this graph.

A Exhibit 8 is a standard P/Z vs. Q plot prepared by me; P being bottomhole pressure. The source of this data is the New Mexico Engineering Commission. Z, super compressibility factor, which was determined by using an analysis of the gas of the field. Q is cumulative production.

The data that I have used on this plot is depicted on the back, on the sheet behind this particular plot, if you will fold over your sheet, you will see the data that I have used. I think we should look at the bottom first, the data for P/Z vs. Q plot. I show in the right column -- pardon me, the left column, the year. The next column to

the right, the average bottomhole pressure from those pressures reported to the New Mexico Engineering Committee. I did disregard pressures that were anonymously low, which I think anyone preparing such a study would do. Z, as I previously stated, was calculated by a use composition of gas, so that P/Z is shown in the next column to the right.

Cumulative production to mid-August of the various years is then shown in the right-most column. The upper data is simply the method in which I determined cumulative production to mid-August, which shows the annual production, cumulative annual production.

Q You are a geologist by profession, and not an engineer, is that correct?

A Yes, sir.

Q Did you actually make these calculations?

A Yes, I did.

Q Did you discuss them with any petroleum engineer, and if so, whom?

A I discussed them with Vince Serack, who is a petroleum engineer in Denver, Colorado. Of course, I had a considerable library at my disposal in which to research this, and, of course, without the aid of the data prepared by the Engineering Committee, I would never have been able

to determine this data. But, professionally, I had help from a petroleum engineer to check the validity of my work.

Q Refer to your graph on the front page, and point out the important statistics in this graph?

A You can see on the upper lefthand corner the various points that I plotted from the data on the sheet behind this plot. A line extrapolated to the lower left -- pardon me, lower right, where this line strikes the zero P/S is the original gas in place in the field.

Now, at the point that this data was prepared, we have something less than ten percent of the original gas in place per day produced. However, the points seem to line up very adequately, and I feel that we are seeking the beginning of a very valid line that is going to follow the trend that I have depicted here.

I have discussed this further with Natural Gas Pipeline Company of America. They tell me that they will shortly make public figures that are in extreme close agreement with the numbers I have been presenting here. From this, I say the original gas in place in this field is 2,360 billion cubic feet of gas, or on the basis of 54 producing wells now in the field, the original gas in place

was 44.7 billion cubic feet of gas per well.

The next point I picked is the abandonment. I chose an abandonment pressure of 600 pounds. This is somewhat open to question. It will probably be, in fact, lower than this. Z was calculated, so that I have P/Z of 646. At this point, the pool recovery should be 1,935 billion cubic feet, and on a per well recovery basis, this should be 35.8 billion cubic feet of gas per well.

In testimony previously before the Commission, specifically in Cases 2749 and 2750 reopened, February 8, 1967, to determine the pool rules, or to finalize the pool rules, Standard of Texas on their Number One exhibit, portrayed what they said was a typical well for the field. This data said that the gas in place for this particular well was 26.6 billion cubic feet of gas per well. At the time this exhibit was prepared, there were 53 producing wells in the field, which would give a field in place total of 1,410 billion cubic feet of gas.

If that was a valid number, then to my original gas in place figure, there would have to be a 67 percent increase in gas in place in the field.

On the top of the chart, I have two arrows. One says gas dedicated to Natural Gas Pipeline Company of America.

This was 1.3 trillion -- let me say that simply, to be consistent, and it should be on this presentation 1,300 billion cubic of gas dedicated to Natural Gas Pipeline Company of America.

Gas dedicated to the Southern Union Pipeline was 100 to 200 billion cubic feet of gas, or a total dedicated gas of 1,500 billion cubic feet. This is from testimony given by Marathon on Page 45 of the Transcript of Cases 2749 and 2750, 1958.

From the total dedicated gas, then, to the pool recovery that I have used, I would find that we would have to increase reserves by 29 percent. What this means to me is that from the time of this Hearing which was February 8,1967 until the present, we have data that seems that there is greater pour volume or greater gas to be produced in this field than suspected, or presented at least in testimony.

So how could we account for this additional increase in gas? One, the field may be larger than presented. In other words, there may be some edge locations that are not producing their gas.

Two, the pour volume may have been inadequately evaluated, because in calculating the gas to be decicated to the two pipelines in the field, they had to make volumetric

calculations, because they had no real production history.

So that I might point out the two percent cutoff porosity was used, apparently at that time, because the industry said in general that we will use a two percent cutoff for this field. So it appears that maybe the cutoff porosity had been placed to high, so that that porosity lower than two percent maybe contributing gas to this reservoir.

The third possibility is that the field has a water drive, and the history of the curve is too short to reflect this. At this point, we have to this date, we have taken out approximately ten percent of the gas to be recovered, as I interpret it, to my knowledge, there have been no wells that have been flooded out, or have had water encroachment. The only well I know that has been abandoned because of the water production is the well I referred to much earlier during the Hearing, which was the Marathon No. 2 North Indian Basin unit in Section 11, Township 21 South, 23 East. This well potentialed with a large quantity of water flowing with the gas. To me, this does not indicate that we have encroachment. The well was probably perforated below the gas water contact of the field.

I believe that summarizes my statement on Exhibit 8.

Q Mr. Mershon, have you made a study of the pressure history in this field?

A Well, of course, to evaluate and prepare Exhibit 8, I had to study the pressure history, and this history indicates that there is excellent communication throughout the reservoir, that one well will drain all of the gas under each section, and perhaps even beyond that.

In testimony before the Commission in Cases 2749 and 2750, I think the pressure studies presented in that clearly show that there is excellent communications throughout the reservoir, and that a well should be able to drain in excess of 640 acres.

Q What importance does the good communication throughout this field have to do with your proposed 990 location?

A Well, if I am permitted to drill this location, and I am prorated to the area that contains gas under my section, then I will not adversely affect any offset operator. Contrary, that I would say that communication is adequate in this reservoir to currently be draining my acreage.

Q So that actually, if the penalty factor is assessed by way of allowable against a well at a 990 location in Section 21 is in direct proportion to the recoverable gas under that section, your 990 location would not adversely

affect any of the offset operators?

A That's correct.

Q Have you many a study of the non-standard well locations in this Indian Hills-Upper Pennsylvanian gas field?

A Yes, I have.

Q How many non-standard locations are there in the field?

A There are 17 that I can determine.

Q How many were in existence when the special pool rules adopted and came in under this so called grandfather clause?

A There are 7 that I classify as grandfather wells, non-standard locations. Some of these are grandfather, because they were wildcats, and actually were drilled even after the pool orders were established. But since they stepped out in excess of a mile from the pool boundaries, I have also classified those wildcats as grandfathers.

Q How many of them were granted exceptions for topography reasons?

A I find that nine wells have non-standard location numbers, and these were approved administratively, because of topographic reasons. I would like to point out that I

took these wells and numbered them by the date in which they were sputted, and analyzed the location at the time in which the well was drilled, and in my opinion, in every case in which these wells were drilled for topographic reasons, and I think they are valid topographic reasons, I would like to point out that in every case they gained geological advantage, and in my opinion gained a geologic advance.

Q Have there been any Hearings requesting exceptions for topographic reasons?

A Yes, there was one, this is Case 3475. It was by Marathon to drill the No. 6 Indian Hills unit in Section 17, 21 south, Range 34 East.

Q Have you reviewed the transcript in this Case?

A Yes, I have. They requested to move the location from 1,650 to 1,440 from the south and the east lines of this section because of topographic reasons. They presented in this Hearing estimated costs to prepare various locations, and the difference betweeen the standard location and the requested location was $5,265. This was heard by Hearing, because one of the offset operators opposed the location. However, the location was granted.

In my opinion, this well moved 210 feet toward the boundary line, and gained geological advantage. No geology

was presented at this Hearing. It was stated by the witness that, in his opinion, all this section would produce. This well is a dryhole. No penalty was assessed to the well.

Q So that actually, to summarize this study, about one out of every three wells drilled in this field are on non-standard locations, 17 out of 54?

A Yes, some of these are dryholes, of course, so I think we might say 25 to 30 percent.

Q But they were all under either the grandfather clause, or for topography reasons?

A That's correct.

Q And those that were for topography reasons, in your opinion, at the time gained geological advantage?

A Yes, they did.

Q Please refer to what has been marked as Exhibit 9, and explain what is the purpose of this portrayal.

A The large square with the notation in the lower center marked 640 acres denotes a standard section of land with a scale of one inch equals 1,000 feet. On the interior of this section, I have placed a dashed line which forms a square, and has a distance of 1,650 feet from the south boundary throughout. Under the pool rules, one can drill a standard location in a place within this square without

penalty.

Normally, when we think of drainage of a reservoir, we think of it in some circular pattern, altered somewhat by permeability, so a location 1,650 from the north and east lines of this section can drain a circle that has an area of 640 acres. We can do this without penalty. I have prescribed that circle as the circle that is the lower left of the two circles scribed, and has a center 1,650 from the north and east lines of this section. I scribed a second circle 990 from the north and east lines of this section. It, too, contains 640 acres.

The difference in the crescent marked 127 acres is that area advantage that I would gained from moving 933 feet diagonally to the northeast.

Q Have you planimetered the number of acres in that half moon shape?

A I calculated that mathematically, which I consider more accurate than a planimeter, as 127 acres.

So you can see in the note, then, in the right, that the area advantage gained is 127 acres over 640 acres, twenty percent. From this interpretation, I say my allowable should be 80 percent.

Q Now, that is on an area advantage portrayal. You

have also shown it in that exhibit on a footage advantage portrayal. Would you explain that?

A Yes, we somewhat discussed this in the last Hearing. I moved in each direction 660 feet closer to the line, so 660 feet is in a ratio to 1,650 of 40 percent, because these are similar triangles. 933 to the diagonal from the standard location to the corner is over 2,333 feet, and is in a ratio of 40 percent. I have gained in a linear advantage of 60 percent. This might be another way of determining penalty.

I chose these, because I feel, one, it is virtually impossible from the data at hand to say where the zero line of pay in this field is. In the exhibits I presented, specifically my net pay or net porosity map greater than two percent --

Q Exhibit 7?

A Which is Exhibit 7, I used a cutoff of two percent porosity. I did that because "this is accepted in the industry," it is on record with the Commission. I feel like that is not a realistic number, that my P/Z vs. Q plot indicates that there is greater gas than previously testified to. Therefore, we do not know what the point between two percent and zero percent, where the true cutoff porosity is.

Therefore, I have prepared Exhibit 9.

Q Now, referring again to your Exhibit 7, do you have an opinion as to whether the 414 acres that you show in Exhibit 7 will contribute gas to a well in Section 21?

A Yes, I do.

Q What is that opinion?

A I think the 414 acres is the minimum that will contribute gas to a well in Section 21, located 990 from the north and east. If this well is not drilled, it certainly will contribute gas to the reservoir, and will be produced by other wells in the field.

Q Will you explain, Mr. Mershon, in your words, why you are asking authority to drill this well 990 from the northeast corner, 990 from the north and east lines?

A I am requesting to drill this location 990 from the north and east lines, to protect my correlative rights and those royalty owners that we are responsible to. I further want to drill this location to minimize risk, because their is a risk at drilling on the edge of a field. I think we demonstrated earlier that 60 percent of the last 15 wells drilled in the field for pay were dry.

If I received an allowable that is in proportion to the productive acreage under this section, I will not

adversely affect offset operators; and my location being almost a mile from the nearest to producing wells, should not adversely affect those wells. I, therefore, ask that I be granted this location to protect my correlative rights.

Q Mr. Mershon, were Exhibits 1 through 9, with the exception of Exhibit 5, prepared by you?

A Yes, they were.

Q And Exhibit 5 is the air photo of the Indian Basin field taken from the West Texas Geological Guidebook, 1968?

A Yes.

MR. LOSEE: We move the introduction of Exhibits 1 through 9 in Case 4089.

MR. PORTER: If there is no objection, the exhibits will be admitted.

(Thereupon, Applicant's Exhibits 1 through 9 in Case 4089 were admitted in evidence.)

MR. LOSEE: That is all the direct examination.

CROSS EXAMINATION

BY MR. MORRIS:

Q Mr. Mershon, please go back and refer to your Exhibit No. 3 in Case 4088. Now, this Exhibit shows the location of wells in the southern part of this pool. It

doesn't show the wells in the pool, is that correct?

MR. PORTER: Are you talking about Exhibit 3?

MR. MORRIS: I am talking about Exhibit 3 in Case 4088.

MR. LOSEE: The pooling case.

MR. PORTER: I see.

A The question, as I understand it, this does not show all the wells in the pool.

Q It does show all the wells in the pool in the south part of this pool?

A To the best of my knowledge, yes.

Q Except for the shallow wells that are shown on this exhibit, and referring only to the wells that are drilled in the Indian Basin-Upper Pennsylvanian field, all of the wells in this end of the field are unorthodox locations, are they not?

A Yes, they are.

Q Just for the record, let's make it clear what we are talking about as far as an unorthodox location is concerned. Would you just state for the record what the pool rules are on orthodox locations?

A An orthodox location is one that is drilled no nearer than 1,650 feet from the boundary of the section, and no nearer

than 330 to a quarter quarter section line.

Q All right, sir. And was the Gulf Well, the Gulf Helbing Federal Well in Section 22 that turned out to be a dryhole, it was drilled at a standard location?

A Yes, it was.

Q And the Hanagan well was drilled at a standard location in Section 21?

A Yes, it was.

Q In the forced pooling case, you have asked, as I understand, to pool the entire acreage in the section, the whole 640 acres?

A Yes, I have.

Q And you are asking the Commission to dedicate the entire section to the well at your proposed location?

A Yes, I am.

Q Please refer to Exhibit No. 1 in Case 4088, the ownership plot. If the entire section is dedicated to the well at your proposed location, would you agree that Marathon Oil Company would have less of an interest in the well than it would have if only the 414 acres were dedicated to the well, as you have depicted upon your interpretation of productive acreage?

A Yes, I would agree.

Q Would not it follow, Mr. Mershon, that the dedication of acreage lying outside your 414 acre opinion of productive acreage would result in a dilution of Marathon's interest in the well, and would impair Marathon's correlative rights, as you have defined them in this Hearing?

A If we could actually draw that line at 414 acres, and be absolutely certain of its correctness, and be absolutely certain that there is no contributing reservoir south of that line between the zero two-percent line, and the zero-reef line, then I would say that you are correct. But I say it is impossible to define that line.

Q Maybe I misunderstand you, but I thought I understood that in the non-standard location portion of this case, that you said that it was your opinion that the 414 acres was -- the line drawn to delineate the 414 acres was the limit of the productive acreage in this section?

A I believe I said that I -- and maybe incorrectly -- but that would represent the minimum pay. And again, I would say that that zero line is one that is physically impossible from the data at hand to determine.

Q You would agree, would you not, that if your opinion as stated is correct, and the acreage below that 414 acre cutoff is not productive of gas, and does not contribute recoverable reserves to your well, that Marathon Oil Company's correlative rights would be impaired by dedication of the

entire 640 acres to your proposed well?

A Yes, I would have to admit that. I don't know how we could justify it to these two 40-acre owners, the cutoff, because they will be prevented from ever protecting their correlative rights.

Q Mr. Mershon, correlative rights under our New Mexico law are defined in terms of recoverable reserves, are they not?

A Yes, they are.

Q So the owners of these 40-acre tracts that you are referring to in the south part of this section would not have any of their correlative rights violated if they had no recoverable reserves under those tracts, would they?

A The only way you could prove whether they had correlative rights would be to drill in the vicinity of those wells.

MR. UTZ: Vicinity of the acreage?

A Vicinity of the acreage, pardon me.

Q In your opinion, Mr. Mershon, does the acreage lying below your 414-acre cutoff line contain recoverable reserves?

A I simply don't have the data to answer that. I do not know.

Q You cannot say that it is your opinion that that acreage does contain recoverable reserves, can you?

A I would just have to simply say there is not adequate data to make the evaluation.

Q Referring to your Exhibit No. 1 in Case 4089, and tothe lefthand portion of that map, if you could visualize where a standard location would be in the northeast quarter of Section 21, it would fall just about on the contour of your isopach of gross production, that would be the one hundred foot line, would it not?

A Very closely, yes.

Q And the well at your proposed location would fall at a point at about 130 feet on the same contour, that is the well at theproposed location would be at about the 130 foot line of the isopach of the gross producing zone, is that correct?

A That's correct.

Q So it would follow from that, that if you are assuming the correctness for the moment of your isopach of gross production, or the gross pay zone, let's say, you would be experiencing an increase of 30 feet of gross pay?

A Yes, sir.

Q And since you started at 100, you would be, therefore, experiencing a 30 percent increase in the gross

pay interval you would expect to find at your proposed location, as compared to the standard location?

A Yes, sir.

Q Please refer to your Exhibit No. 7 in Case 4089, showing the isopach of reef porosity greater than two percent, and here again if you visualized a well at a standard location in the northeast quarter of Section 21, you would have a well located approximately on the 30 foot contour line, would you not?

A I would say it would slightly less than 30, between 25 and 30.

Q And at your proposed location, what would you say it is, about 45 feet?

A 47.

Q 47?

A 45 to 50 feet.

Q All right. So your increase in location as to what you might expect as to the feet of porosity, would be greater than a 50 percent increase if you are increasing from, let's say, 30 feet to 45 feet, it would be a 50 percent increase, would it not?

A No, sir, you would subtract 30 from 45, and you would be increasing 15 feet: and 15 over the original 30 would give you a gained advantage of 50 percent.

Conversely, an interesting point, if I were permitted to drill 990 from the north and east line, and I were to make 45 feet, and I had to move to a standard location, I would be losing 30 percent -- 33 percent.

Q Let me ask you this. I assume by your presentation of Exhibit 7 that you feel that it is significant to examine the isopach of porosity having an indication of more than two percent. How many feet of porosity do you feel that must be present in order to make a commercial well?

A I really can't answer that question, because we see a wide variation in wells that have relatively thin pay, and there aren't too many, but we do see a wide variation in the IP of these wells. And, as I previously stated, the Hanagan is not a commercial producer. I don't know, and I just don't feel like a generalized statement could be made that would be valid that would support whether it took two feet, or ten feet, or fifty feet, because one fracture, and there are fractures in this reservoir, could be significant in a thin zone, that would permit you to effectively develop wellbore permeability which would be essential in draining a reservoir.

Q Then are you saying, Mr. Mershon, that a consideration of porosity alone is not an indication of recoverable reserves?

A Well, of course, the reservoir must have permeability to produce. Therefore, permeability is a factor. This is one in which we have really little data to support a theory of what, for instance, permeability must be, and how to predict at a given point witin a reservoir. I say the data to support permeability in predicting what the potential of a well would be, is extremely speculative.

Q Let me ask you my question again, Mr. Mershon. Is a consideration of porosity alone, as shown on Exhibit No. 7, any indication of recoverable reserves?

A I think my presentation of porosity alone is an indication of recoverable reserves.

Q Well, I thought I asked you at the beginning of our discussion of Exhibit No. 7, if you could give to me some estimate as to number of feet of the section you would have to have of having porosity greater than two percent in order to make a commercial well, and you said that you could not, because the porosity in and of itself was not sufficient to enable you to say that so many feet of porosity would give you a commercial well. Now, am I misstating you?

A No, you are not misstating me. But the manner in which the questions were asked, one, is two percent the

valid cutoff point, and your final question was is porosity a factor in determining the area that is productive, and my answer to that was yes.

But I will point again that at that point you didn't say is two percent the cutoff porosity. And I have stated previously, and I will state again that I don't think we can determine from the data what the cutoff porosity will be in determining the edge of the reservoir.

Q Do you have an opninion, Mr. Mershon, as to the amount of recoverable reserves underlying Section 21?

A I haven't made that calculation.

Q Concerning your discussion of the Hanagan well, do I understand the gist of your testimony correctly, that you do not believe that there was any -- or that a frac job should have been performed on that well in order to create permeability for the production of gas?

A No, I didn't say that. I pointed out that a well that has log characteristics that are extremely similar to this -- in fact, looks actually poorer in quality -- was fraced, and did make a commercial well. Now, the manner in which a well is treated and what response it will have after treatment is a speculation. I don't criticize the manner in which the Hanagan Petroleum Corporation treated their well

at the time in their completion attempts.

Q Are you saying that there was effective permeability in the reservoir surrounding the Hanagan Well?

A I feel like the DST at a rate of 550,000 cubic feet of gas per day, indicated that there was some effective permeability around the reservoir. And since it did not produce any water, I assumed that that reservoir is all hydrocarbon bearing.

Q Now, your opinion in this regard is based upon the DST information that you have, and the production test that was attempted, as you have stated, is that correct?

A Yes. The source of my information was a scout ticket and a review of the data reported to the Oil Conservation Commission.

Q Did you ever attempt to communicate with the Hanagans directly to confirm this information?

A No, I did not.

Q Concerning your study of the non-standard locations in this field, Mr. Mershon, you testified there were 17 non-standard locations. You said 7 of them have been grandfathered in, by which I assume you mean drilled under the Statewide rules, and then given automatic exception?

A Yes.

Q And you said nine were granted administratively on a topographic basis. What is the other one? The nine and seven only add up to sixteen. We have one missing here.

A I had Case 3475, I believe.

Q Oh, all right. That was also granted on a topographic basis, was it not?

A Yes, it was, after Hearing.

Q So there have been no exceptions granted to the field rules in this field, except the automatic exception that is granted to wells that were drilled under the Statewide rules, and except for the wells that were granted exceptions on the basis of topography?

A There have been no other exceptions. There was one, pardon me, a non-standard unit which required a non-standard location. I did not include that in my tally.

Q Well, let's make sure what we are talking about here. Where is that one, and what is the location we are referring to?

A This well is located in Section 3 of 20 1/2 South -- I'm not sure whether that is Range 23 or 24 East. Can someone answer that question? There is an adjustment in Township lines here.

MR. HANAGAN: 24, I think.

A It is Standard of Texas. It is Section 3 of -- it is in Section 3, Township 20 1/2 South, Range 23 East, and it is drilled 990 feet from the south and east lines. This is a non-standard unit.

Q About how many acres are in that particular section, could you estimate?

A The combined two sections, if I am not mistaken, contains 685 acres, and no geology was presented on this particular case. It was a very short Hearing. There was testimony they thought this entire acreage would produce, and they drilled a dryhole.

Q Mr. Mershon, the unorthodox location there, as I understand it, was necessitated due to the section only really being about a-half-a-section,is that right?

A In which the well is located, that's right.

Q Refer to your Exhibit No. 9, in Case 4089, and on that exhibit you make a study of area advantage, and you say the allowable should be 80 percent, and then you make a study of the linear advantage that you are obtaining, and you say based on that, your allowable should be 60 percent.

When you say 80 percent and 60 percent, of what figure are you talking? 80 percent of what, and 60 percent of what?

A Allowable in this field is based on the number of surface acres that you dedicate to a well, and this has been 640 acres. So I say that the 80 should be the 640 acres, and the 60 percent should be of the 640 acres, because I feel like that we are attempting to draw zero lines in which we do not have data to draw zero lines. The control is not adequate to define these lines.

We are all familiar with developing fields on 40-acres spacing, and sometimes it takes years to get down to the edge, specially when we are dealing with carbonate wedgeouts in defining precisely the zero lines in those fields.

Q Now, Mr. Mershon, the advantage that we are talking about here, and the penalty that should be imposed against your unorthodox location, if it is granted, is intended to offset any advantage that you are gaining by virtue of the unorthodox location, isn't that correct?

A Yes.

Q So if the Commission should determine that the productive area of this section -- let me change my choice of words there -- not the productive area, but the area containing recoverable reserves in this particular section, is something less than the full section, then the percentage

of allowable that you have determined here, that is either the 80 percent or the 60 percent, or something in between, should be applied against the allowable that would be assigned on the basis of the acreage containing recoverable reserves in this section, in order to protect everyone's correlative rights, isn't that a correct statement?

A I'm sorry, I can't --

MR. LOSEE: Maybe we can have the Reporter read it back.

MR. MORRIS: Let me state it a different way.

Q (By Mr. Morris) As I understand your exhibit, you are saying that the allowable should be 80 percent figured one way, 60 percent figured another, and you have also said in the compulsory pooling case that you are asking that the entire section be pooled.

Now, I am suggesting to you that the Commission may, and in my opinion should establish something less than the entire section, and should establish a proration unit comprising only what it finds to contain recoverable reserves; and if the Commission does that and establishes a non-standard unit which would have a proportionately reduced allowable, just based upon acreage, isn't it also correct that the Commission having found and estalished that non-standard unit on the basis of a finding of recoverable reserves, should

further reduce that allowable in accordance with the percentages that you have shown here on Exhibit 9, in order to protect correlative rights?

A No, I do not think that the Commission should double penalize the location, which is what you suggest. And these alternate penalties that I show on Exhibit 9, or presented herein, point out the difficulty in establishing the productive acreage, as I have said before, in section 21. I do not think I should be penalized twice.

Q Mr. Mershon, if you were not appying for a non-standard location, if you were drilling your well at a standard location, but you were in here just on Case 4088, on a forced pooling case, and if the Commission established a proration unit, and pooled the proration unit in that case in accordance with your interpretation of productive acreage, that was the 441 acres, how much of an allowable would you be entitled to with respect to your well at a standard location? It would be 441 over 640, would it not?

MR. PORTER: I believe the figure was 414.

Q Excuse me, 414 over 640.

MR. LOSEE: Let me also at this point refer actually, I think, to Mr. Mershon's testimony about the 414 acres. I think his testimony was that that 414 acres

was the two percent porosity in the reef, and that a minimum of that many acres would contribute to the reservoir.

He also testified both on direct and cross that somewhere between the 414 and 640 would contribute, and I think he has been consistent in his position, and yet you would have him opine that only 414 contributed recoverable reserves, in your line of questioning.

Q (By Mr. Morris) Let me state it another way, Mr. Mershon. Assume with me that there will be evidence presented here to the Commission from which the Commission could, if it believes that testimony, find that recoverable reserves in this particular section is something less than 640 acres. Just for the purposes of discussion here, let's say that it's 320 acres, and if the Commission should find that 320 acres of this section contained recoverable reserves, and they establish a proration unit of 320 acres; and if the Commission should find that 320 acres of this section contain recoverable reserves, and they establish a proration of 320 acres. Now, if you were not drilling at an unorthodox location, and if you were drilling at a standard location, isn't it true that you would only be entitled to receive a half an allowable based upon that hypothetication?

A If I drill at a non-standard location, and 320

acres were determined as being a productive area --

Q No, if 320 acres were determined to be the productive area, and you were drilling at a standard location.

A Yes.

Q You would only receive half an allowable, isn't that correct?

A No, that is not correct. I believe if I drilled at a standard location, there would not be a determination made of the number of productive acres.

Q Well, I am asking you to assume, Mr. Mershon, that the productive acreage does become a question by virtue of your bringing a forced pooling action, whether or not the non-standard application were even before the Commission.

A I don't know, really, the rule well enough to answer the question.

MR. MORRIS: I hope the answer is self-evident.

MR. PORTER: If it is, we have wasted a lot of time.

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

CROSS EXAMINATION

BY MR. KELLAHIN:

Q In connection with your Exhibit No. 1, as I understand, that is based --

MR. NUTTER: Which Case, Mr. Kellahin?

Q In Case 4089, that is based, as I understand it, on the work of the Geological Symposium in Roswell, primarily?

A That's correct.

Q What changes did you make on the righthand portion of the Exhibit that differs from the Roswell Symposium?

A Primarily the structure in Section 22 South, 23 East, and I added --

MR. LOSEE: You mean Township.

A Township 22 South, Range 23 East, I altered the structure line. I added a zero dolomite line, I altered somewhat that area in section -- Township 21 South, 24 East. This was made primarily because I had additional data.

Q You mean 22 South, 24 East, don't you? You said 21 South.

A Well --

Q Did you alter 21 South, also?

A Yes, I did.

Q In what manner did you alter it in the area of your proposed location?

A I added that strong structural nose, which is the real strong protrusion that runs in the south of the Township. I also added a nose in section 23 of the Township, and it is

that nose that I show on the map on the right.

Q That is the location of the Gulf Well where the water zone is shown?

A Yes, that is the nose to the east of the Gulf Well.

Q Is that nose based solely on your interpretation of the area in the photo, Exhibit No. 5? Do you have any other evidence of the nose?

A Only the geophoto interpretation.

Q Now, on the lefthand portion of the exhibit, that is just a larger scale drawing of the same information on the righthand side, is it not?

A Yes, in more detail.

Q Now, have you added anything to the lefthand portion of the exhibit which you have not already discussed, which was not supplied by the Roswell Symposium?

A All the work in the map on the left is my interpretation and my work.

Q All of thatis your interpretation?

A Yes, it is.

Q You used the other simply for information, is that correct?

A As a guideline, and primarily to establish just an

area in which we could orient ourselves to the field.

Q Then, the solid lines are your interpretation of the structure on the Upper Pennsylvanian?

A Yes.

Q And the dotted line is your interpretation of the isopach gross production zone?

A Yes.

Q And the zero line is your interpretation of the location of the zero dolomite?

A Well, the zero -- in the left plat, the zero reef.

Q Zero reef?

A Because we don't really know where the last bit of dolomite does actually occur.

Q But that is your interpretation of the end of the reef?

A Yes.

Q Or is that the Roswell Symposium's interpretation?

A That is my interpretation.

Q Are you familiar with the Ralph Lowe Marathron Federal Well?

A Yes, I am.

Q That made water, did it not?

A In my opinion, it did not make water from a zone

that is correlative with the pay in the field. That water, in my opinion, comes from a clean limestone that is below the reef complex, and is correlative to the zones across the bottom portion of Exhibit 2 in Case No. 4089.

And the Ralph Lowe Well was 100 percent limestone and clean white, and it had very much the physical characteristics of this limestone that I show in my cross section below the reef. So I felt like my interpretation of the Ralph Lowe Marathon Well is that this zone is not equivalent to any pay in the Indian Basin field.

Q Actually, it produced water from a zone structurally higher than the Gulf Oil Helbing No. 2, did it not?

A It produced water from a zone that is structurally higher than the Gulf Helbing No. 2, that's correct.

Q You show your estimated gas-water contact on the righthand portion of the lefthand map at minus 3,750 feet. At what depth was the water encountered in the Gulf Helbing Federal No. 2?

A Well, their uppermost perforations, I have to calculate. Their uppermost perforation is at approximately minus 3,412, and it is in an extremely dirty, limestone section.

And the next perforation is at approximately 3,446 or 3,447, and it is in a cleaner zone, and the remaining

perforations are in clean zones.

Q Then the well made water from at least a minus 3,412, would that be correct?

A I'm not sure if that upper perforation contributed, then that would be correct. But the second looks so dirty to me, I am somewhat at a loss to understand why they would have perforated there.

Q It would be your conclusion that the water zone is considerably higher than the 3,550 shown on the righthand side of your exhibit?

A Yes, it is.

Q In connection with your discussion of the unorthodox well locations of those which were approved for topographical reasons, how many are at a 990 location, if any?

A There are several. Would you like for me to check my work data?

Q If you have any that are at a 990 location. I am not talking about the grandfather. I am talking about those approved for topographical reasons.

A The Hanagan No. 1, TP state, in Section 32 of 21 South, 24 East, has been given a non-standard location number, and it was located 990 from the -- 940 from the

north line, and 990 from the west line.

Q That well did not come under the pool rules, did it?

A It didn't, I don't know why it didn't, because it was drilled after the pools were established.

Q Was it within one mile of the outer boundaries of the pool?

A I don't recall. All I know it has been given a non-standard location number by the Commission. That would have to be checked out. I have a well in Section 8 of 22 South, 24 East that was drilled 743 feet from the north line and 105 feet from the west line. That is a non-standard location. That was drilled by John Trigg, No. 1 Federal Asotea Mesa, I believe.

Q When was that well drilled?

A It was sputted on the 5th and 24th of 1965. And Pan-Am drilled a No. 1 Duncan Federal in Section 18 of 22 South, 24 East, 950 from the north line and 950 from the west line, sputted about six months and just recently abandoned.

Q Has there been any applications filed with this Commission, to your knowledge, similar to your application?

A There was a Penroc application to drill 660 feet

from the boundary.

Q What disposition was made of that case by the Commission? Do you know?

A That application was denied.

MR. KELLAHIN: That is all, Mr. Commissioner.

MR. PORTER: Does anyone else have a question? The witness may be excused.

MR. LOSEE: That is all of the applicant's case.

Let me ask you one further question for the record. Mr. Mershon, Mr. Morris asked you a question as to whether you had any opinion as to the number of acres that would contribute gas to this reservoir, and you said you did not. Do you have an opinion with respect to your Exhibit 7 which portrays 414 acres above two percent porosity, as to the recoverable reserves shown by this map?

THE WITNESS: In my opinion, that depicts a minimum of recoverable acres. And, as I must say, I do present a zero limit of reef south of this zero line, and I must say that I feel like there is no reservoir beyond that point. That no-man land in between is something that there just no value to evaluate.

MR. LOSEE: I think that is all.

MR. PORTER: Does anyone else have a question?

MR. NUTTER: Mr. Mershon, have you planimetered the area north of your reef limit there? That is in Section 21.

THE WITNESS: Yes, I believe that is 561 acres.

MR. NUTTER: North of the dotted line, then?

THE WITNESS: Yes, sir. I did that in the last Hearing, I think.

MR. NUTTER: That is all.

MR. PORTER: We will excuse the witness. We are going to recess the Hearing until 1:00 o'clock. Mr. Kellahin and Mr. Morris, would you determine who will proceed first after lunch?

MR. LOSEE: Mr. Examiner, to enable me to submit a little better cross examination, would the protestant submit to me a copy of the Exhibits for the lunch hour? I would like to ask the Commission to ask them to present their exhibits that they propose to use, frankly, to save time. If they don't, all I can do is ask for a recess at the conclusion, and have an opportunity to go over them with my client, as they have had this morning.

MR. KELLAHIN: Insofar as Standard of Texas is concerned, we are going to use the same exhibits presented in the previous Hearing, plus one that Mr. Hull is presently

on. Those exhibits are already available to you.

MR. HANAGAN: Actually, I hadn't planned on using any exhibits. Whatever I am going to talk from will be made an exhibit, I guess. But I really don't have any exhibit. I think we could probably use one that I have, that is a structure map of that vicinity of Cisco Canyon. It is strictly a structure map. The rest of them, I am going to be talking from logs, and just basic data like treating pressures, acid treatments, drill stem tests, that sort of data.

MR. LOSEE: I didn't hear his answer to your question, whether he objects to letting me have the exhibits, the structure map?

MR. HANAGAN: No, I have no objection whatever.

MR. MORRIS: The presentation that will be made by Marathon will, I think, depend in a large measure upon how much of it would be repetitive, and we won't be able to make that decision until after Mr. Hanagan and the Standard of Texas present their evidence. I don't want to admit, myself, at this point that I would present any exhibit.

MR. PORTER: Well, at this point, Mr. Losee, it doesn't appear that any of the exhibits are going to be available for examination.

MR. LOSEE: I have one exhibit here. Thank you, Mr. Hanagan.

MR. PORTER: We do want to proceed as rapidly as possible, and we will adjourn until 1:00 o'clock.

(Thereupon, an adjournement was taken until 1:00 o'clock P.M. of the same day, at which time the following proceedings were had:)

MR. PORTER: The Hearing will come to order, please. Mr. Kellahin, I believe you indicated before noon that your witness would go first.

MR. KELLAHIN: I would like to call Mr. Hugh Hanagan.

MR. PORTER: Let the record show that Mr. Hanagan was sworn.

(Thereupon, Hanagan's Exhibit No. 1 in Cases 4088 and 4089 was marked for identification.)

HUGH HANAGAN

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A Hugh Hanagan.

Q What business are you engaged in?

A I am a Producer, I guess, Oil Producer.

Q Are you connected with Hanagan Petroleum Corporation?

A Yes, sir, I am Vice President of Hanagan Petroleum Corporation.

Q Where are you located?

A Roswell, New Mexico.

Q Have you ever testified the Oil Conservation Commission, and made your qualifications a matter of record?

A Yes, sir.

Q Are you an engineer or a geologist?

A Geologist.

Q You are a geologist?

A Yes, sir.

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

MR. PORTER: Yes, they are.

Q Mr. Hanagan, you are familiar, are you not with the two Cases presently being heard by this Commission?

A Yes, I am.

Q In connection with these Cases, you heard some testimony in regard to the Hanagan Well located in the

Section which is the subject matter of this Hearing?

A That's correct.

Q Are you familiar with the drilling and attempts to complete that well?

A Yes, sir.

Q Would you discuss that history of that well for the benefit of the Commission?

A Hanagan Petroleum Corporation drilled a No. 1 Indian Federal, located in Section 21 of 22 South, 23 East, Eddy County, New Mexico. This well was drilled 1,650 feet from the north and 1,980 feet from the west line. It was drilled in 1966 and plugged in January of 1967, drilled to a total depth of 7,585 feet.

MR. PORTER: 7,585?

A Yes, sir, in the Cisco Canyon formation. It was drill stem tested three times, and production casing was run on it, and production tests were made.

On the drill stem test -- well, first, the Cisco Canyon section was encountered at 7,328, on a minus 3,054 feet, which is approximately 120 feet low structurally to the north offset, Standard No. 5 Bogle Flats. The top 14 feet was dolomite, determined by sample and drilling time. And, of course, we're delighted because it was running above where we figured, considerably higher than we

originally thought it would come in, and also well above were we thought the water was.

The top 14 feet of dolomite was dirty, it wasn't the typical good vuggular dolomite that you find in the other part of the field. The other part of the field, generally, you have a white, tan, medium crystalline dolomite with very good vuggular porosity and fractures.

It would be my opinion or observation, and I probably run samples on 20, 25 of these wells, most of the time while they were drilling into it. Drill time is of the utmost importance. I don't know of any well that was completed for any good well that didn't have a good drilling break-in in the dolomite as they drilled it. The vuggular and fractured porosities can be picked pretty doggone well right off your drilling time, before you ever run a log. Also, the samples are very good. We always go into the Cisco Canyon, all the operators in there enter the Cisco Canyon with excellent mud, due for two reasons, one, not to damage the reservoir, but mainly if you don't you are liable to get blown out of a hole. We always try to keep the mud weight down, and good viscosity. There are very few wells that don't have good samples on it.

Personally, I believe in samples. I am a big

believer in samples. I have never been convinced that you can take what Schlumberger called their Mop Log, and where they can pick dolomite limestone shales and everything right off those logs, without looking at the samples. I was on a well that Trigg drilled in the field, which Schlumberger logged and attempted to do just that, and I thought Mr. Trigg was going to have a heart attack. They estimated he had about 90 percent lime, and whoever it was drilled in solid dolomite and losing circulation. So I don't really have a lot of faith in that mop log.

At any rate, we entered the Cisco Canyon, and this 14 feet was right at the top, and it was a gray medium crystalline dolomite, not only in the Cisco Canyon here in this field, but also in the Abo Reef you will get this gray medium crystalline, but it is dense, it usually has very little or no permeability to it. And when you see that gray dolomite coming in, you are in trouble.

We did have a little stringers of the dolomite. What I thought, of course, was after that 14 feet, is that we were just in the top of it, and it would clean up into a clean dolomite, It did just the opposite, it went into a lime. And so the bottom ten to thirteen feet there in that upper section on the log was lime.

Then we went into this shale break of around 25 feet. By then I was sweating pretty bad. We went into this lower carbonate section just under that shale, the shale being there roughly at 7,390, and went into lime.

Now, you are going to have in the samples, you are going to have some dolomite in those samples there, because they are going to be carried from the dolomite above. I am convinced by the way it drilled that it didn't have any dolomite, and the larger percent or the big percent of the samples were, of course, lime. Then you go into the bottom of that lime there, you go into a shaley lime, and some shale breaks, and into what I call the basal lime member of the carbonate section there at 7,360.

Now, this basal member here, this lime member, it is true, it doesn't produce any place in the field, but it is present throughout the field. Now, the shale that is on top of the -- when you get close to the core, to the thickest section of the reef where you have 500 feet of solid dolomite, and I hope to show you on a large map after a while just where the core of it is in the field, it is some distance away from us here, it is to the north. When you get close to that core, that little lime break, there is no shale break between where you go out of the dolomite into this basal lime member, there is

no shale break. So far as I am concerned, you do have communication with that, that lime member has communication throughout that field with the lime member.

That lime has been perforated in three or four wells, to my knowledge, and it always carries water, although you might not get water on drill stem test. In two cases, they perforated and treated it, and they did end up getting water out of it. That basal lime member, like I said before, is present, in my opinion, throughout the field, and it is the water carrying agent to where we can definitely, as far as I am concerned, that field does have hydrodynamics, and it is done through that lime member.

It was pointed out that this Gulf Well, I believe Gulf No. 1 Well in the northeast of the section in question, that the Gulf No. 1 Well was perforated at the base of the reef. That is true at the base of the reef, but not at the base of the carbonate. You go out of this -- where they are perforated, you go through this shaley member again, and then you go into the lime member. If you would test either by production test or drill stem test, I would almost guarantee you would get water out of that bottom part.

So that is how I think that the hydrodynamics is present in the field and does work. Of course, the water

can be much higher than that, but what I am saying is I think that any well in that field, if you perforate it right at the bottom in this lime member, that you would get water.

Any way, let's get back to the drill stem test. We had three, and we ended up in this lime member. The top test was from 7,326 to 7,400; 7,400 being about eight to ten feet below that shale member. The tool was open 60 minutes; gas surfaced in 12; at an estimated -- and I mean to qualify it by saying estimated -- that it was not a gauge volume of 550 Mcf. Surface flow pressure, 40 to 47 pounds.

Now, the way we estimate gas, if you don't have a bunch of fancy equipment, which we didn't have, is by this surface flow pressure. We used a Johnson Chart, and by the size of the choke you were using, which in this case was a one-inch choke, surface flow pressure 40 to 47 pounds, you look at it on the chart, and it says approximately 550 Mcf, so it is not a gauge test, it is an estimated flow. We recovered 360 feet of heavy gas cut mud.

Now, it was estimated that drill stem tests were not very conclusive in this area, and I certainly beg to differ with it. I think the drill stem tests are one of the best tools in this field, and I think it is probably

one of the best tools to indicate permeability. And when I say permeability, I don't mean that you can measure it in millidarcies, but you can darn sure get an idea of your permeability by your flow pressure.

The flow pressures are critical. When you have good permeability, you will have flow pressures ranging all the way up to near your bottomhole pressure of around 2,800, 2,900 pounds. Flow pressures from 500 pounds on up, you probably got your well; flow pressures from 500 down to around 300, in that neighborhood, you probably got you a well, but it is tight, and it is going to be marginal. Below 200, you are in big trouble, and you can see our flow pressure was 100 to 187. Initial flow pressure, 100; final flow pressure, 187.

We had a 60 minute initial shut-in, 2,825, the initial shut-in. 60 minute final shut-in, 2,734. So roughly we had a 90 pound drop in bottomhole pressure in a 60 minute test.

Drill Stem test No. 2 was taken from 7,405 to 7,480, 75 feet. This tested the lime member below the shale, and extended down through and into the top of what I called the basal lime member, about 15 feet; 15, 20 feet into that lime member. This test was open one hour; gas to the surface

in seven minutes, TSTM, which means "Too Small To Measure". Now, "Too Small To Measure," in the oil field means just that. It means that you just practically haven't got any gas. Now, by rule of thumb, why, I would say anything under 70 Mcf, 75 Mcf, in that neighborhood, and below, would be too small to measure. You can burn it, and it would light your cigarette, but that is all. To small to measure, you can't even turn it out to the pit in a one-inch line. So that is what I mean by too small to measure, and that is a general term that is used in the oil fields everyday of the world, and has been for a long time.

To give you an idea of what kind of volume you are talking about, the surface flow pressure, there was three pounds to the surface, and at the end of the test was zero. Man, we really had permeability. 45 minute initial shut-in, 2,907; 60 minute final, 2,726. There we had about 175 pounds draw down in 60 minutes. We recovered 100 feet of heavy gas cut mud. Flow pressures, 87 pounds to 102 pounds. In either one of those tests that would be taken out here in wildcat country, you wouldn't even consider running pipe on it. You would have been pouring the concrete to that thing right fast. We did take a third test in the basal lime member from 7,484-7,544. It was open twenty-six minutes. Test tool failed. We had surface

gas in 10 minutes, too small to measure. Recovered 1,170 feet of heavy gas cut mud. Initial flow pressure was 132 pounds. The tool failed after that. That final flow pressure was 596, but that would be highly questionable, because the tool had failed.

So really, the final flow pressure, you would have to ignore. Of course, you would not have any final shut-in pressure at all. The initial shut-in pressure was 45 minutes, was 2,887, so you see all the shut-in pressures are within the field pressures, bottomhole pressures. 2,800 to roughly 2,950, in that range, is about what your bottomhole pressures in the field are. I think they are more around 2,800 at the present, a little above that originally.

So anyway, we scratched our heads and got together with our partners, and our partners were Shell Oil Company, they had a working interest, Marathon, Union, Union farm-out, and Lowe. Lowe and Shell were paying their own way in this well. Marathon and Union were farmed-out to us. So here we had two companies in this well that had drilled more and developed the field more, and owned more of the field than anybody else. They both agreed that we were in trouble.

We also agreed that maybe we could acidize into the formation. Our opinion at this point was that we were

not in communication with that formation. In other words, we were right on the feathered edge of that reef. When I say not in direct communication, we were in the reservoir, but we had no permeability. We were in the reservoir because of the pressure, similarity in the bottomhole pressures. But by indications from the way the thing flowed, and particularly the flow pressures, and the way it drilled, and sample examination, we couldn't find any evidence of fractures or vugs. And those two, the fractures and the vugs, are your primary porosity in the field. When we are talking about porosity and permeability, porosity is -- all it simply is, is just holes in the rock. Permeability is when those holes are hooked together so you can have fluid or gas flow through those holes. That is when you are talking about permeability.

So, theoretically, you could have porosity of 20 percent, 25 percent. It doesn't matter how high, practically. Are they hooked together? And if they are not hooked together, then porosity in it doesn't mean much.

As I understood on the last Hearing here in this Case, there were figures thrown around up to ten percent porosity in that limestone there around 7,410. I wouldn't question that there might not be ten percent porosity there. But I would like for them to prove to me any amount of permeability there. We tested it, drill stem tested it with

flow pressures 100 pounds or less. There couldn't possibly be much permeability there.

Now, you say, "well, maybe the reservoir could be damaged." Not when you have a water loss of less than ten, when you enter into it. There hasn't been any big trouble at all in that field with reservoir damage. You got permeability, and you've got you a well that is pretty hard to damage. Some damage caused from mud, to my knowledge, but I don't know of any well that I could contribute or have heard contributed as being a poor well due to mud damage. At any rate, we felt like we were close to the reservoir, close enough to where maybe we could get into some permeability. Now, we knew we were in the reservoir by the pressures, but we also felt by what evidence we had to that point that we did not have any permeability. We decided we would acidize, and see if we couldn't get into it. That is what we did, we acidized, we perforated two zones, we perforated that dolomite zone, perforations 7,332, 7,334, 7,336, 7,338, 7,346, 7,352, 7,356. That set of perforations would be on a minus datum of minus 3,058 to a minus 3,082. That was one shot per interval. We also perforated the lime. When we are desperate, we are going to perforate everything that we think might have a chance, because it has been our experience in the field that where you have this lime present, we aren't

convinced that it contains gas, but it could have fractures in it, and we think that is probably the main cause or main reason that some of these wells are lime producers, in that it is not because of their great proosity or permeability, it is because of the fractures in there, and they actually were able to get into the main reservoir through these fractures.

I might also add that on your lime wells, that nearly every one of them are marginal, or sub-marginal well, with the exception of the Williamson well on the west, and it has dropped considerably here lately.

The Penroc well, which is certainly a lime well, I wouldn't even call it marginal. It is a very sub-marginal well, and the only reason it is producing is because it is almost completed in the Morrow sands, and a majority, 90 percent of their income is from that Morrow sands. The bottom set of perforations were at 7,394, 7,409, 7,414, 7,416, 7,419. That was on a minus datum of minus 3,120 to minus 3,140.

It was our opinion when we drilled this well that we sure wanted to have the dolomite or the pay above a minus 3,300. If we encountered it below a minus 3,300, we were in trouble, and we would be wet.

After we perforated, we set a packer between those two sets of perforations, went in there with 1,000 gallons

of 20 percent acid. Now, 20 percent acid is pretty strong acid. The most, highest percent of acid you usually use, commonly use in the oil fields is 15 percent, and anything above 15 percent you are starting to get into some strong acid. The strongest acid that we use in the oil field, to my knowledge, is 28 percent. So, like I say, we knew we were in trouble. We were trying to get into that reservoir, so we went in with 20 percent acid. We pressured up and had communication after we had about half of the acid treatment in. Our tubing pressure came up on us, so we knew we had communication. Either the packer had filled between our perfs, or else it had gone around the packer and communicated with the upper section which was the dolomite section.

So we went ahead and put the acid in. Maximum treating pressure, 3,600 pounds. Minimum treating pressure, 2,000 pounds. Average injection rate, 1.1 barrel per minute, and that is not a very high injection rate. We pulled tubing out of the hole, and went back in to check to see if we had communication, which we did have, so we decided that we were going to treat them both, anyway, so we didn't mess with it.

On our next -- well, I am getting a little ahead of myself there. That treatment was on the 22nd. On the 23rd, we swabbed a while, and finally kicked off and flowed

to the pits for two hours, estimated at 750 Mcf. We wasn't getting enough gas here to warrant a bunch of fancy gas equipment out there, so all these gauges, with the exception of one, were estimated gauges. That was on the 22nd.

On the 23rd, we went in there and flowed to the pits at an estimated 750 Mcf. We shut down for Christmas; started back up on the 27th; 84-hour shut-in tubing pressure, 1,900 pounds. We opened it, it flowed 3 hours, 300 pounds tubing pressure. And that is where, I believe, we came up with two million flow, right after we started immediately with 19 pounds shut-in tubing pressure. The normal shut-in tubing pressure, by the way, is about 2,350, in that neighborhood. And this two million, as soon as we opened it up, it just blowed like heck; it bled off in three hours to twenty-five pounds. We swabbed and flowed three hours, acid water, BS and W, and load water, plus a small amount of gas. And it kicked back of, flowed two hours on twenty-five pound tubing pressure. So you can see by that, that we didn't do much good with that first treatment.

The draw down in three hours, well, the draw down in three hours from 1,900 pounds down to twenty-five pounds, you know you didn't open anything up, you didn't get that formation broken down, you didn't get anything in the reservoir. We shut the well in for 20 hours, and at the end of 20 hours,

I had 1,800 pounds shut-in tubing pressure. The well blew down in two hours to 25 pounds. Swabbed acid water and load water, two hours, and an estimated 500 Mcf of gas.

Again, you can say we weren't doing any good, so we decided we would hit it with 10,000 gallons of 20 percent acid. So we reacidized 10,000 gallons, 20 percent acid; maximum treating pressure, 3,700 pounds; minimum, 2700. As you can see, it took the same maximum pressure to put away the 10,000 gallons as it did to put away the thousand gallons. Shut-in tube and pressure after twelve hours, 750 pounds. Flowed on 200 pounds of 45 minutes, and blew down to zero. Swabbed two hours, and shut down. We shut the well in fourteen hours, shut-in tube and pressure, 1,200 pounds. Swabbed and then flowed at an estimated 1,000 Mcf, of one million cubic feet in three hours,flow and tubing pressure, 40 pounds. Of course, the gas was again way down. In fact, it died at that point. We had to start swabbing again.

Then we shut the well in again, and I don't have down the number of hours -- I would think overnight, though -- so approximately 14 hours. We had a 1,350 pound shut-in tubing pressure; blew the well down, and it died. Swabbed dry. Shut-in over New Year's. That was the 31st of December when we shut down. As you can see, we just blew the well in, and it died right there. We swabbed it about half that

day, and just shut down for New Year's.

On the 3rd, we went back out there, 72 hours shut-in like I say, I don't have the time here, but in a matter of an hour or two, your pressure would be right down to zero to 20 pounds. At that point is where we had Coleman testers, who was an engineering frim that runs gas tests, he came out with his equipment. I have a copy of it here. We took a 24-hour test of that well on a three-quarter inch choke; flowed at the rate of 125 Mcf per day; tube and pressure, 28 pounds. So it is pretty obvious that we didn't have a well there at that time, and it is pretty obvious that we are not in the reservoir.

So we decided to reacidize. Third stage, we used 15,000 gallons of 20 percent; maximum treating pressure, 6,300 pounds; minimum treating pressure, 4800 pounds. So you see, all we done, the farther away we got from the hole, the harder the doggone thing is getting. It is getting worse. Then you say, "Well, maybe you have an emulsion block." Well, there is ways of telling whether you are getting emulsion block. You run water samples, which we did continuously. Everyday we would have a water sample. We send them into Halliburton to have them analyzed.

If you have emulsion in there, it is going to show up in those water samples, and Halliburton is going to know it.

So I'm not saying that you can't have emulsion blocks, but I am satisfied that we didn't have an emulsion block from all the samples that we took.

We have acidized it now with that 15,000, we shut it in 14 hours, we had 900 pounds shut-in tubing pressure, opened it up. The first hour it flowed 17 barrels of load and acid water. Then we swabbed 7 hours, 144 barrels load and acid water, kicked off and flowed. It was about 5:00 o'clock in the afternoon, and we left it opened all night, so it flowed 15 hours. It flowed 174 barrels of load water, with a slight amount of gas. Flow and tubing pressure, 20 pounds, and died. Swabbed 6 1/2 hours, 29 barrels of load.

Anyway, the last threedays, we had a pumper that works in the area, Mr. Gray, he pumps all of the Pan-Am wells and Penrock wells, and several of them in the field. We had him go by these wells everyday, and blow it down, and everyday it was the same old story, he had about anywhere from 800 to 1,100 shut-in tubing pressure, and it would blow down in 30 minutes to an hour, blow down to zero to 20 pounds. So there is the time we decided we would end that little jewel right there, and we poured the concrete to it.

Q Now, the fact that it blows down within that short period of time, does that indicate anything as to the character of the reservoir?

A It does, it indicates no permeability.

Q And without permeability, you can't complete that well in that area?

A Well, without permeability, you can't produce anything, including water.

Q Did you consider fracturing the well?

A Yes, we did. We considered it, mainly because Mr. Enfield had just treated a well of his up on the north end. He talked us out of it, really, I mean indirectly, not he, himself, but his work on that well did. His well which was in Section 8 of 21-23, which was called the No. 3 West Indian Basin, it was plugged on 10-10-66, and we were roughly a year later, as you can see. Mr. Enfield spent a lot of money on that well. Besides all the acid treatments, he water fraced 21,500 gallons, plus 75,000 pounds of sand. He went in with a second water frac job of 38,500 gallons, plus 17,500 pounds of sand. And he still wasn't convinced, he thought he could get into it. So he went in on the third one, 98,910 gallons, plus 26,000 pounds of sand. He never got into it.

Q Now, you heard Mr. Mershon's testimony in regard to the Pan-American No. 1 Honolulu Federal Well in Section 13.

A Yes, sir.

Q Mr. Mershon did not give the results of the fracture

treatments there. Do you have any information on that?

A I would like to elaborate on that, since they chose to compare our well with that. I think we ought to start just from the drill stem test right on down, and compare those two wells. The well that we are going to compare our No. 1 Indian to, is the Pan-American No. 1 Honolulu. I think the name has been changed, but it is in Section 13 of 22 South, 23 East. It was drilled to the Cisco Canyon. TD, 7,897. The two wells look quite similar on the logs. Their minus datum on top of the reef was 3,648, so approximately 600 feet lower than our well.

I run the samples on this well, also. The top, approximately 28 feet, was a dirty dolomite, somewhat similar to what we had. In appearance, they are quite similar. They also had that little shale break. It wasn't quite as pronounced, or as thick as it was in our well, but roughly it was 18 to 20 feet, top of which was around 7,728 to about 7,750, that would be your shale break. Then they had approximately 50 feet of lime similar to our lime.

Then they entered into the shaley zone at the base of which is what I called the basal lime. I think they probably penetrated it, but the log doesn't quite catch it, the bottom part of that shale. I would say that they were just immediately -- their TD was immediately beneath the top of that basal lime member.

They drill stem tested the well, 7,715 to 7,797, so they included the whole section from practically within a few feet of the top of the Cisco Canyon all the way to total depth. One drill stem test.

This well was opened three hours and forty-five minutes, compared to one hour on our well. It flowed again, and this is at an estimated rate, of 820 Mcf. Surface flow pressure, 325 pounds. Our surface flow pressure flow was 40 to 47 pounds. They recovered 120 feet of oil and gas cut mud, and no water. 60 minute shut-in, the same as we took, 2,883. Our initial shut-in was 2,825. So you see, they are quite similar. Their final shut-in was 2,853, so in three hours and forty-five minutes, they had 30 pounds pressure drop, in three hours and forty-five minutes. We had 90 pounds pressure drop in 60 minutes, one-third -- a little less than one-third the time.

In other words, what I am saying is this, their bottomhole pressure, they have some permeability in that well because their bottomhole pressure are coming back up faster than ours were. So this drill stem test indicates to me -- and by the way, their flow pressure is next, which also indicates the permeability. Their flow pressures of 378 decreasing to 262. You might recall our flow pressures was 100 to 187. So, roughly, they had twice as good a flow pressure as we did.

Now, we go down to the treating of the well and the perforations in it. According to our information, it was two shots per foot, 7,702 to 7,713, 7,720 to 7,728, 7,750 to 7,798, two shots per foot. The sets of perforations on a minus datum was minus 3,648 to a minus 3,744.

This information I am about to read was given to me by Mr. Jim York, Chief Engineer for Pan-Am in Hobbs, Hobbs Production Office. They first acidized with 5,000 gallons. Treating pressures, 4,100 to 3,400. Initial shut-in pressure, 3,200 pounds. Average injection rate, 2.6 barrels per minute. Now, this acid is 15 percent, and we were using 20 percent. Our injection rate was 1.1 barrels per minute. Theirs was 2.6. So they got twice the injection rate with not as strong an acid as we were using.

Everything that I have so far mentioned, to me, anyway, indicates that they do have better permeability than our well does.

After that acid treatment, they flowed an estimated five-hundred million -- 500 Mcf per day. Now, they attempted to water frac, but they did not water frac. They attempted to water frac this well with 100,000 gallons, and a-half-a-pound of sand per gallon. They got 15,000 gallons into the formation. and it sanded up on them. So they really didn't water frac that well.

Then they cleaned her out, and they went in with a 20,000 gallon dolofrac treatment. Maximum treating pressure, 6,400. Initial shut-in, 3,600 pounds. Average injection rate, 2.3 barrels per minute. Now, that was all they did, and they potentialed that well, their potential on that well was an IP of 1,700 Mcf on a 22/64 inch choke. Flowing tubing pressure of 600 pounds. That well was completed, I don't have the exact date, but within 90 days they were back in dolofracing that well again. In February or March of 1967, they reacidized that well again with 20,000 gallons of 15 percent dolofrac, plus 13,000 gallons of 28 percent acid. Now, 28 percent acid is the strongest acid you can use. Average injection rate, 2.3 barrels per minute.

Now, remember the first treatment that they had, they had a 2.6 barrels per minute. They have acidized with 5,000 gallons, they have attempted a sand frac job, and got -- water frac job, and got 15,000 gallons of that in the formation. They reacidized with 20,000 gallons, and yet they haven't improved their injection rate one bit. So they haven't improved that well any, and that was his statement to that effect.

So, really, what permeability they had to begin with, wasn't much, granted, but it was more than what we had. And this frac treatment, and Enfield frac treatment, I don't

know of any other wells in the field that have been fraced, certainly it hasn't been necessary in 99 percent of them, but in both those cases, the frac treatment wasn't the answer, so we decided that -- I am of the opinion, let's put it that way, that I don't believe that we could even have gotten a frac treatment. I think we would have sanded up, the way they did. We didn't have enough permeability to even get it into the formation, unless you want to sit there long enough and grind it in under high pressure, and that is what Enfield tried for days. He sat there and ground that. Eventually you can get it in, yes, but you are not breaking anything, you are not breaking the formation, you are just cementing it a little tighter is what you are doing.

So, at any rate, we didn't frac it, and right to this day, I don't regret not having fraced it. I don't believe that was the answer to it. The answer to that well is that it doesn't have any permeability, and without permeability there is no way for that gas to be in commercial quantities. I am not denying there is gas under that location, but I am saying that if a well drilled over there, that gas in there is not going to be able to flow out, or you're going to be taking it out of the ground faster than that gas can flow over to the wellbore, and it is going to be a long time, in my opinion.

Q Mr. Hanagan, would the area surrounding the well which you drilled, in your opinion, contribute anything to a well drilled at the location proposed by Mr. Mershon?

A I don't think it would contribute a thing to it. We drilled -- of course, we got in on part of the production. We drilled a well down southwest, two wells, actually, two dryholes on the southwest flank, really within the area, one of them was within two miles of this section in question, two miles due west. It was our No. 1 Walpache. I take it back, it was our No. 2 North Walpache Well in Section 24 of -- 22, 22 South, 22 East.

And that well, of course, we were after the Cisco. We did take the well down to the Mississippian or Burnett shale. The other well that we drilled in there was two miles south in Section 1 of 23-22. Now, the one down south was called the No. 11 Walpache. It was a farm-out from Humble, and there again we had several people who were interested, Shell, Monsanto, Humble, Union.

I might say that on that test, that we flowed 700,000 or 700 Mcf on a drill stem test in that well.

We actually got more gas on a drill stem test, we had better flow pressures and better shut-in pressures than we had on the one we run pipe on, but we plugged it. Still wasn't any reservoir around there, at least we weren't

enticed with a big fat reservoir lying right next to that well.

But what I am saying is with that type of information of a drill stem test, you don't normally run pipe. You know what you got, a dryhole.

The other well that I mentioned, the Walpache, North Walpache well, it also flowed a little gas. It flowed 150 Mcf, had every bit as good a flow pressure as we had on this well. We plugged it, too.

Both of those wells were lime wells. There was no dolomite in there, and if you've any kind of a reef buildup, it is just a little old stringer. There is apparently another Cisco Canyon built up to the west, which Union has drilled a well there, and also Atlantic tried one there last year that indicates there is another one up there, but it hasn't proven productive.

What we were planning was that the Indian Basin would extend straight on southwest; and by the drilling of these wells we were convinced that these contour lines do turn north, they don't just go southwest through there. There is a big low on the westside of that field.

Q Are you referring to what has been marked as Hanagan's Exhibit No. 1?

A Yes. I would think it would be the proper time to

enter it.

Q Would you discuss what is shown on that exhibit?

A This is a map that I prepared within 30 days after we plugged the well in Section 21 of 23 -- well, the No. 1 Indian right there, the well in question.

What we did, this map had to be changed quite a bit, because the North Walpache well just two mils due west there on the map, you will see it is a minus datum of 3,502. We drilled that well, and then moved that rig right over on to the Indian Well, so these two wells were drilled, but just one right after the other. And so between the two wells, they tore heck out of my contour map. So this was the map that I prepared after we drilled those two wells, and it is so noted down here, the date that it was done, and I haven't looked at it since.

This map was prepared on January 18, 1967, and there hasn't been anything in there since in this subject area to change it. The only well that has been drilled within that map area at all is over in the next Township, which was a dryhole. You can see just to east in the next Township, about in the center of the Township, I have a well there with a minus 2,846. The location north of there, which was undrilled at the time this map was prepared, was drilled by Pan-Am then as a dryhole. All this is strictly a structure map.

Q Basically, how does this differ from the interpretation offered by Mr. Mershon?

A Well, of course, I have had many discussions, to begin with, of the fault on the westside. I have never gone along with that opinion that there is a fault on the westside. But it doesn't matter whether there is a fault, there is some type of permeability barrier, there is a trapping mechanism on the westside.

As you can see, this map is drawn without any faults, as far as that goes, my Devonian map is drawn without any faults. You are getting even on a Devonian, you are getting almost the same amount of west dip here, steep dip here as you are getting here on the eastside, believe it or not, in places, in this area particularly in this subject area.

You can see my well there has a little old wiggle in there were Mr. Mershon says that -- I mean where he has a definite nosing, you can see that mine does have a wiggle in here. It just doesn't have that steep a reentrance in there. And I see no evidence of that steep reentrance. You can see by contours here that these contours are fairly evenly spaced, and I just don't see any evidence of a reentrance in there.

I do question the perched water theory very much. I just don't understand it. I think there was a statemnt made that Gulf was surprised when they got a dryhole. In a

way, they should have been surprised in that northeast offset to them, they were within 50 feet of it, and it was a good gas well, had no water. That is the Marathon IBB well in Section 14.

But let's go to the southwest and look at that Marathon well. Marathon drilled a well to the Devonian in Section 28. Now, we get into this argument that there is no reef there in Section 28.

MR. NUTTER: Did Lowe drill that well, or Marathon?

THE WITNESS: I'm sorry, Lowe Drilling Company drilled that to the Devonian before any of these wells to the north were drilled. It was a wildcat. The Lowe well on the Symposium Map, and also Mr. Mershon's map showed zero reef north of that well.

Now, what had been my observation in that well is this, when you get into the core of the field where the thickest dolomite is developed, which is in excess of 500 feet, and it is not in this area, it is up north, and that core, that hole 500 feet is just darn near dolomite, except the bottom part of it, and it is lime, it is a white chalky lime.

Now, as you go away from the core, your dolomite thins up, and you start picking up limes. Going away from the core of that reef, there is a little shaley member that starts developing, which is the base of the dolomite, and

you go into that shaley lime or dirty dolomite, and then into this real white clean limestone. It starts to develop as you move away. When you get out on the flanks of it, it is developed into a definite shale.

My contention is that on this Lowe well, and again I ran samples on it, and in fact the sample description and everything is on this log, this Lowe well, I would like say, is located in Section 28, there is a thick shale section. Just as you go out of that shale section is where we pick the top of the Cisco Canyon, and it is present here. The top of the Cisco Canyon, as I pick it off this log, was at 7,600, minus 2,333.

Now, that zone from 7,600, roughly to 7,750, has got some porosity in it, and some permeability. It has to, because they recovered water on a drill stem test. That lime looks like that basal lime. It is white. The upper part of it is probably part of the original reef, as we call it. I mean the dolomite part of it. At any rate, this basal lime member is present all over the field in every well in the field, to my knowledge. And that basal lime member is tight. Sometimes you get a little gas. It is not productive and never has been. I don't know any well like Mr. Mershon stated. There aren't any wells, to my knowledge, that produce out of that basal lime member.

But my contention is that basal lime member is connected to that reservoir and, therefore, again that is why I think that the field does have hydrodynamics, and that is why you can explain water movements throughout that field, even in that Gulf Well.

Let's get back to this well. On a drill stem test taken ten feet below the top of where I picked the Cisco Canyon, at 7,610 to 7,660 -- 7,760, excuse me, they took a drill stem test, opened one hour, recovered 1,859 feet of gas sulphur water.

Here is the interesting thing, 30 minute final shut-in is 2,813 pounds. That is 12 pounds differ from the top test of our drill stem test. The first drill stem test in our well was 2,825; this test was 2,813. It communicated with its part of the reservoir, as far as I am concerned.

Now, if that is true, this test again is taken from a minus 3,333 to 3,483. Pretty interesting, isn't it? They get water within the same interval that the Gulf No. 2 got water. Not only that, but you can go right around the westside to the Standard Well in Section 7, which is a dryhole, and they got water on a drill stem test, a minus 3,219 to 3,321. You see, they are all roughly running around that, anywhere from 3,200 to 3,400 is where they are getting all the water right around the outside here. You go immediately north to the Sun Weaver well in Section 6, and again they

get sulphur water, a minus 3,345 to a minus 3,470.

Let's go on up to more miles to Section 30 of 21-23, Marathon drilled a well in Section 30. They got water, a minus 3,299 to a minus 3,340.

So my contention is that if that is trapped water, then you have trapped water all the way around this bank at darn near the same minus datum, somewhere between a minus 3,300 and 3,400, right in that neighborhood. You are not going to have the exact minus datum from all these waters, because some of this Cisco has a little lime at the top, or they are shaley at the top, and they don't have any porosity.

Now, that is just something that I cannot understand, how you can believe that you have trapped water in this well, and yet every well around the same edge updip has approximately the same water. I have seen no exhibits shown here of any kind of water on that westside of that field. It's been ignored, and yet when you start getting down on the minus datum, it is quite similar. Now, I am not a hydrologist, and I don't even know a whole lot about hydrodynamics, it is over my head, personally, but I would like to show you for just a minute this map that wasn't drawn by me, but it was offered here at one time by Penroc in a case, and it is just a structure map of the whole field, and it was done so pretty and contoured so nicely. They

were my tops that they used to build it with, but I would like to hang it up, and just show you the general field, if I could. I'm not going to talk about this at all, except for one thing that I think is very diagnostic in this field, which is this reentrance coming in through here, and it is darn sure there. Here we had a working interest in this well.

Q Where are those wells?

A We had a working interest in Township 21 South, 24 East. We had a working interest in Union well in Section 18, Penroc well in 19, the Redfern well in Section 31. We drilled Section 32. We had a working interest in Section 28, the Indian Hills No. 3. I sat on this Trigg well here. In other words, I would run, personally run all the samples in these wells in here, including this Pan-Am well down here in 13, and these wells. We had a lot at stake in that we own an overright in a good many of these wells in this area.

Q Will you please talk from this side. I don't think the Commissioner can see.

A But, at any rate, you had a solid lime in this well, and it was tight. You did have some shale breaks and sand breaks in the Cisco Canyon but it was tight.

MR. PORTER: What well?

A In the Union well in Section 18. It was drilled to

the Morrow and plugged. The Penroc well was drilled to the Morrow and completed, dually completed the Penroc well in Section 19, it was dually completed in the Cisco Canyon, which is strictly a lime well, and which is marginal to sub-marginal, and also completed in the Morrow sand.

This lime wedge comes down through here, I'm now in Townships 21 and 23, the Ralph Lowe well in Section 25, the 3-C was predominantly a lime well, but luckily they got a few dolomite stringers and were able to make a well out of it.

It is interesting to note that that well right in here, the two fields were almost cut in half. There is only two productive locations right in this area right here to keep that field from being two different fields. Now, what I am getting at is this: here you have a gas well area this wide, say 7 miles wide. It narrows down to approximately two miles wide, and then flares back out to about five or six miles wide. So you got a bottleneck in there, so to speak. You can check the waters on these wells immediately west of that bottleneck, and they are roughly within a minus 3,750, a tremendous change from right around this bottleneck to wells out here. In other words, the highest well right out here on water is a minus 3,100. So you might say that from about one, two, three miles, you

change waters from roughly 3,750 to 3,100. And yet from this point all the way east four or five miles, there is very little change. It is all 3,750. Every one of these wells in here are roughly a minus 3,750 water. So right here is where you are getting the tremendous change in your water, right at that bottleneck. That is the main thing I wanted to point out. So you can see that the water up to this point is fairly good. It is fairly horizontal, so to speak. But where that bottleneck is, it climbs 600 some feet in about three or four miles.

Q Have you completed your testimony from the Exhibit 1, Mr. Hanagan?

A I hope so.

Q You heard Mr. Mershon's testimony as to some unorthodox well locations, and I believe you pointed to the Trigg well in reference to the Penroc map there. Do you know anything about the location of those wells?

A The Trigg well?

Q And the Hanagan TP well?

A That Trigg well was drilled, I do believe, before the field rules, this Trigg well was drilled right here. He had a cable tool rig on that well. That was a Federal lease, and he had a cable tool on that well when our well, this one here, blew out. It was just down the road from us, and he had a cable tool on that well for months, and, of course,

the minute our well blew out, he got a rig in there and started drilling. How he got that location, I don't know, but it was before, I am almsot positive it was before the field rules.

Q What about the Hanagan TP well?

A The Hanagan TP well, I think, was a grandfather well. I don't believe there were field rules there. But he did have a topographic problem. You might recall, we were next to the highway. We were just north of the highway, practically on the right-of-way. In fact, when that well burned, it melted the highway, so we were that close.

Now, immediately south of the road, and south of us is a hill that goes almost straight up about 600 to 700 feet, I would say, 300 or 400 feet of relief on that, but it was definitely a topographic problem. We didn't have enough room between the road and that hill on the south to build a location without carving out half that mountain. I kind of believe that we were drilling that before the field rules, in that I believe that Penroc was drilling their well, and the Indian Hills No. 1 was in. And I think that was all that was in that area at that time.

Q You heard Mr. Mershon's testimony in regard to the two percent or more porosity, and on that basis he would attribute not less than, I believe, 414 acres to the well

he proposes to drill. Do you have any comment on that?

A Well, as I pointed out on our log, it's been calculated up to ten percent porosity, and my basic idea on it is this: there are two kinds of porosities that you have to have. You got to have one or the other, or both type of porosity to have you a commercial well in that field, and that is you have to have vuggular porosity, or you have to have fractured porosity. If you don't have either one -- I just don't know of any well that doesn't have either one of those. Therefore, you have to have permeability.

What I am saying, the way I feel about that is it doesn't matter to me if they give two percent or ten percent. If you have no permeability, you are out of luck.

Q On the basis of your experience in the pool, and particularly in Section 21, in Township 22 South, Range 23 East, is all of that acreage productive? Does it contain recoverable gas reserves?

A Repeat that, please?

Q Does that section contain recoverable reserves, in your opinion?

A I certainly wouldn't say that none of this section did. But I certainly would say that the area around our well wouldn't. It contains gas, true, but it is probably going to be there a long time.

Q And then a well drilled at the location proposed by Mr. Mershon, if we assume it is completed as a producing well, where would its gas come from?

A I think it would come from the northeast corner of that section, possibly a little on the northwest of Section 22, which belongs to Gulf; and the majority of it would come from Standard's location to the north, where the No. 5 Bogle is located, and the Gulf No. 1 Well to the east of the Standard well. I would say that Standard and Gulf would certainly be losing some of their gas.

Q What would be -- what do you feel would be the maximum acreage you feel could be dedicated to this well?

A If I am figuring that the water is at a minus 3,300 on my map, and that everything west of our well is impermeable, then about the only thing it leaves is the northeast quarter.

Q 160 acres?

A 160 acres.

Q The well location has been set up, the application at 990 feet out of the corner. Do you have any experience with deviation in the well which you drilled?

A Yes, I sure have. I'm sorry I didn't mention it. We ran a directional survey on that hole on the No. 1 Indian well. The bottom of that hole is 203 feet north, 69 degrees west. Therefore, we were drifting roughly due

west. And it's been our experience in drilling in this Cisco Canyon, and also in the Abo, wherever you have -- particularly where you have steep dips, that you are going to drift, and you are going to drift updip.

Therefore, I think it is perfectly logical that since we were drifting darn near due west, that the highest part of this structure is right there immediately west of us. I could be down over into the next section to the west, but theoretically if we are on the permeability barrier there, then anything west would be even tighter.

We had the option, and that is another reason we ran pipe on this well. And the main reason that we ran a directional survey is we had an option to drill that west offset in that next section. We had a farm out from Mobil to drill that well. Well, after we found out first that we didn't make a well, and secondly, that we were drifting to the west, which, as far as we were concerned, we were going updip. Man, that location to the west looked pretty bad, so we never did drill it, we turned back that option.

Q Actually, the well did drift north approximately 74 or 75 feet?

A Yes, only it would drift more to the north at an unorthodox location that they are requesting, according to my map.

Q In other words, that would put the bottom of their hole closer than 990 feet to the north line?

A It most certainly would, and I don't think they could keep from doing it. Normal drilling, they would be drifting north and west.

Q The only way this could be controlled, would that be by whipstocking the well?

A Yes, sir. Now, the directional survey is on record. We filed it with the USGS.

Q It is filed with the Oil Commission?

A Yes. I have the approved form here with me that shows it to have been run.

Q Mr. Hanagan, when you drilled Section 21, you had either leases or farm-outs on substantially all the section?

A We had it on all the section.

Q Do you still own any interest in this section?

A Yes, we own an overright under Marathon's acreage there. I think it is 120 acres, is that correct -- 160 acres -- 120. 120 acres. We have an overright under that section. We have an overright under the Gulf No. 2 well, the section to the east. We also have an overright on the Gulf No. 1 well, the diagonal northeast offset to this well.

Q So actually if this well were completed and was a producer, you would stand to benefit by it, wouldn't you?

A Yes, sir. As you can see, you can follow the logical conclusion. If they drill a well there, and then Gulf is going probably going to drill one, so we could end up with an overright in both those sections. I mean a producing overright under the requested section there, and the one to the east, it is conceivable we could end up with a producing overright in both those sections.

Q What is your reason for opposing the application of Mr. Mershon?

A As I stated in my letter as I sent up here, and I do want to make one correction, I think I said 36,000 gallons of acid instead of 26,000.

At any rate, as I stated in that letter, we certainly have a lot at stake in that field. And we would have gladly, or would have been really glad to have drilled this well at a 990 location. It is obvious that the farther north you get, the better chance you have of making a well.

We drilled it under the field rules, and we think the field rules have been established. They have been adhered to up to this point, and as far as I am concerned, this field has been developed and this shouldn't be -- and the field has been developed, everybody spent their money to develop the field and establish these rules, and that they shouldn't be thrown out the window. Rules are rules, and I think that

unless there is some logical reason like topographic, it is perfectly obvious to me that anybody that would drill in that section would much prefer a 990 location.

But if they feel so strongly that the majority of that acreage is good, then I don't see why they would be out a darn bit drilling 1,650; because in effect, they are saying that 1,650 location is productive, and if it is productive, all their testimony points to that fact, then they shouldn't be reneging on drilling the 1,650.

Q Was Hanagan's Exhibit No. 1 prepared by you?

A Yes, sir.

MR. KELLAHIN: I would like to offer in evidence Hanagan's Exhibit No. 1.

MR. PORTER: If there is no objection, the Exhibit will be admitted.

(Thereupon, Hanagan's Exhibit No. 1 was received in evidence.)

MR. PORTER: Mr. Hanagan, apparently you have had a lot of experience as a geologist in this pool. Is it your opinion that Mr. Mershon can possibly get a commercial well at a 990 location?

THE WITNESS: Yes, sir, it certainly is. It is certainly possible. I would like to drill it, myself. But I also will say this, that he's not going to be producing his

gas by any large percent.

MR. PORTER: Does anyone else have a question?

CROSS EXAMINATION

BY MR. LOSEE:

Q Mr. Hanagan, you have just testified in answer to Mr. Porter's question, that a 990 location would, in your opinion, get a gas well, is that correct?

A Yes.

Q And that obviously at this point that gas is being taken by some other wells in the area, is it not?

A That's correct.

Q Which two wells are they?

A Well, I would say possibly three wells, but the Gulf No. 2, the northeast offset, and the Standard well in the north offset.

Q So that actually at this time, drainage is occurring out from under the section 21 to the wells to the north?

A I think that's correct.

Q When you were talking about the completion of your well, were you reading from your original notes prepared, or are they some you have since --

A They were taken off our report in the Office. Everyday they were called in in the evening.

Q So that is an actual reproduction of the original

records in your Office?

A Yes.

Q In connection with the drilling of this well, did you file reports with the Oil Commission and with the USGS on the drilling of your Hanagan well?

A Well, yes, we filed the proper reports. You don't have to file a progress report, if that is what you are getting at.

Q Let me hand you a USGS well completion, or recompletion report, which shows a stamp of February 8, 1967, with the USGS, shows it signed by you as Vice President on February 7, 1967, and ask if this is the form that you filed?

A Yes.

Q Will you turn it over to the back which shows the completion treatment of that, and read the language into the record that is circled in red?

A Yes, sir. "No formation water recovered from DST's or production tests. After total 26,000 gallons acid, well stabilized at estimated 150 to 250 Mcf."

MR. LOSEE: Will you hand that to the Reporter, and ask him to mark it as our Exhibit 10, please.

(Thereupon, Applicant's Exhibit No. 10 in Cases 4088 and 4089 was marked for identification.)

Q (By Mr. Losee) Now, the information you related with respect to the Pan American well in your comparison

with it, as Mr. Mershon had compared, I believe you stated you obtained that from the District Engineer in Hobbs?

A Yes, sir.

Q Let me hand you a Sundry Form filed with the USGS, it actually is the Oil Commission's copy, dated January 12, 1966, and signed by the Area Superintendent, whose name I can't read, and ask you to read the language underlined with a heavy black pen?

A "Stimulations were made of 5,000 gallons acid; water frac 15,000 gallons water, 7,500 pounds sand, and 3,000 pounds glass beads, and reacidized with 20,000 gallons. On --" On what?

Q If you can't make it out, skip the next word. I couldn't either.

A "On 1-10-66, in 21 hours through a 22/64 inch choke, flowed at the rate of 1.7 MMcf," which is exactly what I testified to.

Q Well, I think you testified they were not able to fracture the well.

A Mr. Losee, I testified to thefact that they had that well set up for a hundred thousand water frac job, with a half pound sand per gallon, and all they were able to get in was 15,000 gallons, 7,500 pounds of sand, and it sanded out on them.

out on them.

Q Does that form show that it sanded out on them?

A No, sir.

MR. LOSEE: If you will hand that to the Reporter and ask him to mark it as Exhibit 11.

(Thereupon, Applicant's Exhibit No. 11 in Cases 4088 and 4089 was marked for identification.)

Q (By Mr. Losee) I will hand you another USGS form, signed by the Area Superintendent, and ask you if you will read the underlined language.

A "In accordance with Form C-331, dated 2-17-67, treated well with 20,000 gallons 15 percent retarded dolofrac, followed by 13,000 gallons 28 percent acid, and overflushed with 7,000 gallons treated water," which I also testified exactly to that.

MR. LOSEE: Will you hand that to the Reporter and ask him to mark it as Exhibit No. 12?

(Thereupon, Applicant's Exhibit No. 12 in Cases 4088 and 4089 was marked for identification.)

Q (By Mr. Losee) Now, the work you used in preparing your Exhibit 1 was that sub-surface geology?

A Yes, sir.

Q In your preparation, I believe you earlier testified that although you don't have as sharp a nose as Mr. Mershon

does running to the east of the Gulf Well in Section 22, you do show the contours bending down in that direction?

A Well, if you see a map of the whole field, you will see how the outer edges of it wiggles here and there.

Q I am really referring solely to your Exhibit 1.

A It has a wiggle, yes.

A And --

A It doesn't have a pronounced nose, though.

Q But it is a nose direction in that area, is it not?

A Well, of course, the main nose, you can see is pretty obvious where I think the main nosing is. It is located on your Mobil well there in Section 18 or 19, whatever section this is here -- Section 17. Your main nosing goes down through 17, and west of our well in 21, and somewhat --

Q But you do still portray a nosing off to the east of the Gulf Well, do you not?

A Yes, a wiggle.

Q Do you suppose if you had the use of some geophoto work, that that nose might become more pronounced?

A You know, I'm glad you brought that question up, because I really don't, and I will tell you why. If you study that field, you will see that from the base of your third Bone Springs sand of the Wolfcamp, you will notice that there

is a huge wedge. On the northwest side of your field, the Wolfcamp is about 2,000 feet thick; on the east side of the field, it is about 500 feet thick.

Now, my contention is this, with that type of wedge, you are talking about 1,500 feet of thickening within about a seven mile radius, 7 to 8 miles. I think that pretty well blanks deeper structure, because when you drill a well in there, you are not sure where you are going to get that third Bone Springs sand. It might be ten feet thick, and it might be three-hundred feet thick. I do not think it reflects deep structure. Is that what you mean?

Q Well, have you examined any geophoto work?

A No, sir. I have seen that.

Q Nothing except the Applicant's presentation?

A I say I have seen that Exhibit.

Q I believe you testified, Mr. Hanagan, in your opinion, there was some gas around your well which actually is bottomed some 75 feet north and 238 feet west of the surface location, and that although it would --

A I didn't say that, did I? I said that well is 203 feet north, 69 degrees west.

Q Strike my question about bottomhole location. That you had some gas around the wellbore, that you said it would be there a long time, but that it would eventually get to the

wellbore of an unorthodox location, is that correct?

A I didn't say that it would. I don't know it ever would get to the wellbore, because that field could well be abandoned before it would ever move that much.

Q But you cannot state it would not get to the wellbore?

A No, I could not.

MR. LOSEE: I think that is all.

MR. PORTER: Does anyone else have a question of the witness? The witness may be excused.

Mr. Kellahin, is there any chance you could put the Penroc map into the record, since it was dicussed?

MR. KELLAHIN: We hadn't intended to, but we could do so.

THE WITNESS: It is the only copy. I don't want to, but if you want it, I will. You have one in the case file. There is one in that case file.

MR. KELLAHIN: If the Commission desires, I will move that the map be incorporated by reference with the Case file of the Penroc application.

MR. PORTER: Is there any objection?

MR. LOSEE: No objection.

MR. PORTER: The Penroc map which was incorporated into a previous record will be included as part of the record

in this Case.

MR. UTZ: What was the Case about?

MR. LOSEE: An unorthodox location, I think.

Mr. Porter, I also would move the introduction of Exhibits 10, 11, and 12.

MR. PORTER: Is there any objection to the admission of Applicant's Exhibits 10, 11, and 12? They will be made part of the record.

(Thereupon, Applicant's Exhibits 10, 11, and 12 in Cases 4088 and 4089 were admitted in evidence.)

(Thereupon, Standard of Texas Exhibit 1 through 6 in Cases 4088 and 4089 were marked for identification.)

PAUL HULL

called as witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q State your name, please?

A Paul Hull.

Q By whom are you employed, and in what position?

A Standard Oil Company of Texas, as Supervisor, Proration Engineer.

Q Where are you located?

A Houston.

Q Mr. Hyll, you did not participate in the previous Hearing in this Case, did you?

A No, sir.

Q The witness John Cameron, do you have any supervision over him?

A Yes, I directly supervise John.

Q And the work that he did in connection with that Case, was that done under your supervision?

A It was.

Q Have you testified before the Oil Conservation Commission of New Mexico, and made your qualifications a matter of record?

A Yes, sir.

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

MR. PORTER? Yes, they are.

Q Mr. Hull, have you prepared some exhibits for use in this Hearing?

A I have prepared some just since this morning. And I had these exhibits whichwere presented by Mr. Cameron at the previous Hearing prepared, also.

Q Referring to what has been marked as Standard Oil Company of Texas Exhibit No. 1, would you identify that

exhibit?

A Yes, we have several copies of an eight-and-a-half by eleven section of the map. On the wall is a map of the total field, and this is the exact map which was submitted at the first Hearing; we took it out of the Hearing file. We have made no changes in either the large map or the small map since the previous Hearing.

This is a map of the gas-water contact in the Indian Basin field. You can see that it has a fairly uniform gradiant from west to east, maybe a little southwest to northeast, and this is supported by a goodly number of production and drill stem tests in various wells. It is also supported by hydrographic studies in the area.

Circled in red are the wells in which either production tests or drill stem tests were conducted, that indicated an oil-water contact substantially different from the 3,750 which was originally thought to be the gas-water contact throughout the field.

In addition tothat, we have a large number of data on there which is -- it gives one sub-sea depth, and is preceded by either a greater than or a less than symbol; and these are the wells in which tests were run which indicated, for instance, gas production, so that obviously the gas-water contact has to be below the bottom perforation

or the bottom of the well.

In other cases, there are tests which recovered all water, and there were no tests in the well, so that the gas-water contact of necessity must be higher than the top of the perforations or the tested interval in that well.

As I say, we have 14 wells circled in red which give positive evidence of a gas-water contact differing from the 3,750. It addition, I believe there are either two or three wells where the data is underlined in orange, which also gives positive control; that is, they pin the gas-water contact down to, say, 50 feet or 75 feet, something like this, but that interval does straddle the 3,750, but at least gives us positive control on mapping the surface.

From this and the other studies that the hydrologists have made, we conclude with no question in our minds that there is a gradiant in the gas-water contact here, and that the test in the Gulf Well in Section 22 merely confirms the presence of this gradiant.

Q Now, referring to what has been marked as Standard Oil Company of Texas Exhibit No. 2, would you identify that exhibit?

A Exhibit No. 2 is once again a portion of the map of the entire field. In this case, we did not submit the

entire map, because it did not appear to be germane to this Hearing.

This is a structure map on the top of the Cisco Canyon carbonate interval. It does not differentiate from that submitted by Mr. Hanagan. It does not have the pronounced nose to the east of the Gulf Well that Mr. Mershon's map has. We can find no basis for doing that. This map is prepared strictly from sub-surface information. We have seismic information in the area but it is worthless. We have access to geophoto interpretations in the area, and our photo-geologist in the Division that handles this concludes that it does not contribute to the sub-surface structure. I have brought this with me, and will be glad to submit it for the record. We marked this as Exhibit 5, I believe.

Q Yes, No. 5. Take it up there so the Commissioner can see it.

A This is the area here (indicating).

Q Speak up so the Reporter can hear you.

A This is the area of Sections 22 and 21. Here is the Hanagan dryhole, the Gulf dryhole. Through this area here, there is no indication of a fault.

Q What area are you talking about?

A The area in the western part of Township 23 East, 22 South. In other words, the faults that were shown on the photo entered by Mr. Mershon this morning are not shown

in this interpretation. This interpretation was made by a Geophoto Services of Denver, Colorado, May, 1952.

In the two sections that we are concerned with, and particularly in the area of the nose that Mr. Mershon mapped, the dip is shown to be -- all the dip is shown to be less than three degrees, much of it less than one. It has general random orientation.

From this, our photo-geologist and I also conclude that it has nothing to contribute to the subsurface interpretation, particularly in view of the excellent log control we had.

I might add I don't really think it is too greatly unusual to have two photo-geologists or two any kind of geologists interpret an area differently.

MR. PORTER: I think we will all agree with that statement.

A We did not touch on the point, but I might mention that I am a Geological Engineer.

Q Now, referring to what has been marked as Standard Exhibit No. 3, would you identify that exhibit?

A Yes, this is an isopach map, in which we combined both the quantity and the quality of the porosity in the Indian Basin pay. We have here multiplied for each well, we have multiplied the net pay thickness as picked from the

porosity logs, times the average porosity. Actually, we didn't do it quite that way. What we did was take the porosity logs and planimeter the log through the net pay interval, and that is what these numbers are, and you then could divide the number on here by the net pay if you wanted to know what the average porosity is.

For instance, the Hanagan well has a .88 value. We picked 24 feet in there, so the porosity would be slightly over three percent average porosity, and you could do this for any of the other wells.

Now, we did this for every well in the field, and we have all the data here. We do not have the map. But in looking over the data, at one point it becomes very obvious that a porosity foot value, porosity feet value of approximately one is the borderline between a commercial well and a non-commercial well. There is one commercial well that has a porosity foot value as low as one. There are two more that have porosity feet value of between one and two. All the other wells in the field have porosity feet value in excess of three.

The dryholes have porosity feet values from just over one down. So a porosity foot value of approximately one has proven to be a very excellent dividing line between making a well and not making a well.

You notice that we have on this plat the proposed location for the Mershon well colored in solid, and a regular location as an empty circle. And it is obvious that by our interpretation, that moving from an orthodox location to the requested location will make the difference between making a well and not making a well. We have planimetered the area above the zero line, and it is 266 acres.

Q Would that necessarily mean that all that 266 acres would contribute to a well drilled at the location proposed?

A In geologic time, it would. In the time we have to deplete this field, it most likely will not.

Q Why would it not contribute?

A Because when we get down into these values, the permeability is so low that the movement of gas is glacial.

Q Then if Mr. Mershon completes a well as proposed, where would his gas come from?

A Well, his gas is going to come from the north. If we take a look at his Exhibit 9, I believe, the one with the circles on it -- and I thought I had it right here. Here is Mr. Mershon's Exhibit No. 9, and you can see that a substantial part of it lies to the north of his proposed location.

Now, the portion of this line to the south is going to be in this little wedge where the formation is wedging

down, going to -- pinching out completely.

Even if you can get the gas out of there, there isn't much there. The only place that he can produce commercial quantities of gas from the north of his well -- you will notice on our Exhibit 3 in the very northeast corner, there is a little bit of his lease of that section that has in excess of four porosity feet. The bulk of it is three or less. In fact, the bulk of it is less than two. So as he produces up this wedge, it is going to move up much faster to the north, so this circle is going to be tremendously deformed, because he is going to get practically no production from here, so this is going to become an ellipse to the north.

What it will mean is, to take the extreme case, if he had a 640-acre allowable, the same as our well, that since he would be producing essentially nothing from the north, the front of his production would be moving toward our well twice as fast as the front of our production is moving toward his well. So this is a very conservative picture of the amount of drainage that is going to take place.

Q Now, referring to what has been marked as Standard's Exhibit No. 5, would you identify that exhibit?

A Yes.

Q We have only one copy of the exhibit.

A Wait a minute, I don't want to go to Number 5 yet. I want to go on to No. 4.

Q Referring to what has been marked as Exhibit No. 4 -- I overlooked that -- would you identify that?

A Well, No. 4 is somewhat of a tabulation of this drainage problem that I was just mentioning. In Section 16, which contains our Bogle Flats No. 5, the pour volume is 5,120 acre feet.

In Section 21, where the Mershon well will be located, it is drilled, there are 266 productive acres, but that goes down to a wedge edge of zero, and that section contains a productive pour volume -- I should say productive -- at least it has a pour volume that could have gas in it of 452 acres, acre feet.

So this means that if Section 21 were assigned a 640-acre allowable, that allowable would be approximately 11 1/2 times the amount required to prevent drainage. And even if it is assigned 266, it will be over 4 1/2 times the amount. And, of course, if it is assigned 266, it is going to produce it. And so that extra 3 1/2 factor in there is going to come from Standard and the Gulf lease to the east.

Q Then on that basis, what acreage could be assigned to the well, in your opinion?

A Well, to prevent drainage in either direction, to protect correlative rights all the way around, it would have to be a small amount of acreage. I would suggest, since Mr. Mershon is drilling a 990 location, which I believe is standard for 160-acre spacing, that 160 acres would be a reasonable allowable to be assigned to that well.

Q That would be based solely on the spacing of the well?

A That's right.

Q And without regard to the amount of gas underlying his tract?

A No, that would still be some three times the amount of allowable that he would really need to protect his correlative rights.

Q Are we ready to go into Exhibit 5?

A Im' sorry, we should have introduced this when we were talking about Exhibit 1.

Exhibit No. 5 is some work that our people did in 1966 as part of a continuing study of the hydrodynamics of this area, and the contours on here are given in hydrostatic head. But since the density of gas is so low, you can almost make a one to one correlation between hydrostatic head and the gas-water contact, and you will see that the contours go streaming right on down here almost exactly

like they do on the gas-water contact map.

The hydrodynamics of the Eddy County and that part of New Mexico have been the subject of a good many studies, and this is not a novel or unique map at all. There is a number of them, some of which have been published.

Q Now, you heard the testimony by Mr. Mershon in regard to the water-gas contact, and his theory on the perched water in the Gulf Well. Have you any comments on that?

A Yes, I had studied Mr. Mershon's Exhibit No. 1 from the previous Hearing, and had tried to visualize how this perched water could possibly exist. I was not able to come up with a satisfactory answer. I had made some cross sections across the map, using his contoured values, and could find no trapping mechanism whatsoever. And today in addition to that same map which he reintroduced, his Exhibit 6, he introduced a map of the base of the reef, and used this to demonstrate the mechanism by which this perched water came about.

In looking this over during the lunch hour, I find what appears to be a number of discrepancies between the two maps. For instance, on Exhibit 6, Mr. Mershon shows the contact between the top of the water and the base of the reef at 3,425 feet subsea. And the 3,425 foot contour

comes around, comes down the side of this nose and crosses the zero line. Now, if this indeed existed this way, this could perhaps trap the water, but this information does not jibe with that of his Exhibit 1.

Perhaps if I came down there and pointed to some of these things, we might be in a little better shape. Is that all right?

Q Yes, if it all right with the Commission.

A I have traced on Exhibit 1 the contours in the area of the perched water table, and superimposed them on the contours of Exhibit 1; and in orange I have shown the gas-water contact which is also the contact between the water and the base of the reef from Exhibit 6. I have shown this in orange, and this is the trapping mechanism for the water. The only trouble is that if we look back to Exhibit 1 at the crest of the nose where, say, the minus 3,400 foot contour crosses the crest of the nose, then if we interpolate between the 50 foot contour and the 100 foot contour on the isopach for the gross pay, we find that there must be about 80 feet of gross pay at that point. So, according to Exhibit 1, then the base of the reef at that point would 3,400, minus 80, or 3,320. So the base of the reef at this point is 3,320, so that obviously the -- excuse me, I subtracted when I should have added. 3,400 plus 80, so it would be

3,480. So this contour, the orange contour would actually have to swing around back this way on the north side of it, and the water would be able to spill over the crest of this nose.

I have sketched the data in two or three ways, and if it's permissible, I will enter these very rough sketches as exhibits.

MR. KELLAHIN: Let's enter the exhibit you have worked from as Exhibit 7, and then your others would be 8, 9, and 10.

(Thereupon Standard of Texas Exhibits 7 through 10 in Cases 4088 and 4089 were marked for identification.)

A No. 8 is a profile running down the crest of the nose, and the inked line on here is taken from Exhibit 1, and it shows the elevation of the crest of this nose at the top of the reef. If we go to Exhibit No. 6 and run this same cross section down here, down the crest of this nose, then we find that from Exhibit 6, the base of the reef follows the pencilled line; and so not only do we not take into consideration the thickness of the reef here, but we have the base of reef some 75 to 100 feet higher than the top of the reef from one of the maps to the other. Obviously, one or the other is mismapped.

From Exhibit 1, I have taken a cross section from the Gulf Well in Section 22 perpendicular to the crest of

the nose, and to the water shown in Section 13 on Exhibit 1, in a straight line across there, and I have platted the top and base of the reef, and it has this shape, this being the --

Q Which Exhibit is that?

A This is Exhibit 9. Here is the crest of the nose. This is the Gulf Well, top of the reef at 3,401, I believe. The top perforation was 3,412. Mr. Mershon says he would put more faith in a perforation at 3,447, I believe, the produced water exclusively, and that point is well above the spill point shown on this cross section. And if that were not low enough, if we came down the nose, we can come down the nose another 250 feet, so there is no way that that water could be trapped against that nose.

The only explanation we feel is valid is that this is a tilted water table which meets all of the facts of the well test in this field, plus the hydrodynamic studies made both by our Company and many others.

Exhibit No. 10 is along the same line of Section as Exhibit No. 9, but it is taken from Exhibit 6. When they are overlaid at the same subsea, you can see that once again at this point the base of the reef from Exhibit No. 6 comes almost exactly at the top of the reef on Exhibit No. 1. So with these discrepancies we find it very difficult

to give any weight to the proposition that it is a perched water table.

Also one other point I would like to comment on is with reference to the Lowe-Marathon well, we certainly concur with Mr. Hanagan that the zone that was tested in that well is part of the reef, it is in communication with it. We do differ with his interpretation of what part of the reef it is. We have the paleontological report from the Holzworth Paleontological Lab, which indicates that the lower part of the tested zone in the Lowe well is equivalent to the upper part of the reef in the field pay. We agree that we are both in pressure and fluid communication, and that the test data here fits and supports the other data we have concerning a tilted water table.

Q Do you have anything else to add?

A I believe not.

Q Exhibits 1 through 4, those are the same exhibits that were offered by Mr. Cameron in the previous Case, is that correct?

A Mr. Cameron did not actually offer Exhibit 4. He had it with him, and he read it into the record.

Q Have you examined the data on this Exhibit?

A Yes.

Q Are you in agreement with what is shown there?

A Yes, sir.

Q And Exhibit No. 5 was taken from your records. Did you prepare that, or how was that prepared?

A Exhibit 5, that was taken from our files. I did not prepare that.

Q Have you examined the data shown on that?

A No, sir.

Q You have not. But that is --

A I have examined some of the hydrodynamic data in the area, but not the exact sheets from which from that was prepared.

Q Are you in agreement with what is shown there?

A Yes, sir.

Q And Exhibit No. 6 is not your work at all?

A No, sir.

Q What is that?

A Exhibit 6, I believe, was the photo-geology map.

Q And Exhibit 7 was the Applicant's exhibit number -- what was that?

MR. LOSEE: No. 6.

Q No. 6 in this same proceeding on which you have marked certain data?

A It was Exhibit No. 1, I believe, on which I had marked data from Exhibit 6.

Q It is their Exhibit No. 1?

A Yes.

Q On which you marked?

A Yes.

Q And then 8, 9, and 10 are your sketches?

A That's right.

MR. KELLAHIN: At this time, I would like to offer in evidence Exhibits 1 through 10, inclusive.

MR. PORTER: Any objection? They will be admitted.

(Thereupon, Standard's Exhibits 1 through 10 in Cases 4088 and 4089 were admitted in evidence.)

MR. KELLAHIN: That completes the direct examination of the witness.

MR. PORTER: We will take a short recess.

(Thereupon a recess was taken.)

MR. PORTER: At this point, I would like to put into the record some specific information concerning the map. Penroc's Exhibit No. 4 in Case 3426 will by reference be made a part of this Case. We didn't have the Case Number before. Mr. Losee, do you have some questions?

CROSS EXAMINATION

BY MR. LOSEE:

Q Mr. Hull, when you started in on your dissertation

on the differences between Exhibit 6 and Exhibit 1 of the Applicant, I believe you first made the statement that you had examined the record in the prior hearing which only had Exhibit 1 in it, to see if you could justify in your own mind the perched water table theory?

A Yes, sir.

Q And that during the noon hour you looked at Exhibit 6 whichwas first presented at this Hearing?

A Yes.

Q I also recalled that you said that by looking at Exhibit 6, if it was correctly shown, it portrayed how the water could be trapped in the area of the Gulf well?

A I said that.

Q And then you proceeded to show how Exhibit 6 differed from Exhibit 1 --

A Yes, sir.

Q -- by your hand graphs, and I've forgotten the numbers and don't have a copy available. Now, in connection with Exhibit 1, and I refer you to the transcript you must have read in connection with the first case, on Page 10, to a statement that Mr. Mershon made with respect to the location of the barrier, and ask if you recall this was in the transcript of the first case; "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 feet. Control does not permit this analysis."

Do you recall that statement made in reference to Exhibit No. 1 in the transcript?

A Yes, sir, I recall that.

Q So actually in the portrayal of Exhibit 1 in the earlier hearing, Mr. Mershon was not testifying that his 3,300 feet was an accurate figure, that it could be plus or minus 50 feet, and that his control did not permit that assumption?

A That is true. And I appreciate what he was saying at that point, that that didn't solve the problem that bothered me about perched water.

Q But if Exhibit 6 has some differences between Exhibit 1, Exhibit 6 then is explained by being a more detailed explanation of the perched water, is it not?

A I don't take it that way. I mean it may be, as far as the water level is concerned. But what I was trying to explain a while ago, it had nothing to do really with the water level. It was the absence of a barrier to hold any water, regardless what the level was.

Q Well, if the barrier exists, as Mr. Mershon had portrayed in Exhibit 6, then that does satisfactorily

explain the presence of water in that area, does it not?

A I think I said earlier that it could be an explanation. I am not prepared to say that I would accept that as an explanation, because I'm not sure that the gradiant in this area is not strong enough, and that there is sufficient permeability to sweep the water out of there. I do not believe that there are any areas as large as these that are going to be -- where the water is going to be completely isolated from the water in the field.

But disregarding that, the major conflict between the two maps, I think perhaps it casts the entire contention in very serious question.

Q Let's refer solely to Exhibit 6. The transcript of the earlier hearing, I think, pointed out that Mr. Mershon was not saying with respect to Exhibit 1 that that 3,300 was dead right. As a matter of fact, he said it could be 50 or 100 feet off.

A How much off?

Q 50 to 100 feet.

A All right, sir. But the point is it isn't the water level that is the problem, it is the height of the ridge with respect to the elevation of the Gulf well. You see, the base of the reef, if you take from Exhibit 1, goes down. Could I have a copy of Exhibit 1? Where the base of the

reef crosses the crest of the nose, it is as low as 3,530 feet, so that that is the spill point. There can be no water trapped behind there above 3,530, according to Exhibit 1.

Q What about Exhibit 6?

A Well, Exhibit 6 -- where is Exhibit 6? Exhibit 6 shows a spill point to be at 3,425, which is what Mr. Mershon pointed out this morning.

The only comment I have on that is that this map was drawn on the same data that he had for the previous one, I presume. Certainly there were no additional wells. I think that anyone, and I am sure Mr. Mershon checked it, could see that the interpretation in Exhibit 1 could not do what he was claiming it was doing, and I think anyone would have attempted to reinterpret the data to make it fit the claim.

Q But the data on Exhibit 1 when he testified to it, he said it could change 50 to 100 feet?

A He was only making a disclaimer, as far as the water level was concerned. He was not making a disclaimer as far as the structural interpretation of either the top of the reef or the gross pay.

Q But the enlarged portrayal on Exhibit 6 does, in your opinion, offer one explanation for the perched water?

A Well, it isn't too good an explanation, but it is the only explanation possible.

Q Mr. Hull, do you subscribe to the theory that a fault exists across the westside of this field?

A I am not convinced in my own mind that one does exists. There are some indications it doesn't cut any of the wells. The wells are in pressure communication, but there are certainly a lot of maps around that have a fault there, and I can't say there isn't, but it is not a sealing fault.

I don't belive anyone would -- no one that I know of contends that there is a sealing fault on the westside of the field. And if it isn't sealing, it doesn't make too much difference whether it is there or not.

Q Would you please refer to your Exhibit 5, and the Commission has the only copy.

A Yes.

Q Does Exhibit portray a fault?

A It does.

Q Would you give us, just for the record, the sections starting from the north to the south in Township 22 South, Range 23 East?

A All right. It trends south-southeast down the eastside of Section 6, crossing the corner there, the southeast corner of Section 6, down the westside of Section 8, approximately

a quarter of a mile from the west side of Section 17, just west of the half section -- north-south half section line in Section 20, just east of the north half section line in Section 29, and down the eastside of Section 31, very nearly fitting the southeast corner of that section.

Q Now, I believe you said with respect to Exhibit 5, Mr. Hull, that although that this wasn't prepared by you, it was a map prepared by Standard of Texas?

A Yes.

Q Would you take your Exhibit 1, the small copy, rather than the large map behind me, and draw that fault across those three sections as it exists.

MR. KELLAHIN: I object to the phrasing of the question. He says as it exists.

Q All right, as it is portrayed on your Exhibit 5.

A (Indicating)

Q Your Exhisit 1 is presented to explain or show the hydrodynamic theory of your Company in this field, this large map behind me?

A Well, actually, it is presented to show our interpretation of the production and drill stem test data that has been obtained in this field, and it's confirmed by the hydrodynamic study.

Q Now, with respect to Exhibit 1, you mentioned there

were 14 wells that were circled in red from which the gas-water contact could be determined?

A Yes, sir.

Q Now, were there any other points in which water was encountered?

A Let me back up one second. The 14 points circled in red are those in which the gas-water contact can be pinned down to a fairly fixed interval that differs from 3,750, which was originally thought to be the gas-water contact for the entire field. There are others that I pinned down. There are two other wells that are firm control points, but they do fall in that interval, I mean the 3,750 falls within the zone tested.

Q Would you circled those other wells that you are referring to? We had a red pencil.

A Would you mind if I put a square around them, instead of a circle to differentiate them from the other? I mean they do fall in a different category, and this was an Exhibit from the previous hearing?

Q Now, these you are putting a square around the wellbore, the well actually encountered water?

A Oh, yes. As an example, in the Marathon-Indian Basin, North Indian Basin unit No. 1 in Section 10-22 East -- 21 South, 23 East, tested clean to a depth of a 7,326. And

then they had a wet test over an interval 3,731 to 3,777, you see, so that includes this 3,750, which took it out of the category of the one circled in red.

Q What other wells are not circled in red?

A Oh, I would judge there are possibly 30.

Q That encountered water in the well?

A No, sir, they either did -- how many tested water?

Q Yes.

A All right. Here is two more.

Q Would you give us the names and put a square around them?

A The Ralph Lowe-Indian Basin No. 1-A in Section 22 of the same Township.

Q How deep was the water in that?

A The tested interval was minus 3,737 to 3,788. It flowed 2.9 million cubic feet of gas a day, and recovered apparently 240 feet of water on a DST.

The Ralph Lowe-Indian Basin 1-C in Section 26 was tested over an interval of minus 3,688 to minus 3,748, which is very close to the minus 3,750 number, and that well flowed 7.15 million cubic feet of gas, and recovered 85 feet of sulphur water. And I believe that may be all. No, here is one. Ralph Lowe No. 1 in Section 21, Township 21 South, Range 24 East, it has gas production to a depth

of 3,739, and tested water over an interval below 3,855.

Those are the wells on which water was recovered. The other wells which produced only gas, of course, give us a value that the gas-water contact have to be below that.

Q And that is true with respect to all of the wells thatyou have that are not either circled or squared?

A That's right.

Q Water was not actually encountered? You are similarly recording the bottom of the test or the bottom of the hole?

A That is true.

Q How many wells do you have circled and squared in that area? You had 14 circles, so tell me how many squares?

A There is one, two, three, four, five squares.

Q And the 14 circles make 19. Your map covers four Townships?

A Roughly.

Q Now, in the particular Township of the subject application, how many wells do you have which encountered water? That is 22 South, 23 East.

A Five.

Q And it is on the basis of those tests that this map was **prepared?**

A All the tests, yes, sir.

Q All right, you can sit down again. Now turning

to your Exhibit 2, Mr. Hull, I would like for you to take the Commission's exhibit, if you please, so that it will be part of the record. Would you draw that same fault that is shown on your Exhibit 5, and show where it would be located?

A Shown in a rough red line.

Q Well, with that fault shown on your Exhibit 2, does that cast some doubt as to those contours running to the northwest clear across Sections 17 and 20?

A If it is through there, it might displace them, but I would not think they would necessarily change direction.

Q Please refer to your Exhibit 3, and again I would like to ask you to take the Commission's exhibit. Would you draw that same fault across there?

A (Indicating)

Q Do you have an opinion on this map as to whether the existence of that fault, if it is exists as you have shown on Exhibit 5, would change your contour lines running to the northwest?

A If the fault were there, it would change it.

Q Well, your Exhibit 5 shows its presence there, does it not?

A That is true.

Q What would it do to those contours on the westside

of the map?

A This is a net porosity map. They probably would run into it and the zero line would go right up to the fault.

Q So that actually from Sections 21 and 16, they would run somewhat in a straight line into the fault, rather than squeezing to the northwest?

A Looking only at this small section of the map, I can tell you, yes, they might.

Q Mr. Hull, this is a porosity feet map, net effective pay. Can you show the Gulf well in Section 22? Have you calculated for that well the porosity feet of the reef that was exposed in the well?

A For the Gulf --

Q For the Gulf well in Section 22 that you show below the zero line.

A I have not. It perhaps has been calculated, but since it falls below the zero line, I did not include it in my work.

Q Would you say it is an incorrect statement that it had one-and-two-tenths porosity feet of reef present in it?

A This is the Gulf No. 2?

Q Well, the Gulf Well in Section 22. It is the southwesterly well, No. 2 Helbing.

A Well, maybe I am confused, but it looks like it is the southeasterly well.

Q That is correct.

A We show that zero.

Q I realize you show it zero, because your map is net effective pay. But my question is, would you say it was an incorrect statement that it had one-and-two-tenths porosity feet of reef, of net reef present in the well?

A Of net reef?

Q Yes.

A I couldn't comment on that.

Q Well, if it would -- let me ask you to assume that to be true.

A All right, sir.

Q And assume that your map, rather than being porosity feet of net effective pay, it was porosity feet of net effective reef, where would your zero line be then?

A Oh, it would be south of there.

Q South of the Gulf No. 2 well?

A Yes. Let me check my data here. I maybe able to give you a number on that.

I don't believe I have that data. It obviously has some net feet, because it produced some water. Net feet of reef, not net feet of pay.

Q And if you assume that the trapped or perched water theory is correct that Mr. Mershon has portrayed on Exhibit 6, would that not mean that your map porosity feet of net effective pay would have the zero line swinging down to the southeast across Section 22?

MR. KELLAHIN: I object to the question. It is an assumption based on a prior assumption which he is requesting to make, and I think the value of the answer would be meaningless.

MR. LOSEE: Well, he already said he disagrees with Mr. Mershon's theory on Exhibit 6, but he also says that is a possibility, and I have asked him to assume the possibility.

MR. KELLAHIN: I object to the question, based on two assumptions.

MR. PORTER: The Commission feels that the witness should give us an answer to the question, if he feels that he can.

THE WITNESS: Restate the question, please.

MR. LOSEE: Read it back. I'm afraid if I rephrase it, I will get another objection.

(Thereupon the last question was read by the Reporter.)

A Yes. Of course, you would have to have little bumps on it like Mr. Mershon's map has, to go up around the well. I think Gulf must be as unlucky as we are. I thought we

were the only Company to drill the only two non-productive acres, but it looks like Gulf did, too.

Q Mr. Hull, is it your testimony that nothing south of your zero line will contribute gas to a well at the proposed 990 location?

A In the real time we have to deal with, that is right.

Q Are you positive that it will not contribute gas to a well at that location during the life of the well?

A In my opinion, it will not. I don't believe anyone could be positive about anything. There are too many dryholes around here that were drilled on positive evidence.

Q But then, I take it, if you are not positive, it maybe possible that something south of the zero line would contribute gas during the life of that well?

A Well, I think you always have to say yes, that is possible.

Q From your contours on this map, Mr. Mershon's well at a 990 location, he would be able to complete it as a producer?

A That is my opinion.

Q If he is not allowed to drill that well, who is going to recover the gas in that section 21?

A Standard is going to recover a good share of it,

what little there is.

Q From their well up in Section 16?

A Yes, sir.

Q Now, referring to your Exhibit 4 which is the calculation of pour volume.

A Yes.

Q For your well in Section 16, and for your calculation of the pour volume in Section 21, would you say it might be a correct statement that the pour volume of the Gulf well in Section 15, the Gulf-Lowe well which has approximately twice as many net effective pay in porosity feet as your well, would have a pour volume of 10,000 acre feet, plus or minus?

A I think that is a good assumption.

Q And by the same token that you would penalize Mr. Mershon by reason of the pour volume or lack thereof in Section 21 for his well, would you think Standard of Texas should be penalized 50 percent because it has 50 percent less pour volume than its neighbor, Gulf?

A Obviously not. To proceed with that point just a little bit further, we made a rather detailed study of this field to see whether or not it would be to our advantage to ask for a different allocation formula. Standard believes that every field, oil or gas, should be prorated on the basis

of reserves. And the closer you can come to reserves, the better it is for everyone concerned. We worked very diligently at this. As you well know, the quality of the logs is not wht everyone would desire them to be, but doing the best we could, it turned out that on a net acre foot basis, we would have just a hair larger percentage of the reservoir than we do on the present allocation formula. And knowing that we could be kicked in the teeth, at least, by a good many folks, we didn't think it worth it to go forth. This is not part of the allocation formula, but I think if you do take a look at most of the wells in the field, you will see that this is about -- it certainly is not the most extreme ratio, but there are no ratios between wells on the order and magnitude of that between, say, Standard and Marathon, or Gulf and Marathon, because not only do you have the thin section, but you have a rather limited productive area.

So that there is some safety in numbers, I suppose, I could say, in the difference between 400 and 5,000, and the difference between 5,000 and 10,000. After all, I was not suggesting that he be cut down to the exact relationship. I was being big in suggesting that he could have three or four times his share.

Q Actually, in all of the wells in the field, the only factor with respect to an allowable is surface acres, is that not correct?

A That is true, because the situation hadn't come up before. I believe that it had been bandied about in a hearing, but it was a new point.

Q Well, at present in this field, they are all surface acres?

A That's right. But I believe that is the reason we are here.

MR. LOSEE: I have no further questions.

MR. PORTER: Does anyone else have a question of Mr. Hull?

THE WITNESS: Could I clarify just a couple of points rather quickly, one, as to the placement of this fault on the west. I think I had mentioned earlier that some of our interpretations do show a fault. On all of our subsurface work that is prepared for reservoir work, for development drilling for this sort of thing, is not a rather scientific study as this hydrodynamics is. The maps that do show the fault have it placed appreciably farther to the west.

The second point I would like to touch on is that while there are only 19 wells that can be taken as, say, absolute control points on there, every well in that field gives some information. It limits you one way or the other, and you cannot violate the data that you get from those fields, so it isn't as though we were attempting to map

four Townships with only 19 wells.

MR. PORTER: The witness may be excused.

MR. KELLAHIN: If the Commissioner please, if Mr. Losee has no objection, Mr. Hull would like to be excused from the Hearing so he could leave town.

That completes our presentation. Thank you.

MR. PORTER: Mr. Morris?

(Thereupon, Marathon's Exhibits 1 and 2 in Cases 4088 and 4089 were marked for identification.)

CLYDE E. ALTON

called as witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MORRIS:

Q Mr. Alton, please state your name and where you reside?

A I am Clyde E. Alton. I reside in Houston, Texas.

Q By whom are you employed, and in what capacity?

A I am employed by Marathon Oil Company as a Senior Petroleum Engineer, on the staff of the Division Manager of Operation.

Q Have you previously testified before the Examiners of this Commission?

A Yes, sir.

Q Have you previously testified before the Commission, itself?

A No, sir.

Q Would you briefly state your education and experience in the petroleum industry?

A Yes, sir. I obtained a Bachelor of Science degree in Petroleum Engineering from the University of Oklahoma. In that same year, I went to work for Marathon Oil Company, then the Ohio Oil Company. I was assigned to the Hobbs area. I worked in the Hobbs for several years. I was Area Engineer in Hobbs, Area Engineer in Seminole, Area Engineer in Aaron, Texas, District Engineer in Bay City, Texas, on the Gulf Coast; spent two-and-a-half years in Libya, North Africa, and Supervisor of field engineers for Oasis Oil Company, on loan to Oasis from Marathon. And for the past four years, four-and-a-half years, I have been in the Houston Office on the staff of the Division Operations Manager.

Q Geographically, what areas does your duty cover on the staff in Houston?

A My duties cover whatwe call our Midland district, which includes the Aaron area, and the Hobbs area, and the Indian Basin field is under the Hobbs area.

Q How long have you been familiar with the development

and operations of this field?

A Since 1965.

MR. MORRIS: If the Commission please, are Mr. Alton's qualifications acceptable?

MR. PORTER: Yes, they are.

Q Mr. Alton, what information have you reviewed in preparation for this Hearing?

A I have reviewed log information on wells completed in this area of Section 21, reviewed Core information within the Indian Basin field. I think that pretty well covers it.

Q Would you refer to Marathon's Exhibit No. 1, and I think it's been marked in Cases 4088 and 4089. Would you state what that exhibit is?

A Yes, this is a copy of a portion of the neutron porosity log in the Hanagan Federal No. 1 well in Section 21.

Q What section of the well does this log cover?

A This log covers the section from roughly 80 feet above the top of the Upper Penn to the total depth.

Q What type of log is this?

A This is a Sidewall neutron porosity log.

Q What does that mean, Mr. Alton? What do you see when you look at that type of log?

A Well, essentially, this is a gammar ray neutron log, and we are supposed to be able to read directly from

the scale on the log, porosity.

Q Point where the scale is located here.

A The scale is located just above the neutron log, on the righthand side of the log. You will note we have three scales from the top down, dolomite, porosity, sandstone porosity, and limestone porosity.

I might add, if I may, that I correlated the neutron porosity log with the density log, and in this manner, I might say, that I believe Mr. Mershon has said previously, has testified to the fact that this correlation can be done, and lithology can be determined from this correlation.

Q And this lithology you have listed here on the righthand side of the neutron log?

A Yes, sir. I might add that I did not have the benefit of samples or sitting on the well, as did Mr. Hanagan. I have a little more faith in the logs than Mr. Hanagan does, evidently, because I base my lithology on the logs, not on the samples.

Q Now, what do you have indicated here in red on this log?

A On this log, I show in red porosity, and it is all, in my opinion, based on the logs dolomite porosity.

Q Is there room for a difference of opinion based

upon log interpretation, particularly as to the lower seven foot interval?

A There is certainly room for differences of opinion, yes.

MR. PORTER: Mr. Morris, Commissioner Armijo has a short commitment, so let's recess the Hearing for just a short time.

MR. MORRIS: Certainly.

(Thereupon, a recess was taken.)

BY MR. MORRIS:

Q Mr. Alton, we were discussing what isshown on this log, and you had pointed out the porosity cutoff, or the porosity scales at the top of the log, and I was asking you what you could read from the log?

Is it possible to read permeability from the log?

A It is not possible to read permeability from this log, or any log that I know of.

Q What cutoff have you used here on your porosity scale for the purpose of determining your net pay in this well, and what criteria have you used in making the cutoff?

A Well, I have used porosity cutoff for dolomite of two percent, and this is what was agreed upon in the field rules hearing. So I have used in the dolomite porosity cutoff two percent. Now, I would like to say here that I

have examined -- let me first say that I have given all the pay in this well, I have called all the pay dolomite, and I have given it 17 feet dolomite pay. I have examined, as I have said before, cores from six Marathon fields that were cored in the Upper Penn section, and I find that even though we have porosity and sometimes porosity in excess of two percent, even then we are not assured of having permeability.

Out of over 500 core samples that were analyzed, some in the dolomite section, some 78 percent of these samples in the range of permeability, two percent or less had less than one-tenth millidarcy permeability. There were some samples in the range of two to four percent porosity that also had less than one-tenth millidarcy permeability.

So the pay section boils down to the fact that you must have permeability along with porosity.

Now, in the Hanagan well in our Exhibit 1, we see we have 17 feet of porosity. I haven't averaged this porosity, but I would assume that you could come up with approximately four to five percent average, which is extremely good in this dolomite reef. Yet the permeability evidently wasn't there, because Hanagan, as he said, perforated everything he had in there, and acidized it three different times with 26,000 gallons of acid, and made every attempt to complete this well, and could not make a

commercial producer. So, in my opinion, this dolomite pay has no permeability.

Q Could it be possibly a misnomer to call this net pay, as you have it shown here on this log?

A Well, it could possibly be. Let's say the gas could exist in this 17 feet of dolomite, and probably does.

Q Is the distinction that you are talking about here a distinction between net feet of porosity which you call net pay, and something else which you would call net effective pay that would result in recoverable reserves?

A That is true. Maybe we should say instead of net pay, possibly we should say net porosity, 17 feet of porosity, rather than 17 feet of net pay. But we do know that gas was produced from this well, so I would have to assume that gas is contained in these dolomite stringers.

Q Now, have you used this figure of 17 feet of net porosity in preparing an isopach of the net gas pay, or, if you will, an isopach of net porosity in this area?

A Yes, I have.

Q Has that been marked Exhibit No. 2 in Cases 4088 and 4089?

A I believe it has.

Q All right. Refer to that Exhibit, please, and justpoint out what that exhibit shows?

A Well, this is an exhibit, it is an isopach of net porosity. We have labeled it net gas pay, but from my previous testimony I would prefer to call it net porosity. And we have taken an area in the area of interest here around Section 21 of 22-23, and we have shown beside each well in large numbers the net porosity feet in those particular wells.

You will note that there is no change in this exhibit whatsoever from the exhibit offered in the original hearing, with one exception, and that is in Section 21. I believe Mr. Roy Young's testimony, from his testimony in that hearing, he gave it 14 feet of dolomite pay -- I'm sorry, he gave the Hanagan well in Section 21, 14 feet of dolomite pay, whereas I give it 17 feet. And I have, therefore, thrown my zero contour line slightly farther south.

Q How many acres are contained in Section 21 within the zero contour line of net porosity?

A I calculate that 338 acres are contained in Section 21 within the zero line.

Q Now, without regard to the non-standard location, I am asking you to just assume that a well was going to be drilled at a standard location in the northeast quarter of this section.

A Yes, sir.

Q How much acreage should be considered productive, and so that recoverable reserves would be attributable to that well? How many acres should be attributed to the well, and what allowable should it receive, in your opinion, in order that correlative rights be protected?

A Well, sir, as you can see from the exhibit, I have picked the 20 foot line as a limit, as my opinion of the limit of recoverable reserves in this section. And this covers approximately 235 acres. Therefore, if Mr. Mershon were to drill at a standard location, I would think his allowable should be based on 235 acres.

Q Now, at a 235-acre line, that is all of the acreage line within section 21 above what you show here as the 20-foot contour line?

A That's correct.

Q And that is your pick of the area of recoverable reserves?

A Right.

Q Now, I want to make this absolutely clear, that the 235 acres represents your opinion as to what a well drilled at a standard location should receive as an allowable?

A That's correct.

Q Now, have you given any consideration to the

advantage that Mr. Mershon is deriving from moving from a standard location, or an orthodox location to an unorthodox location where he proposes to drill his well, and to the offsetting penalty that should be placed upon his allowable in order to offset the advantage that he has obtained?

A Yes, sir, I have.

Q What conclusions have you reached in that regard?

A Well, from a standard location to the 990 location which Mr. Mershon is requesting, his moving north; and we have heard testimony previously today that any movement north of this location would make a much better location. He is moving on a diagonal north to the section corner, the northeast corner of section 21, a distance of, I believe, 933 feet, which is approximately two-fifths of the distance to the section corner from the standard location. This, I believe Mr. Mershon testified to, was a ratio of 40 percent.

I am going to give Mr. Mershon the benefit of the doubt here. I don't think he should be penalized 40 percent for the drilling of a non-standard location, but I do feel like 25 percent would be a realistic penalty for that movement.

Q That would be 25 percent of what figure?

A 25 percent of 235 acres, which I feel is the limit, the surface acres limit of the recoverable reserves in

Section 21.

Q All right. So, as a result of that, what is your recommendation as to the allowable to be assinged to Mr. Mershon's well if he is permitted to drill it at the unorthodox location?

A If he is permitted to drill this well at the unorthodox location, I think his allowable should be penalized by 25 percent of the 235 acres, which I believe would calculate out to be approximately 175 acres allowable.

Q In your opinion, Mr. Alton, if Mr. Mershon were granted in excess of 175-acre allowable at his proposed unorthodox location, would correlative rights be violated?

A Definitely.

Q With respect to Exhibit 1, was the information shown on Exhibit No. 1 placed upon there by you or under your direction?

A Yes, sir.

Q In your opinion, does the information reflected upon Exhibit No. 2 accurately depict the information shown thereon?

A Yes, sir.

MR. MORRIS: At this time, we offer Exhibits No. 1 and 2 into evidence.

MR. PORTER: If there is no objection, the Exhibits 1 and 2 will be admitted.

(Thereupon, Marathon's Exhibits No. 1 and 2 in Cases 4088 and 4089 were received in evidence.)

MR. MORRIS: That is all I have on direct.

MR. PORTER: Any questions of Mr. Alton?

CROSS EXAMINATION

BY MR. LOSEE:

Q Mr. Alton, isn't the Indian Hills-Upper Pennsylvanian gas pool a low porosity average pool?

A The Indian Basin-Upper Penn gas pool is a normally average low porosity pool, yes, sir.

Q It is an average low porosity pool?

A Yes.

Q Isn't it possible that some of the wells in the Indian Basin Pool are producing with less than two percent porosity?

A I would have to say that is possible. Not probable, but possible.

Q And so to the extent that it is possible, your cutoff point at two percent would move your zero line on your Exhibit 2 on your isopach farther to the south?

A That is correct, if I use a one percent, it would move it farther south.

Q And as you stated, it is possible that they are

producing from sections with less than two percent of porosity?

A In my opinion, it is not probable, but it is possible.

Q Now, although your Exhibit 2 is labeled net gas pay, you said you preferred to call it a net porosity map?

A Yes, sir.

Q You show the Gulf No. 2 in Section 22 as having no net porosity?

A Yes, sir. And -- excuse me.

Q Go ahead.

A This I would have to change, because this is based on the No. 2 Gulf in Section 22having no net gas pay. I show the zero line going through that reflecting gas pay. So this would be correct, if this were net porosity, I would have to lower the zero line in Section 22.

Q If you assumed that that had 32 feet of net porosity, how far farther south would that move your zero line?

A In Section 22, considerably farther south. But in Section 21, I doubt that it would affect it at all.

Q Mr. Alton, your recommendation to the Commission, as I took it, was that they penalize Mr. Mershon because he asked to force pool Marathon and that you would also penalize Mr. Mershon because he asked for an unorthodox location?

MR. MORRIS: I object to the form of the question. I think the record is quite clear that Mr. Alton did not make any answer that said that Mr. Mershon should be penalized because he is force pooling Marathon. I think that is a very bad characterization of Mr. Alton's answer.

Q But, regardless of the language, was not that the effect of your recommendation?

A Mr. Losee, would you repeat your question, please?

MR. PORTER: Not the original question, but in different language.

Q (By Mr. Losee) Mr. Alton, did you recommend to the Commission that in Case 4088, which is the forced pooling Case, that a penalty be assessed against Mr. Mershon, and that also in Case 4089, because of the unorthodox location, a further penalty be assessed against him?

A Mr. Losee, I didn't -- I hope I didn't recommend that a penalty be assessed against Mr. Mershon on the forced pooling Case.

However, in light of the fact that I am dealing with recoverable reserves, if you want to look at it in that light, I would have to say yes, I am.

Q Do you know of any instance in which the Commission has assessed such double penalty?

A I don't look at this as a double penalty, Mr. Losee.

In my opinion, the maximum recoverable reserves from this section are 235 acres. Therefore, I am not penalizing Mr. Mershon for the forced pooling. As I understand it, only recoverable reserves can be forced pooled.

Q Now, you are in effect, though, by your recommendation, asking for two penalties, one for the amount of recoverable reserves, and one for the unorthodox location?

A No, sir, I am not. I am asking for no penalty on the recoverable reserves. In my opinion, that is the acres of recoverable reserves in this section. Therefore, I am not asking that he be penalized, a penalty on Mr. Mershon on those 235 acres.

MR. PORTER: In other words, if he were to drill an orthodox location, you would favor giving him 235 acres?

THE WITNESS: Yes, sir.

MR. PORTER: Allowable?

THE WITNESS: Yes, sir.

Q (By Mr. Losee) Which of the two Cases would you -- if we were applying for an orthodox location, we wouldn't need Case 4089. Where would you assess the penalty, in which Case? The forced pooling?

MR. MORRIS: I think the question is misleading. He insists on using the word penalty here, which is very misleading.

MR. LOSEE: It is correct, though, isn't it?

MR. PORTER: We might refer to it as adjustment. I believe that is the way our law refers to it, the allowable may be adjusted.

MR. MORRIS: Could you restate the question? I really didn't understand your question.

Q (By Mr. Losee) Well, let me just strike the question. I didn't get an answer to this one.

Do you know of any instance in which the Commission in the combination of a forced pooling and an unorthodox location has offset the advantage twice gained by the proposed operator?

A No, sir, I do not.

Q One further question, Mr. Alton. How much of the recoverable reserves in this Indian Basin gas field does Marathon feel they own?

A I don't know the exact figure, Mr. Losee. I would venture a figure of approximately 20 percent.

MR. LOSEE: I think that is all.

MR. PORTER: Does anyone else have a question of Mr. Alton? You may be excused. I believe you have already entered your exhibits.

MR. MORRIS: I have a closing statement at the appropriate time.

MR. PORTER: Does anyone else have any further

testimony to offer?

MR. LOSEE: Yes, sir. I would like a little rebuttal.

PAUL M. MERSHON, Jr.

called 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, you are the Applicant in this Case that testified this morning?

A Yes, I am.

Q Would you please refer to Standard of Texas Exhibit 1, which is on the board, and explain what if any portion of this exhibit you have some doubts about, realizing the lateness of the hour?

A I notice a bulge here in the so called tilted water or gas-water contact in the wells that they have beyond this point in Section 27, Township 21, Range 24 East, and Section 3, Township 22 South, Range 24 East. They have pulled down the hydrodynamics or level of this gas-water contact. This water, in my opinion, can't be any higher, because I believe this is very close to the top of the reef.

In Section 7, Township 22-23, the water goes down downdip from a positive control point to the west. This is against the gradiant from a well in Section 8 of 22-23. In my opinion, this is not reef equivalent in Section 28, 22 South, 23 East. The hydrodynamic fluids in the tilted reservoir are positive, they are most frequently demonstrated in reservoirs that contain oil.

The reason for this is that as the water flows downdip, even imperceptibly slowly, fluids with gravity that approaches that of water tilts in the direction of the flow. Extremely low gravity crude can tilt a long distance down off the structure; medium gravity crude tilts less. Gas, having an extremely great variation in specific gravity greater than that of water, takes an extremely high hydrodynamic force to tilt.

I would like to have this, if the Commissioner so feels, this is an area beyond my ability to make this calculation, but I have talked to two hydrodynamists about tilting a gas-water contact, and they say they are extremely rare. And that is all the statement I have about exhibit.

Q Mr. Mershon, would you refer to Standard of Texas Exhibit 6, which is their large geophoto.

A I would say that, as everyone pointed out earlier, that geologists sometimes due disagree, but I believe I could

detect on this map in 22 South, 23 East, Section 22, some very strong dip reversals that could very well support a nose, although there are some disagreements there. There appears to be even maybe a high around the north part of Section 22.

Q Have you circled those in red, those dips?

A I have circled those dips that would support a nose.

Q Now, Mr. Hull in discussing your Exhibit 1 and your Exhibit 6, pointed out the discrepancies or a discrepancy that existed with respect to it. Would you explain it?

A I would have to say that the discrepancies Mr. Hull depicted are valid, and he is correct. When I prepared Exhibit 6, I was aware, myself, that discrepancies existed. However, I did not choose to alter Exhibit 1, because I think basically the work is valid. The geometry of redrawing the maps which are the base of the reef and the top of the reef, and fitting the isopach thickness of the reef in would not be a difficult task to do. I just simply did not perform it. It would be quite simple to make the data fit the map as I have presented it. There are discrepancies, and for this I apologize. I don't think it makes my work invalid.

Q Do you feel like your presentation in Exhibit 6 with reference to a more detailed portrayal of the perched

water theory that you have is a correct presentation?

A I believe it is a correct presentation.

Q Refer to Marathon's Exhibit No. 1, which is the log, and point out the areas, if you will, where you disagree?

A I agree essentially with the upper seven feet. On the log I later presented, I call this eight feet from the formation density log. The zone that he calls three feet, I think I can demonstrate contains six feet. I believe there is some limestone porosity below that.

In the lower zone in which he has seven feet of dolomite, I have eight feet of limestone.

Now, Mr. Alton said that he made a lithology plot of this to determine lithology, without the examination of samples. I believe earlier, I believe I also testified that I had prepared a lithology plot, and had looked at the sample description. I said I felt like the lithology plot fit the sample description very adequately; and Mr. Hanagan felt like samples are essential in understanding the zone.

On my Exhibit 3, which is the two logs of the Hanagan well, you will see a series of points numbered 1, 2, 3, 4, 5, 6. On each of those points, I have prepared a lithology plot.

I will make one statement, by and large I would agree with Mr. Alton's interpretation. I think it is a

little conservative.

Q How many net feet of pay do you show in this net feet of porosity in this Hanagan well?

A On Mr. Alton's exhibit or my own?

Q On your own.

A 23 feet.

Q And he actually shows 17?

A Correct.

(Thereupon Applicant's Exhibit No. 13 in Cases 4088 and 4089 was marked for identification.)

THE WITNESS: I would like to also enter as an exhibit copies of my work logs in which I pick net pay. This is a formation density log, and it shows in the shaded area how this porosity was determined.

(Thereupon Applicant's Exhibit No. 14 in Cases 4088 and 4089 was marked for identification.)

Q (By Mr. Losee) Mr. Mershon, in the original case, you took Marathon's isopach of what is labeled "Net Gas Pay," but they prefer to call it "Net Porosity," and considering the porosity that was found in the Gulf Well in Section 22, the Gulf No. 2 well, you moved the zero line and the 20 foot line down in red. Would you do the same thing again?

MR. MORRIS: Excuse me, is the witness doing this on the official exhibit?

MR. LOSEE: The one we are going to introduce.

MR. PORTER: This will be a Mershon Exhibit adopted from a Marathon exhibit?

MR. LOSEE: Yes.

Q (By Mr. Losee) You have moved the 20-foot contour and the zero-foot contour on Marthon's map to the south, for the reason that you show porosity in the Gulf well of how many feet, net porosity?

A In the Gulf well?

Q Yes.

A 32 feet.

Q Now, you also have moved it farther south, accounting for your pick of 22 feet of net porosity in the Hanagan well, in contrast to Mr. Alton's 17 feet?

A Yes.

Q Any other reasons?

A None.

Q Now, I will hand you what is our copy of Standard of Texas Exhibit 3, which is their isopach of porosity feet of net effective pay, and ask if you have calculated the net effective porosity in the Gulf well?

A Yes, sir. I performed the task somewhat differently,

and I did come up with a net porosity feet under the same conditions that they would have calculated. I came up with 1.2 porosity feet in the Gulf Federal Helbing.

Q Based upon that calculation, have you redrawn the zero line in the Standard Exhibit 3?

A Yes.

Q And the two-foot line?

A Yes, I have. In order to evaluate the data, I looked at the .88 in the Hanagan well in Section 21, and I measured the half-way distance between zero and the two-foot porosity foot map or line; and immediately under .88, I draw this half-way point in red. Then I scale half-way from that to the zero line, and I draw another dash which is immediately south of the Hanagan well.

This would indicate that they drew **their** -- if I had drawn a point one porosity foot line, and had evaluated **this** point, I would say that point was approximately .6 porosity feet. So I have to make some adjustment, and using their contour intervals, not mine, I have adjusted down the zero porosity foot line in the Standard of Texas No. 3 exhibit. I have also utilized the 1.2 porosity feet in the Gulf Helbing, because I feel like their presentation of squeezing the zero is not realistic. And that completes my work.

(Thereupon, Applicant's Exhibits 15 and 16 in Cases 4088 and 4089 were marked for identification.)

MR. LOSEE: The Applicant will move the admission of the exhibits, what I think to be Numbers 13 through 16.

MR. PORTER: If there is no objection, the Exhibits will be admitted.

(Thereupon, Applicant's Exhibits 13 through 16 in Cases 4088 and 4089 were received in evidence.)

MR. LOSEE: Nothing further.

MR. PORTER: Does anyone have any questions of Mr. Mershon? The witness may be excused.

Does anyone have any more testimony to present? I have a telegram that I would like to read into the record at this time. It is addressed to the Commission, dated June 25, 1969. "In reference to Case 4088, Order No. R-3737, Mansanto Company joins Standard of Texas in its recommendation to this Commission in regard to the location and acreage assignment to be permitted Paul M. Mershon for an unorthodox gas well location in Section 21, Township 22 South, Range 23 East, Eddy County, New Mexico. In the event the Commission allows the 340 acre assignment, we believe the location should be 1,650 from the north and east lines, that a maximum of 160 acres should be permitted if the approved location is to be 900 feet from the north and east lines." Signed,

Frank Goerner, Production Director.

Does anybody have a statement? Mr. Morris.

MR. MORRIS: If the Commission please, I think perhaps Marathon is in a somewhat special position in this Hearing, due to the fact that it owns acreage in this section, and has a definite interest both in the compulsory pooling case and the non-standard location case.

I would like to direct my attention first to the forced pooling case. Even if an unorthodox location were not involved in this Hearing, and the only hearing that was before this Commission was the forced pooling case, Marathon would be in here questioning the amount of productive acreage that should be established as a unit. This is evident when you look at the map showing the ownership of Section 21, because Marathon's acreage is 120 acres running in a vertical tier of 40's here. It does not go all the way down to the bottom of the section line.

If the whole section would be pooled, as the Applicant asked, Marathon's interest would be diluted as opposed to the pooling of the acreage on the basis that we have requested that it be pooled, that is on the basis of recoverable reserves.

So the question of what the recoverable reserves in this pool are, and where they are located, is very

germane just on the question of compulsory pooling, before you ever get to the question of unorthodox location. So when Mr. Losee asked if we know of any cases where there has been a double whack at the allowable, all I can say is maybe we have a peculiar case here, maybe we have a very particular circumstance that we need to direct our attention to.

MR. PORTER: It has been referred to now as a penalty, and adjustment, and a whack.

MR. NUTTER: And a double whack.

MR. MORRIS: I think Mr. Alton stated it very correctly in his cross examination, that this is not a penalty, it is merely -- if we are talking about the forced pooling case, we are talking about what the recoverable reserves are, and we have to talk about that when we are talking about the protection of correlative rights.

I am not going to read long passages out of the statute, but I do want to read and refer the Commission to the statutory definition of correlative rights, which is Section 65-3-29, subparagraph H of our New Mexico Statutes: "Correlative rights means the opportunity afforded, so far as it is practicable to do so, to the owner of each property in a pool to produce without waste his just and equitable share of the oil or gas, or both, in the pool, being an

amount, so far as can be practically determined, and so far as can be practicably obtained without waste, substantially in the proportion that the quantity of recoverable oil or gas, or both, under such property bears to the total recoverable oil or gas, or both, in the pool, and for such purpose to use his just and equitable share of the reservoir energy."

Also, in Section 65-3-14, dealing with allocation of production, you will also find reference to recoverable gas.

So that is why we have emphasized all through this Hearing, not what the net porosity may be, what the gross pay may be, but what are the recoverable reserves, because this is the statutory standard. If the acreage doesn't contain recoverable reserves, then that acreage should be excluded from the unit to be pooled, and only the acreage that does contain recoverable reserves should be included. And, of course, the allowable that would assigned to the pooled unit would be in proportion to the acreage. I think our forced pooling statute is quite clear on that, that it is on a surface acreage basis.

Now, the Commission has been presented with some conflicting testimony. Mr. Mershon says there are at least 414, I think his figure was, productive acres. Mr. Hanagan

says 160 productive acres, Standard Oil Company says 160 productive acres is what they will stand for, but that is three times what they are entitled to; and we say that just on the basis of productive acreage recoverable reserves, 175 acres is the correct figure -- excuse me, 235 acres, excuse me. I had the wrong figure written here. 235 acres is the correct figure.

MR. PORTER: Mr. Losee would agree to the wrong figure.

MR. MORRIS: Now, that 235 acres, I can't emphasize too much for our position in this Case, is what Mr. Mershon would be entitled to if he were coming in here forced pooling and drilling a well at a standard location.

Now, we turn to the other Case, and the other aspect of the Case before the Commission. Well, first, before we do that, I was pointing out the difference in the productive acreage that has been testified to. The main difference between what Mr. Mershon testified to and what all the rest of the evidence has testified to, hinged on one important difference, and that is Mr. Mershon's interpretation of the Hanagan well and whether there was any permeability in the acreage surrounding that well so that you could say that there are recoverable reserves there. If you knock out the idea that there are recoverable reserves around the Hanagan well, there

is no way you can justify the 414 acre figure that Mr. Mershon testified with respect to.

Now, turning very quickly here to the non-standard or the unorthodox location aspect of this matter, it is Marathon's position that the application for an unorthodox location should be denied. Mr. Mershons' own testimony has shown that there is no need to drill at the unorthodox location under his view of the geology of this area. In other words, to make a good well, his own testimony shows that he could make a good well at an orthodox location. If he wants to drill at an orthodox location, we would be more than happy to see him get a 235-acre allowable. There is no more justification here in this case to grant the exception on the unorthodox location aspect of this, than there was in the Penroc case.

Now, I ask the Commission to take notice of its Order No. R-3098 in Case No. 3426, which was the Penroc case, and in which an application for an unorthodox location was denied. If that Penroc case had been granted, it would have been the first one granted, except on topographic reasons. And let me emphasize here that the topographic exception is one that is written into the pool rules. So it is not really an exception at all, it is something that is authored by the rules.

So what the applicant is asking for here would be the only exception to the pool rules that has ever been

granted in this field. I think the thing that is really at the heart of this, as far as the unorthodox location is concerned, is that what Mr. Mershon proposes is basically unfair to the operators in this pool who have spent their money, invested their money, abiding by the rules, drilling the wells at orthodox locations. At the whole south end of this pool, there is not a single unorthodox location, and some of these wells are edge wells, and some are dryholes. Mr. Hanagan, I am sure, would like to drill a well at an unorthodox location, and not experience a dryhole, but he followed the rules. So did Gulf. You pay your money and you take your chance in the oil business, and this is the way the game has been played in this field, and it is just basically unfair for Mr. Mershon to come in and ask for an exception to the pool rules.

Now, if the location is granted, if the Commission does say, "Mr. Mershon, we realize you have maybe some gas there in the northeast quarter, we feel like we have to let you drill," the advantage must be offset by penalizing the allowable. If Mr. Losee wants to talk about a penalty, this is the place to talk about it, because you are talking about penalizing a plan for wanting to violate the rules. Mr. Mershon has given the Commission, I think, some guidelines that it can go by in making this penalty. You will recall

it was our recommendation that the 235-acre allowable which he would be entitled to at a standard location be cut by 25 percent as apenalty for going to an unorthodox location, which would bring it down to a 175-acre allowable.

Just one further point, that in the event the Commission should permit the well to be drilled in an unorthodox location, we would seriously ask the Commission to require that a directional survey be run on this well to determine that the bottomhole location of the well be no closer than the 990 location from the north and east lines of the section, and that that survey be filed with the Commission. Thank you very much.

MR. PORTER: Mr. Kastler.

MR. KASTLER: Gulf Oil Corporation is appearing in this Case to make a statement only in relation to Case 4089, which is the unorthodox location case. Gulf Oil Corporation is an offset operator to this proposed unorthodox location, having one lease currently in production at the northeast diagonal offset in Section 15, and a lease directly offsetting Applicant's property to the east in Section 22, 22 South, 23 East.

Gulf objects to the Applicant's proposed location not only because it would result in drainage of Gulf's lands, but also because it is in direct violation of the announced

purposes of the Commission's Order No. R-2440 which established pool rules for the Indian Basin-Upper Penn gas pool. This Order expressly states that special rules and regulations should provide for limited well locations in order to assure orderly development of the pool and protect correlative rights. If the Applicant's testimony regarding 640 or even 414 productive acres in Section 21 is correct, the proposed well should certainly be drilled at a standard location in order to most efficiently drain his producing unit. Even if a lesser number of acres are deemed to be productive, it is Gulf's opinion that it is still advisable to adhere to the Commission's established policies which have been observed by all other operators in the pool.

In our opinion, if this exception is allowed to stand so that this Applicant is permitted to drill his land at a preferred structural location, then every other landowner should, in all fairness, be afforded the same opportunity which would result in impairment of correlative rights by encouraging the drilling of many additional wells. In other words, a bad precedent, in our opinion, would be created which would not only result in economic waste by drilling unnecessary wells without being able to recover additional gas in these and numerous other pools in New Mexico, but it would also impair the correlative rights by drainage.

The operators in this pool in compliance with the well location requirements have relied on the assumption that the Commission will continue to refuse to grant unorthodox well locations on the basis of structure alone. We feel the provision of the rules which allows for unorthodox locations on the basis of topograhical considerations, and to complete wells previously drilled to other horizons provides just reason, in the absence of opposition, for making exceptions for equitable administration of the rules. Equity is not accorded, however, where the Applicant proposes to make an unorthodox location merely in order to gain structure, particularly when it puts him in a position of placing his well farther away from the major portion of the area where he testifies that his deposits of gas are located. In such an instance, he is unjustly benefited by being allowed to create a drainage pattern which does not drain the bulk of his lands at all, but drains the lands leased by his neighbors.

For these reasons, Gulf Oil Corporation respectfully request the application for an unorthodox location be denied.

MR. PORTER: Mr. Kellahin.

MR. KELLAHIN: If the Commission please, I think one thing stands out in this Case as much as anything, and that is that it is unique, it is the first case I know of

in which Applicant has sought to force pool acreage containing a dryhole, and at the same time seek an unorthodox location. It puts him in the position in the one case of saying as a risk factor in the forced pooling case that they should have a higher risk factor of the maximum of 50 percent allowed by the statutes, because they are drilling between two dryholes; and, at the same time, in seeking the unorthodox well location, saying the well was dry but the acreage is productive and will contribute to our well at the unorthodox well location.

Now, this just doesn't make sense. I believe that the testimony that was offered by Mr. Hanagan in this Case clearly shows that if a well could have been completed on their tract at the location they drilled, it certainly would have been completed. They were outside the reservoir, they tried to acidize their way into it, but the acid just didn't go that far. Certainly, all of the testimony offered by the Applicant in this Case as to productive acreage is based solely on the question of porosity.

Well, we don't deny that there is gas underlying this tract. A good part of the tract contains gas. The whole problem, as was shown by Mr. Hanagan, is that you can't get it to move through the formation to get to the wellbore. So the purpose of moving the well location is not to find gas necessarily, but to find gas that is in conjunction with

permeability and give him a producing well. This is the only purpose for the unorthodox well location.

As I understand the testimony that has been offered by the Applicant here, he didn't claim, based on his porosity figures, that there was more than 414 acres productive of gas. This again is based solely on porosity, and no information is given us on permeability.

Standard of Texas calculations said 266 acres. Again, we are still just talking about porosity. And Marathon says 235 acres. Marathon and Standard are fairly close together on their calculations, but we are not talking about gas that can be produced when we are talking about the porosity.

The testimony offered by Standard and Hanagan was to the effect that the most that a well drilled at the location proposed to be drilled by this Applicant could drain on this section would be 160 acres, and it probably wouldn't even drain that. The gas it would be producing would be coming from offsetting acreage. This has been referred to as a penalty, and certainly we want to cut him back. It is not a penalty, it is a provision in the statute for the protection of correlative rights, and the allowable must be adjusted if the operator is going to get an undue advantage by moving up closer to his neighbors land. This

has been done many times before, and there is nothing unique about that.

As far as the forced pooling case is concerned, we are not particularly concerned with that, but I would point out that Hanagan does own an interest in this, and they would stand probably to profit by the completion of a producing well which would include their land, their overrights. Primarkly they are here, though, because they are operators in the pool, and they want to see the orderly development of the pool as it has been sofar preserved for future development; and they probably stand to be hurt by some other exception in the future, if this exception is granted. We don't want to see this precedent.

It is our position that the unorthodox well location should be denied. If it is approved, we urge the Commission to grant not more than 160-acre allowable to the well, and we join with Mr. Morris in saying the directional survey should be required. Mr. Hanagan's testimony showed the normal situation in this pool is for the wells to deviate, and we want some assurance that the bottom of that hole is not closer than 990 feet from the property lines. Thank you.

MR. PORTER: Does anyone else have a statement they would like to make in the Case?

MR. LOSEE: With reference to Case 4088, let me first turn to the

risk factor in the Order in which 25 percent was established. The Applicant feels like it should be closer to 50. This is a development well and not a wildcat, and that is true in substantially all of the force pooling cases. The Commission, simply because of the spacing rule for wildcats, doesn't lend itself to forced pooling. The industry, as we pointed out, assesses 100 and 200 percent penalty to their members by their own form, which is in prevalent use in southeastern New Mexico.

In this Case, as we pointed out, the well is a mile from the nearest producer. It is at 7600 feet in depth, and Mr. Mershon testified that some of the highest costs in the State of New Mexico are to drill to that depth. Nine out of the last fifteen wells drilled in this Indian Basin pool were dry. Now, as a result, we feel like the penalty should more closely approximately 50 percent. As I earlier pointed out, we are fraught with the burden in the forced pooling case of having a presumption by virtue of the special pool rules on 640-acre spacing. All the 54 wells in the field are so spaced. As you can readily see, there are two 40 acre tracts in the south portion. If it should develop that the field moves to the south two locations, by cutting the size of the pool unit down so that actually the members in the south portion of the section

do not have enough acreage to justify, if the field were to develop in that direction, the Commission would find that these people would be unable to protect their gas under their wells, and for that reason we feel like in the forced pooling that it should force pool the 640-acre section.

Turning now briefly to Case 4089, the Applicant is here simply to protect the gas under his section 21. No one here has denied that it's presently being drained by the operators to the north. They talk about maintaining the field rules, and all of the orthodox 640 acre units, but they want to chop this unit down. Mr. Mershon's statement was that nearly 25 percent of the wells drilled in this field were either grandfathered in or for topographic reasons, every single one of them, as a practical matter, were upstructure, and they gained the geological advantage, and by reason it was topography, they suffered no penalty. We recognize that by requesting the unorthodox location mainly for geological reasons, that the Commission should offset any advantage that we get in that area. The testimony did go uncontradicted that the communication in this reservoir, as is true in most gas reservoirs, and surely this one, is very good throughout the field. Actually, as far as offsetting any advantage by the 990 location, so long as the Commission

assesses the allowable in proportion to the recoverable reserves under Section 21, Mr. Mershon will gain no more advantage from being 990, than he would 1,650, or even one foot out of the line. In the long run, if he receives the same allowable in direct proportion to the recoverable reserves under his section, he won't recover any more. And I think for that reason, any attempt to not only adjust for recoverable reserves in the section, but also to assess a penalty for an updip move geologically is basically unfair. There are lots of alternatives with respect to what the offset advantage or what the penalty Mr. Mershon should be submitted to, as far as mathematical calculations; one on acreage by moving his location, he in effect got a 20 percent advantage in acres; one in lineal feet, he got a 40 percent advantage; Marathon's testimony on their map was 265 acres. But when they admit that the porosity existed in the Gulf well to the west, which they did, and Mr. Mershon redrew their zero line as he did in the former case, there is approximately 340 acres above the zero line. Standard of Texas shows 266 acres of net recoverable reserves.

If you take Mr. Mershon's redraft, considering the porosity in the Gulf well, he came up with 320. His presentation shows there is 561 acres of reef present, of which he believes at least 414 acres will contribute to a well.

Now, the conversation about permeability. No one mapped it, and I think Mr. Hull expressed it when he stated the data wasn't sufficient to insert it in these maps. The Applicant is here simply asking the Commission for the right to protect the gas under his section, to minimize the risk of drilling this well. We recognize that we should suffer an allowable penalty, and we ask the Commission to consider all the evidence in making that assessment. Thank you.

MR. PORTER: Does anyone else have anything to offer in the Case? The Commission will take the Case under advisement, and the Hearing is adjourned.

(Thereupon, at 5:50 o'clock P.M. the Hearing was concluded.)

I N D E X

EXHIBITS

EXHIBITS (Continued)

	MARKED FOR IDENTIFICATION	OFFERED AND RECEIVED IN EVIDENCE
APPLICANT'S:		
No. 10 in Cases 4088 and 4089	133	139
Nos. 11 and 12 in Cases 4088 and 4089	135	139
No. 13 in Cases 4088 and 4089	194	197
No. 14 in Cases 4088 and 4089	194	197
Nos. 15 and 16 in Cases 4088 and 4089	197	197
HANAGAN PETROLEUM CORP.:		
No. 1 in Cases 4088 and 4089	93	132
MARATHON OIL COMPANY:		
Nos. 1 and 2 in Cases 4088 and 4089	174	185
STANDARD OIL COMPANY OF TEXAS:		
Nos. 1 through 6 in Cases 4088 and 4089	139	156
Nos. 7 through 10 in Cases 4088 and 4089	152	156

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

I, SAMUEL 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.

My Commission Expires:

December 6, 1972.